

Plastic Ubiquity and Mut(e)abilities: The Unfolding Sociomaterialities of Plastic

Submitted by Tridibesh Dey to the University of Exeter as a thesis
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I certify that all material in this thesis which is not my own work has been identified and that any material that has previously been submitted and approved for the award of a degree by this or any other University has been acknowledged.

Abstract:

Mutability, the capacity for multiple functions and forms, is a quality associated with plastics – custom-designed synthetic materials. However, based on an ethnographic trajectory comprising practical apprenticeship, and extensive (participant) observation of processes with plastic waste in the Indian city of Ahmedabad, this thesis demonstrates that plastic's mutability is not fixed, or given. In other words, plastic's ontology – its plasticity – is contextual, emergent and complex. It shows that plastic mutabilities are relational; embedded within and conditional upon a nexus of heterogeneous relations, at-once social and material – sociomaterial. Furthermore, to enact plastic mutability is to also re-assemble these historical relations in significant ways.

A liminal period of regulatory implementation within solid waste management is scrutinised. Here, the Indian state partners with private waste collection and processing firms to elaborate a federal and regional infrastructure to reclaim plastic waste for incineration-based projects of profit extraction. In the process of neoliberalisation, pre-existing networks of plastic localisation and recycling self-organised among the gendered lower-caste urban poor are marginalised, and their time-tested community-based processes enacting plastic recyclability are curtailed – 'muted'. These mutings are shown both as accretions of older legacies (caste, colonisation, etc.) of extraction and abandonment, and as differently re-enacted. In actuality, the present infrastructure remains patchy across sites and scales of practice, encountering all kinds of frictions and transpiring in complex ways that significantly betray planned patterns of incinerability. As the 'system' fails practically, but persists nevertheless as an extractionary arrangement, a range of hacks, alternative routines, and modes of plastic waste circulation

emerge in the responses of dissatisfied urban communities and practical networks which re-combine and re-enact plastic recyclability. These often involve state representatives in collaborative localised arrangements, for instance, as consignments of incinerable plastic waste get diverted into recycling networks. However, such penumbral possibilities also enable obfuscating the failures of the neoliberal infrastructure. Networked processes of plastic mutability (recyclability and incinerability) thus entwine and emerge together in ways that engender new forms of muting and mutation. As such, socio-economic, and political possibilities open up (mutation) but also close down (muting) continually, constitutive of processes that succeed or fail to enact plastic materiality in specific ways. We map such complex cross-cutting processes and possibilities by the concept of plastic mut(e)ability.

As communities, infrastructures, and environments struggle with the ever-increasing accumulation and complexity of ubiquitous plastic waste, the thesis offers a timely intervention, contextually studying wider possibilities that emerge in the presence of plastics. Contributing to ongoing deliberations within Anthropology and Science and Technology Studies on empirical ontologies of plastic, the thesis also addresses matters of concern to policy-makers, public-facing practitioners, citizens, and activists.

Contents

Abstract:	3
Contents.....	5
Table of Figures:.....	7
Timeline of Key Historical & Research Events:	8
Additional Declaration:.....	9
Acknowledgements:.....	10
Abbreviations:	16
Chapter 1: Introduction	19
Plastic (Im)possibilities:	23
The Here and the Now: Where this Thesis Comes In	37
Plastic Mut(e)ability as a Concept for Story-ing Plastic's Ubiquity:	46
Thesis Plan:.....	52
Chapter 2: On Theories	58
What is at Stake?	60
Drawing on Actor-Network Theory (ANT), Post-ANTs, and their Critiques.....	67
Situating Plastic Mut(e)ability:	76
Chapter 3: On Methodology.....	87
A Plastic Trajectory	88
Finding Ahmedabad (Again):.....	95
Knowing: On Methods	101
On Positionality and Mutability:	117
On Ethico-Political Positions, and (Practical) Concerns:.....	124
Conclusion:.....	132
Chapter 4: Un-'common' Ubiquities: A Legacy of Politics, Place, Practice, & Plastics	135
Setting the Scene: Un-'common' Ubiquities.....	136
Uneven Lineages of Local Governance.....	149
Caste across Regimes:	155
Post-Colony and Plastics:	161
Enacting Plastic Recyclability: Key Practices and Networks	174
'Recyclers':	179
Practices, Relations, and Pragmatics of Plastic Localisation:	186
<i>Pastivalas</i> and <i>Peethawalas</i> :.....	186
<i>Kachre binnewalis</i> :	195
Conclusion:.....	204
Chapter 5: Enacting Incinerability: Of Infrastructures and Mutings	207

Plastic Incinerability: Towards Reforms	209
Ahmedabad: Early Experiments in Incinerability	223
India's New Solid Waste Management 'System': Design of an Infrastructure	228
Clean India: Techno-Cultural Embeddedness and Reputation	239
'Clean' Ahmedabad:.....	247
Mutings:.....	262
Chapter 6: Plastic Mut(e)ability I: Integrating the 'System'	273
Troubling Definitions and Ambiguities	275
Cosmetic Devices:.....	285
Topological Alliances: Collectively Translating Troubling Definitions.....	292
Cosmetic Devices and Situated Technocultures	300
Space:	304
Technoculture:	312
Categories and Identification:	314
From <i>Kachre Binnewalis</i> to Authorised 'Integrated' Waste Managers	323
Conclusion: Mut(e)abilities; Infrastructuring	334
Chapter 7: Plastic Mut(e)ability II: Penumbral Circulations.....	339
Shadow Infrastructures:.....	341
Sack-Droppings and Basket-Transfers: Waste-Workers Unite	363
<i>Peethawalas</i> and Door-to-Door Waste Collectors:	365
<i>Kachre Binnewalis</i> and Street-Sweepers:	375
<i>Beeja</i> Arrangements: Temporalities, Alliances, & Matinal Plastic Transfers	382
Conclusion: Plastic Mut(e)abilities and Further Notes on Infrastructuring.....	394
Chapter 8: In Conclusion.....	408
Key Contentions:	409
Theoretical Implications:.....	412
Limitations, What-Mores, Alternatives, Regrets:	414
Policy Takeaways:.....	417
Bibliography:.....	422

Table of Figures:

Fig. 1: Ahmedabad	21
Fig. 2: Mr. Modi picks plastics	28
Fig. 3: Plastics on a Mumbai Beach	31
Fig. 4: Growing number of social scientific papers on plastics.....	46
Fig. 5: Polythene recyclability & incinerability	52
Fig. 6: Re-relating with the 'field'	100
Fig. 7: Mr. Popat Lal.....	121
Fig. 8, Fig. 9: Reciprocity – Nilu Ma's fish curry.....	131
Fig. 10: Surat Plague on the New York Times cover	138
Fig. 11: Ahmedabad's solid waste generation over the decades.....	166
Fig. 12: Plastic recycling: key processes of mediation.....	176
Fig. 13: Ramapir no tekro	179
Fig. 14: Polythene pellet-making	183
Fig. 15: Degrees of 'spoiltness': graded low-density polythene pellets	185
Fig. 16: Price chart at a <i>peetha</i> : rates of purchase	191
Fig. 17: Inside a <i>peetha</i>	195
Fig. 18: Collectivity in plastic-foraging	202
Fig. 19: Swachh Bharat Abhiyan/ Clean India Mission	241
Fig. 20: Clean India: Pledge to Segregate.....	243
Fig. 21: Direct observation: Swachh Survekshan Report	245
Fig. 22: Remote Transfer Station, Wadaj	251
Fig. 23, Fig. 24, Fig. 25, Fig. 26: ICT-based monitoring of SWM.....	256
Fig. 27: Waste Collection vehicle, Ahmedabad	257
Fig. 28: Street-sweeping, transfers to the <i>dhalao</i> and RTS, Ahmedabad	258
Fig. 29: Municipality bins for segregated waste storage at source.....	260
Fig. 30: <i>Dhalao</i> (representative image)	262
Fig. 31: Plastic recycling: recommended resin-coding.....	278
Fig. 32: Conveyor belt (from AMC public report)	288
Fig. 33: Representative <i>peetha</i> map	307
Fig. 34: Cosmetic device: conveyor belt.....	308
Fig. 35: 'Recycling' PET flakes.....	329
Fig. 36: The new collective posing with waste collection equipment.....	331
Fig. 37, Fig. 38: The road at Ramapir no tekro.....	340
Fig. 39: Shadow infrastructures: RTS and roadside <i>peetha</i> shopfronts	367
Fig. 40: Tracking vehicular movement	369
Fig. 41: Street-sweeping: municipality handcart	381
Fig. 42: 'Women throw garbage at AMC office'	384
Fig. 43: Technological <i>peethawala</i> : rendering matinal transfers accountable.....	393

Timeline of Key Historical & Research Events:

1818	British East India Company occupies Ahmedabad
1824	Ahmedabad Cantonment established
1834	Ahmedabad Municipal Committee formed
1914 – 1915	Gandhi returns to Ahmedabad from South Africa
1917	Sabarmati Ashram established
1947	India becomes independent from British rule; Congress establishes federal government
1950	Constitution of India becomes effective
1950	Ahmedabad Municipal Corporation (AMC) established in its modern form
1960 –	First <i>peetha</i> established at Ramapir no tekro; starts dealing in metals, glass, paper, jute bags. (source: local knowledge)
1980 –	Large-scale closure at Ahmedabad's textile mills
1985 –	Indian petrochemical sector de-regulated; plastics start circulating within retail consumption markets at scale
1986	Environment Protection Act (EPA) comes into force
1991	Liberalisation of the Indian economy
1994	Surat Plague
2000	The first-ever federal Solid Waste Management (SWM) and Handling Rules enacted
2001	Modi of BJP becomes Chief Minister of Gujarat state
2002	Communal riots, latest in the series of many, in Gujarat
2011	Plastic Waste Management (PWM) Rules enacted federally
2014	Modi becomes India's Prime Minister [BJP comes to power]
October 2014	Clean India Mission launched federally
2014 – 2015	Author works as a PWM engineer in Rajasthan
2016	Revised SWM & PWM Rules enacted federally
2017 –	SWM/ PWM infrastructure starts to be implemented at the municipal level in Ahmedabad
Late 2017	PhD enrolment/ Informal field enquiries started by Author
2018 – 2019	Residence and fieldwork in Ahmedabad
Late 2019 –	COVID-19 Pandemic
Late 2019 – 2021	Writing up
December 2021	Thesis handed in

Additional Declaration:

I confirm that this thesis is the result of my own fieldwork and research. It includes nothing that is the outcome of joint or collaborative research. Co-authored papers and parallel publications are specifically identified below and are duly cited in the thesis as references, whenever used. In any case, empirical materials used in these publications differ substantially from what the present thesis draws on.

Dey, T. (2020). COVID-19 as Method: Managing the Ubiquity of Waste and Waste-Collectors in India. *Journal of Legal Anthropology*, 4(1), 76–91.
doi:10.3167/jla.2020.040106

Dey, T. (2021). Plastic Mut(e)ability: Limited Promises of Plasticity. *Worldwide Waste: Journal of Interdisciplinary Studies*, 4(1). doi:10.5334/wwwj.63

Dey, T., & Michael, M. (2020, April). Driving Home ‘Single-Use’: Plastic Politics in the Times of the COVID-19. *Discover Society*, p. 2020. Retrieved from <https://archive.discoverociety.org/2020/04/30/driving-home-single-use-plastic-politics-in-the-times-of-the-covid-19/>

Dey, T., & Michael, M. (2021). Caring for the Multiple Cares of Plastic. In T. Farrelly, S. Taffel, & I. Shaw (Eds.), *Plastic Legacies: Persistence, Pollution, and Politics* (pp. 139-157). Edmonton, AB: Athabasca University Press.
doi:10.15215/aupress/9781771993272.01

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This thesis was written in between late 2019 and late 2021, a period that one could clearly claim as having been one of the most difficult in recent human experience. This is not least due to the COVID-19 pandemic which presented setbacks for one and all, albeit unevenly. Acknowledging some of the personal and professional challenges alongside forms of support, mitigation, learning, and

inspiration, is important as these constituted the very conditions of my life and work, combined in the solitude of a one-room studio in locked down Exeter.

Unable to travel and socialise due to my own co-morbidities, the period of writing up was spent mostly in isolation, away not least from family and close friends back 'home' in India. Many loved ones passed away prematurely during this period, sometimes by the lack of something as banal as an oxygen cylinder as state infrastructures gave in. As friends and family in India, and elsewhere, feared for their lives, days and nights were spent in anxiety, suspense, anger, and grief. I approached work during this time as a life-sustaining routine with each word written down turning into an exercise in care and faith in life, and the politics that I believe in. Writing gave meaning to my days and nights in isolation.

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The pandemic and its complex experience co-incided with other critical events as they registered in embodied rage, frustration, but also motivation and joy. This is the period when the phrase 'I can't breathe' revealed forms of systemic injustice

and violence that have always governed the lives of (racialised) people. This was also a time when the Black Lives Matter movement provided much-needed space for necessary conversations, critiques and reminder in the affirmative power of de-colonial politics. Institutional violence of the Indian state, discriminatory ethno-religious excesses in the form of an Islamophobic Citizen Amendment Act, and further disenfranchisement of the Kashmiri people, caused much frustration, but also the spontaneous surge of popular protests (anti-CAA protests, for example) generated limited hope in the power of the citizen for change (mutabilities?). One of the largest farmers protests started in 2020 in India as I was writing up, and continued right till December 2021. The farmers succeeded eventually in forcing India's federal government to repeal the three 'Black Laws' that sought large-scale free-marketing of agriculture. Affirmative manifestations like these provided hope on days and lonely evenings when the present and future seemed bleak.

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Abbreviations:

ACB – Ahmedabad Cantonment Board
AMC – Ahmedabad Municipal Corporation
BJP – Bharatiya Janata Party
BPF – British Plastics Federation
CEO – Chief Executive Officer
Congress – Indian National Congress
CPCB – Central Pollution Control Board
DBFOO – Design, Build, Finance, Own, Operate,
EPR – Extended Producer Responsibility
EU – European Union
FICCI – Federation of Indian Chambers of Commerce and Industry
GERC – Gujarat Electricity Regulatory Commission
GPS – Global Positioning System
GRUDA – Gujarat Regularisation of Unauthorised Development Act
HCV – High Calorific Value
HDPE – High Density Polyethylene
HM – High Molecular (HDPE)
ICT – Information and Communication Technology
IS – Indian Standards
Kcal – Kilocalorie
Kg – Kilogram
KKPKP – Kagad Kach Patra Kashtakari Panchayat
LCV – Low Calorific Value
LDPE – Low Density Polyethylene
(M) MT – (Million) Metric Tonne
MoEFCC – Ministry of Environment, Forest, and Climate Change
MoF – Ministry of Finance
MoHUA – Ministry of Housing and Urban Affairs
MoNRE – Ministry of New and Renewable Energy
MRF – Material Recovery Facility
(M) SWM – (Municipal) Solid Waste Management

MSWHM – Municipal Solid Waste Handling and Management
MW – Mega Watt
NGO – Non Governmental Organisation
O&M – Operation and Maintenance
P.C. P.A. – Per Capita Per Annum
PP – Polypropylene
PPP – Public Private Partnership
PS – Polystyrene
PVC – Polyvinyl Chloride
PWM – Plastic Waste Management
RDF – Refuse Derived Fuel
RFID – Radio Frequency Identification
(r) PET – (recycled) Polyethylene Terephthalate
RTS – Remote Transfer Station
RWA – Residents Welfare Association
SEWA – Self Employed Women's Association
SPCB – State Pollution Control Board
ULB – Urban Local Body
UNCRD – United Nations Commission on Regional Development
WTE – Waste to Energy

Chapter 1: Introduction

‘...plastic as a material has always yielded objects in the form of questions: what else could your life become in the company of this shiny new thing?’

– Anand Pandian ([Lexicon for an Anthropocene Yet Unseen](#): Plastic)

It was 6 in the morning, winter 2018. Kantaben (pseudonym) was out and about. The municipality street-sweeper would not arrive for another hour, and this was Kantaben’s opportune time window to glean for the choicest of plastic recyclables. Carrying another empty sack, I follow hurriedly in her footsteps as we pursue a habitual trajectory, stopping by one of the last remaining *dhalaos* (large metallic municipality bins with public access), roadside bins, picking up and sequestering any (worthy) plastic that lay on our path.

The Sabarmati Riverfront of Ahmedabad was nearly empty, save the occasional morning walker in branded trainers. As the sun rose over the skyline from across the river’s eastern bank, the first light settled on patches of plastic accumulated around overflowing bins. There were empty bottles, carrier bags, aluminated crisp and snack bags, crumpled and lined with spicy oil which a hungry street-dog licked mindfully, not bothered by our regular presence. As Kantaben and I walked, we found plastic leftovers – torn, broken and tattered, or intact – proliferating the concrete banks of the river, adjoining road, the sidewalk, grassy sides of the sidewalk, empty plots of land, and so on. *Here, there, and there*, plastic waste was ‘everywhere’. Shiny, not so shiny, translucent, crumpled, soiled with sand, oil, licked and mangled by stray animals, or simply lying, fluttering gently in the crimson morning breeze, dotted with condensed dew. Leftovers of consumption and waste from the night and the day before, when men (women much less so¹)

¹ See (Phadke, Khan, & Ranade, 2011), among others, for contexts and critiques on gendered access to public places in India.

usually gather by the river-bank to loiter, sit, eat, chat, share stories, leaving behind plasticated traces of their transient passages.

“This image has been removed by the author of this thesis/dissertation for copyright reasons”.

Fig. 1: Ahmedabad, the capital region and the most populous urban conglomerate in the western Indian state of Gujarat, is among the fastest expanding cities, globally (Kotkin, 2010). Once a major hub for textile industry, especially between 1861 – 1990 (known as the ‘Manchester of the East’), Ahmedabad emerged as a major industrial and commercial centre post-liberalisation of the Indian economy from the late 1980s. Among major industries, petrochemicals and plastics figure as prominent. A 2011 British Plastics Federation market study names Gujarat as the petrochemical hub of India (BPF, 2011). Gujarat is also among the Indian states producing the highest amount of plastic waste, with a large number of recycling establishments (CPCB, 2019). Most of these facilities are based in and around Ahmedabad, which produces about 4,000 metric tonnes (MT) of solid waste per day. Courtesy: Google Maps 2021

Leaving the Riverfront behind, Kantaben and I walked past the residential quarters. Each *dhalao* or 'housing society' bin reflects the consumption and disposal habits of its neighbouring residents, and consequently, the probability of high-quality, recyclable plastics that one might be able to discover in those bins – Kantaben had explained to me basic practical knowledges in the early phase of my apprenticeship. We instinctively headed towards the bins with higher likelihood for polythene terephthalate (PET) bottles and containers, high-density polythene (HDPE) shampoo containers, paper cereal cartons, low-density polythene (LDPE) Amazon packaging and wrapping films, and so on. These are familiar materials that are routinely made recyclable by the technical practices, and networks of profitable exchange and mediation, of which Kantaben is a part.

On the contrary, poorer households, who tend to buy low-volume decanted items from grocery shops, and whose neighbourhood bins are consequently filled with thin polythene carrier bags of cheap feedstock, often smeared with sticky food remains, we gave those a miss. Kantaben knows that mixed and contaminated plastics would not fetch a high rate, or good reputation within recycling circles. Indeed, admixtures (like oil on polythene) are technically difficult and financially costly to separate, whereas such soiled consignments of plastic bring down the overall material quality (and price) of the recycled plastic feedstock. Kantaben and I also walked past leftovers in the form of aluminium-layered small polythene shampoo and snack sachets that are abundant across some of the low-income neighbourhoods. Such composite layered materials are also techno-financially intractable, and resulting substrates fetch low prices anyway; hence, such objects are unworthy of picking up and carrying!

Further ahead, the main road (Ashram Road), is one of the busiest thoroughfares of Western Ahmedabad, with the highest concentration of five-star hotels, restaurants, shopping malls, commercial centres, shops, and offices. A prominent site of activity, and consumption, with one of the highest footfalls in the city. We headed there. Street-spaces on Ashram Road (especially before restaurants, hotels, and high-end shops) tend to be favourite gleaning grounds for foragers starting from late in the night, when the traffic subsides – so, we hurried to find what’s left. We picked up some more PET bottles, and thick white (signifying ‘virgin’ material – according to governmental regulatory codes for plastic bags – (MoEFCC, 2016)) polythene carrier bags (the ‘legal’ ones, since the government banned carrier bag circulation with thickness less than 50 microns in 2016) and were lucky to recover some paper cartons and a mound of LDPE packaging materials from in front of a supermarket. ‘White dull’ (as these translucent stretchable polythene films are known in the local recycling networks) sells at more than Rs. 25 (£0.25 approx.) a kilo. Kantaben was happy with the morning’s haul.

Plastic (Im)possibilities:

Unlike most naturally-obtained materials traditionally used to produce objects, plastics are ‘materials by design’, as they afford the production of materials from scratch, object and material thus co-produced as part of the same process (Bensaude Vincent, 2007; 2013)². ‘(Plastic) is less a thing than the trace of a

² To be sure, plastics are constituted by naturally-occurring hydrocarbons (molecular compounds of carbon and hydrogen that are abundant in most organic substances like wood, coal, petroleum, natural gas, mulch and agricultural-waste). But these singular hydrocarbon molecules (called monomers) may differ widely in structure, composition, and properties, and be technically modified; furthermore, they are (re-) aligned, composed with other molecules, etc. to generate a wide variety of elaborate material chains and lattices (called polymers). There are more than 10,000 such compounds in circulation worldwide, according to some estimates (Thompson, Swan, Moore, & vom Saal, 2009).

movement', Roland Barthes had written in his now-classic ode to the material, 70 years ago (Barthes, 1971, p. 92). 'Infinitely transmutable' and customisable – 'atom by atom' (Bensaude Vincent, 2013) – plastics are thus, theoretically at least, amenable to a wide range of processes. Furthermore, configured from cheap and abundant raw materials, thanks to the petrochemical industry (Altman, 2017), plastics permitted (and were preferred for) design and batch-production at a massive scale, emerging as the iconic material of industrial modernity in the post-War Western world, enabling unprecedented scalability, and profitability for its producers.

In India, plastic objects were rare until as late as the 1970s; carrier bags stowed preciously by internationally-mobile urban households (Doron & Jeffrey, 2018). However, with the indigenous petrochemical industry starting to be de-regulated from the mid-1980s (Gill, 2009), and the economy opening up to private investment, foreign capital participation, and massive deregulation across sectors from the early 1990s, plastic worked hand-in-glove in the development of massive industrial consumer markets and the (re) production of urban classes (Doron & Jeffrey, 2018; Chatterjee, 2004). Like in the USA, by responding to and driving specific demographic demands, aspirations, needs, etc., plastics opened up socio-economic (and political) possibilities 'for people of every economic class' (Meikle, 1995, p. 45). Indeed, by the early 2000s, carrier bags, packaging devices, but also objects of convenient mundane use and markers of class identity had started to be mass-produced in plastic (from plastic bags, PET bottles, toothbrushes, white goods and electronic appliances, cars, etc.). A 'use and throw' culture (read (Hawkins, 2013) on plastics and the socio-material enactment of disposability) was emerging. These replaced older materials (jute and paper-bags, glass, neem twigs, etc.) and became ubiquitous – albeit

unevenly, across demographics, regions, and times of the year (Pathak & Nichter, 2019; Dey, 2021). Drawing on new economic sociology (Muniesa, Millo, & Callon, 2007; Caliskan & Callon, 2009; 2010), Hawkins and others have shown how plastic packaging entail 'market devices' which enable the very production and expansion of (new) commodity markets (Hawkins, 2012; 2013; Hawkins, Potter, & Race, 2015). In effect, with the material affordances of plastic in packaging, any commodity could be portioned according to specific market demands – from sachets at the 'bottom of the pyramid' (Prahalad & Hart, 1998; Cross & Street, 2009) to larger containers, responding to a wide variety of sociomaterial needs.

Again, thanks to the varying physico-chemical capacities – say, lightness, durability, insulation, and so on – which could be specifically attuned for utility, cost efficiency, and scale, plastics (say, in the form of polyvinyl chloride, or PVC, pipes, or as polythene lamination) became ubiquitous components in India's rapidly expanding infrastructures (BPF, 2011; CPCB, 2013; Dey & Michael, 2021). One abundant and 'infinitely mutable' material to replace all the pre-existing materials in objects and use, across sites and scales – plastics drove India's emergence as a major consumer democracy into the new millennium. Of course, walking with Kantaben and other foragers across Ahmedabad (I elaborate below on positionality, reciprocity, and the ethico-practical details of 'fieldwork'), picking up plastic leftovers from private and public sites of disposal – about 3 decades after economic liberalisation, some of these uneven plastic ubiquities become abundantly apparent.

Given that plastics are near-ubiquitous, elaborating a critical 'global' phenomenon (McKay, Stanes, Githua, Lei, & Dixon, 2020), where does India stand, and why should anybody zoom in on the ongoing plastic realities and processes in

Ahmedabad city? What does the work of Kantaben, and her colleagues import within the larger scheme of things – what are its social and material stakes, its theoretical possibilities? What roles do the state (and its intricate, uneven, hard-to-point-a-finger-at infrastructures, both prominent and in the shadows) play in the unfolding sociomaterial reality of plastics?

As of 2020, India produces an industrial estimate of 15,788,000 metric tonnes (MT) of plastic per annum. A report from PlastIndia – India's apex plastic industrial body – documented a consistent above-10% growth in the domestic consumption of polymers across financial 5-year cycles from 2005, with projections that the industry will remain firm as 'a very fast growing sector' (Plastindia, 2018, p. 2). A 2011 British Plastics Federation market report estimated the rate of growth of the Indian plastics industry at 16 % per annum (p. a.) – presently one of the highest in the world, ahead even of China (10% p. a.) (BPF, 2011). This is despite traditionally higher net production and per capita consumption in plastics in other parts of the world, especially in the US – 109 kg per capita per annum (p.c. p.a.) in 2018, while in India the estimated figure stood at 11 kg p.c. p.a. and upward (Venkatesh & Kukreti, 2018). Globally, close to 9 billion tonnes of plastics have been produced till 2018 (Solheim, 2018), with petrochemical companies ramping up production (Gardiner, 2019).

Ahmedabad city, where I lived for over 8 months and conducted this ethnographic study spread across 2018-19, is a significant site in India's plastic industry, the latter being concentrated predominantly in the state of Gujarat. In effect, Gujarat is home to the highest number of plastic producers – more than 5000 firms in 2011 (BPF, 2011), including Reliance Industries – now a major international producer of polymers – with a domestic market share exceeding 41% (Plastindia,

2018). Ahmedabad constitutes the capital region of Gujarat, and besides being one of India's most populous and fastest growing metropolises (Kotkin, 2010), it has emerged as a major expanding commercial and industrial centre (Yagnik & Sheth, 2011). It is by no co-incidence that the last 4-yearly PlastIndia conference – a major confluence of the Indian plastic industry was held in Ahmedabad in 2018. One of the most significant periods of present-day urban growth (not least in terms of territories and neighbouring municipalities and village bodies absorbed into the Ahmedabad Municipal Corporation – AMC) was during the decade of 2000-2010, and onward, when Ahmedabad, the home-ground and main political constituency of Narendra Modi, India's present Prime Minister, operated as the Chief Minister of Gujarat for close to 15 years (2001-2014). During the Bharatiya Janata Party (BJP) regime under Mr. Modi, the state of Gujarat emerged as a major hub for neoliberal commerce and 'business-friendly' pliable governance when private profit tended to shape policies governing the public good (Desai, 2012; Breman, 2016; Mahadevia, Pai, & Mahendra, 2018; Jaffrelot, 2019). In this period, urbanisation was actively pursued as policy, and Ahmedabad emerged as the 'middle-class megacity' (Mehta, 2016). The urban middle-class, especially a rapidly emerging neo-middle class, composed of economically-upward backward castes-classes, developed as the drivers of economic growth, consumerism modelled upon discursive fantasies of a localised 'globalisation', and the political constituency of the ruling party with its agenda of ethno-religious Hindutva nationalism (Desai, 2008; I. Chatterjee, 2009; Bobbio, 2012; Banerjee & Mehta, 2017; Mathur & Mittal, 2020). With local and global capital and commodity flowing in, deregulated, to the uneven sociomaterialities of the city and the state, Gujarat is also, unsurprisingly, among the Indian states that generate the highest quantity of plastic waste, annually (CPCB, 2019). By

2010, Ahmedabad city alone generated close to 4000 MT of 'solid waste' per day, including large quantities of plastics (AMC, 2017). Where do all the thrown away plastics go? What do they do?

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Fig. 2: India's Prime Minister, Narendra Modi, picks up plastic discards from a beach near Chennai (2019). A video, publicised by his social media handles, shows him 'plogging' (picking up plastic while jogging – a term and organised activity current in Sweden) and eventually transferring the (plastic) sack full of plastic waste to a sanitary worker. Mr. Modi also left a message to the nation, urging citizens to ensure that public places are kept 'clean' and tidy'. Over the past 7 years, Mr. Modi's government has pushed for economic growth and also promoted a centralised regime for sequestering and processing plastic waste in India, notably through heavily capitalised Waste-to-Energy (WTE) technologies, implemented through public-private partnerships (PPP). Courtesy: Twitter (@narendramodi)

Though India prohibited the import of plastic waste in 2019 (illegal imports continue albeit at a smaller scale (Kaur, 2019)), the residues of domestic circulation (including 'product' import) and consumption, are abundant, complex,

and substantial. Plastics routinely end up accumulating not just in scarce landfill spaces but also in the rural and urban commons – on streets, street-sides, empty pieces of land, fields, riversides, water bodies, and in sewage drains. As we have observed through the morning passage with Kantaben above into streets and public places of Ahmedabad, plastic's materiality complicates matters. Indeed, the same qualities (say, durability, material multiplicity) and affordances (say, abundant supplies) that make plastics profitable and desirable as commercial products, also tend to make these objects recalcitrant and resistant to further processes, if not degradation, once they are discarded post-use, i.e., when they become 'waste' (Hawkins, 2013; Pathak & Nichter, 2019). These accumulations tend to align with particular patterns of consumption and material quality/value, producing uneven territorial concentrations. The spectre of plastic waste – accumulation and persistence – poses a sharp counter-experience to plastic's supposed capacity for 'infinite transmutation' to different forms and functions.

Disrupting aesthetic, sanitary orders in cities, clogging sewage lines to cause floods, diseases through vector-breeding in stagnant water, landfill-fires and incinerator smokes which 'irritate' everyone (albeit unevenly), plastic's everywhere-ness has been argued to cause 'binding' environmental effects on populations across demographics (Doron & Jeffrey, 2018). Not just localised (or localisable, containable) in marginalised sites, ghettos, and urban peripheries, where waste could once be dumped at a 'safe' distance away (from elites), the unruly ubiquity of plastics turns discards into obdurate matters 'out of place', matters of anxiety, and urgent 'public' concern (Pathak & Nichter, 2019; Pathak, 2020; Dey & Michael, 2021). More importantly, plastic waste comes to matter as the matter that the civic bodies – responsible for the local governance and waste management – are unable to adequately address (see below). The sheer

tonnage, ubiquity, and complexity of plastics reveal (also compound) the chronic lack of techno-financial resources suffered by India's civic bodies, which are responsible nevertheless for local governance (including of waste). As such, the various limitations, inadequacies, and piecemeal, uneven occasioning of state attention and the uneven gender and caste-network based (private) works that have characterised ('public') sanitary infrastructures ever since they were introduced in colonial India (including in Ahmedabad) to preserve political and economic interests of the Crown and its elites, come into sharp relief (Chaplin, 2011; Doron & Jeffrey, 2018). Ironically, while plastics are firmly promoted, held in-place within large-scale economic, commercial calculations, and infrastructural developments, the crises of out-of-place plastic leftovers, expose the incoherences within state priorities and mess across scales of governance, and state apparatuses.

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Fig. 3: This image is from Mumbai. Every year, especially during monsoons, overwhelming quantities of plastic wash up to the shores of the coastal metropolis. These are glimpses of the gargantuan plastisphere that is now beyond the control purely of any individual nation-state. Citizens and the local government mobilise to ‘clean up’ these shores, sequestering and re-locating some of these plastics (notably those that are visible, tangible – sequestrable) into municipal infrastructures of containment. But more plastics wash up every day, as incessantly as the tidal waves. The scale and complexity of the plastic waste overwhelms limited municipal capacities, which are not secure either... Photo Courtesy: Mahim Beach CleanUp

Plastic exposes a state failure in civic attention (Doron & Jeffrey, 2018; Paterok, 2019). As such, (plastic-fuelled) commercial hubs and populous conglomerates like Ahmedabad city (or Mumbai, as above) would submerge as massive sinks for plastic waste as the indispensable consequence of national and transnational commerce in plastics and plasticated commodity. However, this is not necessarily the case. Indeed, foragers like Kantaben, and the vast, de-centralised networks of plastic recovery and recycling that they partially constitute and contribute to, have, historically, taken a significant lead role in partly mitigating the plastic waste crisis on a regular basis.

By certain estimates, there are over 50,000 foragers in Ahmedabad city, who, like Kantaben, draw on the 'everywhereness' – the spatial distribution – of plastic waste. They turn strategic spatial mobility, material identification and segregation skills, and transportation labour to build scale, and enable the salvaging of value from thrown away plastics for a living. They are mostly Dalit (social outcasts under the all-pervasive caste system unevenly specific to South Asian communities – ex-untouchables), and female (at least in Ahmedabad), members of the urban poor who have mostly been excluded from other livelihood opportunities. Foragers are not the only practitioners localising plastic, although they outnumber rarer professionals like (male) *pastiwalas*, who drive tricycles and carts, and buy (instead of gleaning) scrap directly from households and businesses. After preliminary sorting – as is common practice after the morning foraging sortie, the sequestered plastics are sold at *peethas*. *Peethas* are more spacious focal points of material aggregation constituting the recycling network, where plastics are further segregated and cleaned (similar establishments are known as *kabaadis* elsewhere across northern India (Gidwani, 2010; 2015)). Ramapir no tekro, a marshland that was once peripheral but now central (thanks to urban expansion), and a site to one of Ahmedabad's largest informal settlements, is home to Kantaben and more than 500 foragers, and at least 20 *peethas* operational in 2019. *Peethas* are enterprises which build scale and prepare secure bales and sacks of homogenous plastic categories, before consigning them off to the city's recycling 'factories'. The latter are material-specific workshops – typically small, sometimes one-room establishments – spread across Ahmedabad's former textile industrial belts and suburbs (like Naroda, Rakhiyal, Chandola Lake, etc.). Here plastics are broken down, ground, or melted into more elemental feedstock.

Ever since plastic's industrial and commercial prominence in India from the 1990s, recycled plastic feedstock has tended to be in strong demand (Gill, 2009). These constitute raw material for the manufacture of a wide range of (cheaper variety) everyday objects – from cushions and clothes (polyester fibre), bottles (recycled PET), recycled carrier bags and packaging material (polythene – PE, and polypropylene – PP), combs, toys, tumblers, cutlery, stationery (especially of polystyrene – PS). These feed into the diverse mainstream and intersecting parallel retail markets across sectors and demographics over the large country. But they are popular mainly among India's expanding middle class, and lower middle-class groups, enabling the procurement of necessary and aspirational items, as well as counterfeits and various forms of object-workarounds (Hodges, 2017) at much low(er) costs than in premium commercial circuits. In other words, if plastic 'waste' accumulation articulates a certain persistence and immutability in plastics, then the technical expertise, labour, and practices of plastic mediation and exchange included under the umbrella term of 'recycling' may be understood to occasion further mutabilities. They enact *plastics* out of intractable discards.

Plastic recycling practices incorporate wide-ranging material, corporeal, social, economic, political, environmental (but also conceptual) stakes and implications. On the one hand, obviously, they help constitute networks and markets that make discarded plastics recyclable, re-integrated into processes of fresh calculation and parallel commerce, co-elaborating new consumption practices (and potentially re-defining 'class' itself). In the process, thrown away plastic objects are partly denied the status of waste (interpreted, say, as things without value (M. Thompson, 2017), or as markers of sanitary/cultural danger that must be put away (Douglas, 2002 [1966]; Hawkins, 2006)). On the other hand, (although offering public service by indiscriminately removing discards from urban space

does not constitute the motivation for these enterprises – as observed above), by diverting large quantities of (recycling-worthy) plastic waste, nevertheless, Kantaben and other gleaners and scrap-localisers end up reducing some of the perturbing plastics sticking onto urban landscapes and societies. As such, they ‘provide critical economic and ecological services to cities by lowering their waste burdens in highly cost-effective ways’ (Gidwani, 2015, p. 5; Chikarmane & Narayan, 2000; Dias, 2012; Fredericks, 2014; Samson, 2015).

In the process, though, recycling practitioners, who physically extricate and handle – sort, clean, shred, melt, grind – plastics, are disproportionately exposed daily to its leachates, derivatives (say, micro and nano-scale particulates), compounds, other entangled material, but also stray animals, crimes, and harassment (Chaturvedi & Gidwani, 2011). Yet, save limited technical, financial, and legal aid from certain NGOs, these extensive plastic salvage networks receive little support from the state or the civil society at large (Gidwani, 2010). Such institutional neglect is chronic and structural, and amounts to a curtailment, or reduction in the possibilities, of these processual enterprises. Of course, the lack of state support is partly due to chronic lack in finances, or technical, administrative capacity suffered by civic bodies. However, institutional apathy results also from deep sociological roots and structures of the post-colonial state and civil society. Indeed, the work of waste in South Asia – whether privately, communally, or municipally occasioned, has always drawn on and impinged upon networks of caste – i.e., the ritual social mandate to practice by virtue of birth. The historical arrangements of handling and removing discarded and abject materials³ have traditionally drawn on but also compounded gendered and caste-

³ The matter of waste matters, not least as a socio-cultural identifier of the different (Dalit) caste-groups handling (and thus co-constituted by) them. For more specific and critical engagement with the different

based socio-practical networks, identities, and cultural legacies (Chaplin, 2011; Tam, 2013; Doron & Raja, 2015; Wilson & Singh, 2016; Doron & Jeffrey, 2018). The persisting legacies of caste mean removing discards from 'public' spaces is considered ritually acquiesced duty for certain lower caste groups, and as such, it is deemed unworthy of societal attention or political support within elite constituencies (Teltumbde, 2018)⁴.

However, plastics and their potential mutability (into objects of value) have offered limited opportunities for mediating and mitigating socio-economic neglect, humiliation, and poverty for those who remove and salvage waste, and perhaps even to chart alternative social histories for their communities. Indeed, the processes of recovering and re-moulding plastic discards into new products and merchandise help enact and enable relations of work, entrepreneurial opportunity, techno-practical expertise, livelihood, and socio-political legacy for the marginalised socio-practical groups occasioning them. Indeed, over the last 3 decades, plastics changed the entire landscape of the traditional caste-based practices of removing waste, opening up new possibilities for technical innovation, livelihood, and commerce.

Many Dalit *chamaars*, like Kantaben, whose ancestors were mandated to clear animal carcasses and process leather (called *chamra* in Gujarati and Hindi) within traditional agrarian societies of northern Gujarat, are now working in Ahmedabad city with plastics, and thriving (living above poverty levels, at least). 'With plastic

gender-caste-based practices, networks, and politics – past and present – of different materials, like animal carcasses, human faeces and other bodily object, waste from medical care and diseases, human dead bodies, hair, agricultural waste, construction waste, e-waste, and so on, see (Shinoda, 2002; Singh, 2014; Doron & Raja, 2015; Doron & Jeffrey, 2018; Ilaiah Shepherd, 2019; Butt, 2020; Laser, 2020; Vaughn, 2020), among others.

⁴ Dr. Anand Teltumbde, a prominent Dalit scholar, political critique, and civil rights advocate is incarcerated since April 2020 over [contested charges](#) of sedition. Citing his valuable work is in expression of solidarity.

bottles, bags, etc., my income has increased many times over', another forager, Veenaben (again, anonymised), confided. Plastic waste is abundant, lightweight and water-repellent, thus easy to carry, and with high demand, plastics fetch handsome exchange rates and higher daily incomes for foragers (see also (Doron & Jeffrey, 2018)). For other actors within the recycling network (like workers and owners of *peethas* and 'factory'-based recyclers), plastics significantly helped expand their scale of operation, increased the number of possible value-added services, jobs (say, sorting through the multiple material categories of plastic), consequently increasing business security (from diversification), margins of profit and incomes (Gill, 2009). My interlocutors from Ahmedabad overwhelmingly echoed one of Kaveri Gill's respondents – a plastic recycler from Delhi, a Dalit man, who had (now-famously) commented, 'in plastic, we are becoming landlords, so we much prefer it' (Gill, 2009, p. 161). For example, at Ramapir no tekro, where plastic foraging, sorting, and aggregation enterprises dominate the socio-economic life of residents, plastic processes co-elaborate their claims of habitation over urban place and community. Limited economic and political power offer these resident-workers limited defence against neoliberal land grab and real estate re-development. Indeed, Dalits, as socially (also spatially) outcast from the Vedic caste hierarchy (*varnashrama*), have not only been economically exploited (say, with hazardous labour secured through ritual mandate and against low/no pay and support), but have also been denied property and equal socio-political rights⁵. With plastics, however – a modern industrial material with little historical baggage locally (unlike iron, copper, animal hide, carcasses, or human faeces),

⁵ Though there have been remedial measures constituted by the post-colonial welfare state, the independent republic of India, socio-economic discrimination has persisted, albeit in new and re-entrenched patterns, in complex ways into the present day (Mosse, 2018; Teltumbde, 2018)). We shall describe some of these below.

this 'shiny new thing' – new meanings, objects, techno-practical cultures, and socio-economic, political articulations (if not change) have appeared possible. This echoes authors like Gill (2009), Reno (2009), Hawkins et al. (2015), Fredericks (2018), McKay and Perez (2018), Millar (2018), Nguyen (2018), Wagner-Lawlor (2018), Dey and Michael (2021), etc., who have discussed socio-political potentials actualised with plastics within specific material-practical contexts elsewhere in the world. This is to say, plastics may imbibe a variety of sociomaterial possibilities. Plastic processes do not simply occasion potential material mutabilities, but they might also offer opportunities for enacting limited socio-economic change and political re-arrangement.

The Here and the Now: Where this Thesis Comes In

The present thesis situates itself within this specific universe of plastics, peoples, and practices, inextricably entangled. More particularly now, it draws on a historic moment of neoliberal state reforms, and picks up on sociomaterial mutabilities materialised there-in with plastics. This empirical moment refers to the Centre, i.e., the (federal) Government of India, initiating policies, programs, and intervening – infrastructurally, into the domain of plastic waste recovery and processing. These reforms were introduced with renewed force 2014 onward under the aegis of solid waste management – SWM, with the states (e.g., Gujarat) unevenly interpreting and implementing these. The policy philosophy, which began assuming substance and shape within governmental circles in the early 2000s, echoes similar initiatives being undertaken globally through the 1990s within the developing worlds⁶, and privileges privatisation and technologisation.

⁶ ...and thus reflects a wider 'neoliberal turn' in waste management in the Global South post-1990s, where public policy and state practices were re-framed, re-configured around the belief that profit-

However, this involves a rather selective promotion of corporate-style private firms being enrolled under public contracts in SWM, and an alleged 'obsession' with capital-intensive large-scale techniques of Waste-to-Energy (WTE) that promised to reduce large waste volumes at scale, at speed, and at 'cost efficiency' (Shah, 2011; Schindler, DeMaria, & Pandit, 2012; Gidwani & Corwin, 2017; Luthra, 2017; Doron & Jeffrey, 2018; Sambyal & Agarwal, 2018; Shankar & Sahni, 2018). These developments draw on assessments of the processual amenability of plastic (waste) beyond informal recycling, and particularly, fold in calculations of plastic's mutability into products/commodities of different sorts (say, saleable energy derived from plastic incineration, which has tended to dominate WTE technology in India). That is to say, mainstream corporate-style WTE and waste management firms, and the state, saw value in plastic (waste).

The state of Gujarat was an early-starter and front-runner in the laying out of infrastructures favouring state-promoted corporate pursuit of profit by the incineration of large quantities of plastics. Consistent with the neoliberal policies pursued across other sectors, Gujarat, under Narendra Modi's 15-year long Chief Ministership, initiated private-public partnerships in SWM through the 2000s, earlier than most other Indian states. Ahmedabad, in particular, emerged as a testing-ground for many of these technocratic programs. At least 3 WTE projects for Ahmedabad alone were signed before 2015, planned to incinerate daily up to 70% of the city's solid waste. In order to sequester maximal amounts of plastic waste for incineration (since plastics raise energy output and profit due to their high calorific value), to ensure segregation (of 'dry' plastic from 'wet' food waste as moisture admixture reduces energy output and plant-functionality), and for

driven private firms could deliver more cost-efficient services and accountability (Lee, 1997; Eggerth, 2005; Spronk, 2010).

cost-efficient waste collection and scale-building, a wide range of municipal arrangements, contracts, sub-contracts, routines, machines, tools, devices, sites, and programs emerged, or were launched as part of an accreting infrastructure. As a pre-meditated move on its competition (notably informal recycling networks), such a profit-driven 'public' infrastructure complicated the access to plastic waste for foragers (like Kantaben), *peethawalas*, and recyclers. Following, Mr. Modi's election for political leadership at the Centre, in 2014, many of these neoliberal programs were promoted federally, imbibed within revised legislature (notably Solid Waste Management Rules and Plastic Waste Management Rules 2016), and promoted further with Mr. Modi's pet project for responsabilising and involving the 'private' in the multi-scale enactment of 'Clean India' (initiated in 2014).

Authors have provided important critiques of some of the ecological, socio-economic, and political implications of such large-scale and powerful silver-bullet solutionism. In pursuing aspirations to address a complex waste issue 'scientifically' and 'efficiently' and to offer Indian cities a 'global facelift' (with added promise of generating energy, a valued resource), studies have zoomed in on the (potential) undermining of the health of citizens and the environmental commons through incineration emissions, and also on the continuing institutional abandonment of enterprises, priorities, and different needs of its lower caste (and cast away) urban poor (see (Gidwani, 2010; Bhan, 2016; Demaria & Schindler, 2016; Gidwani & Maringanti, 2016; Luthra, 2017; de Bercegol & Gowda, 2019; Kornberg, 2019) among many others). Questions of politics, and justice around denying (historical) right to waste to the same working population by transferring the same to powerful corporates instead, and its implications for socio-economic, spatial, and political re-enactments of the 'public' have been published (Chaturvedi & Gidwani, 2011; Gidwani & Reddy, 2011; Cornea, Véron, & Zimmer,

2017; Shankar & Sahni, 2018). Co-option of formerly independent foragers, 'informalisation' of waste-work, and its de-valuation with structural undermining of financial and political rights under private sub-contracts have also been subject to a long tradition of critical and careful discussion (Shankar & Sahni, 2017; Dey, 2020; Luthra, 2020) (see also (Sassen, 1994; Roy, 2005) for more general critiques of the 'informal' within neoliberal economies).

Some of these works draw on more traditional Marxist political economy perspectives, including some of its more recent material and ecological re-iterations under urban political ecology. Some, like Gidwani's, re-work older formulations of the 'surplus' into contextually attuned formulations (say, *infra*-economy – (Gidwani, 2015)). While these valuable works make the necessary relations of power, discontents, and divides apparent and sharp, authors have called for more materially grounded and fine-grained empirical studies on the mundane sociomaterial life of policy, or of the actual infrastructures of waste management. This is especially with regards to how these emerge in practice across sites and scales, shaped by the various socio-political, topographical, and infrastructural dispositions, compulsions, and opportunities on the ground. Or, how they (re)produce hierarchies, hegemonies, divides, and limited possibilities for generating community (Gidwani, 2015; Samson, 2015; Millington & Lawhon, 2019). Moreover, for post-colonial settings⁷, where specific historicities and complex yet dynamic socio-cultural, economic, and political stratifications and claims (say, around intersectional experiences and realities of gender, caste, class, religion, etc.) are barely addressed in Marxist structural critiques (e.g., see

⁷ I do not essentialise the post-colonial category. Instead, I echo Mignolo's critique of post-colonialism (2005), and propose a situated, historically and socio-materially-grounded representation of the intersectional experiences of domination, and compounded marginalisation. As such, imperialism mediates and is necessarily mediated (if not intensified) by a range of local hegemonies, and differences.

(Ranganathan, 2015)). This is not a rebuttal of political economy; on the contrary, grounded re-examinations of relational ontologies are sought that accord closer attunement to the specific forms of vulnerability, liminalities, inventive agencies, and collective possibilities of change that (might) emerge from the uneven layers, and layerings, of power (Spivak, 1988; Prakash, 1990; Bhabha, 2012). Furthermore, given the complex challenges raised in uneven globally-connected locations facing compounded ecological threat – not least with plastics, an urgent re-thinking of ‘human agency over multiple and incommensurable scales at once’ is warranted (Chakrabarty, 2012).

Here, I am thinking particularly about the various recombinant material as well as social realities that plastics enact. What unfolding possibilities for continuity and change, stability and mutability, plasticity and persistence do plastics hold? This is not least with regard to remaindered recycling networks and the cross-cutting socio-political stakes involved in these processes, but also pertains to state-sponsored processual infrastructures of plastic incineration. Do these processes persist, succeed in mediating plastic as desired? Do these get mediated and transformed in different ways? As such, in their sociomaterial emergence, what conceptual and critical possibilities are actualised? This is where we turn to relationally and practically embedded, iterative, and critically reflexive ethnography, and let its empirical specificities themselves elaborate ‘theory’.

Kantaben, or the recycling communities of Ahmedabad were no strangers to me. Working previously as a trained engineer – before I became anthropologist, I had worked to set up plastic recycling facilities for a rural district in western India. This was in 2014-15, and my project-related networking, learning, and collaboration led me to some of the foragers, segregator-aggregators (*peethawalas*), and

recyclers of plastics in Ahmedabad, the nearest metropolis and major plastics recycling hub, barely 200 miles away from my district of work in Rajasthan. Re-training as part of my PhD as anthropologist in the domains of everyday science and technologies, I went back to these familiar practitioners and networks of technical expertise, especially after the introduction and the ongoing implementation of the SWM infrastructures in the city, as part of national policy. I conducted a wide range of interviews, informal chats, and surveys observing solid waste management infrastructure in Ahmedabad city, besides reading historical archives, legislation, policy-documents or listening to their interpretation from state and non-state actors, practitioners, and stakeholders. I also worked voluntarily with/for foragers and one *peethawala*, who agreed to employ me as an apprentice within his establishment (i.e., without payment). Working with these experts led me to learn techniques and plastic processes, and familiarised me with practical networks in-situ. It also positioned and enabled me to study the different forms of adjustment, compromise, and improvisation constituted as part of individual and collective responses to the new reforms.

The present body of knowledge therefore results from these ongoing relations of socio-professional engagement, practical exchange, and new situated relations, mobilities, ethnographic enquiries and observations, that constituted 2 years (discontinuously between 2018-2019) of intense ethnographic fieldwork pursuing the actual state of solid waste management (especially of plastic waste) in India, and Ahmedabad, especially. What I experienced, observed, and learned, during these extended periods of engagement with different publics, but also lived experiences in the city (e.g., I engaged with the municipality SWM system as a resident citizen), betray top-down theorisation. I share more elaborate details about how the new SWM policies, and its legislative, inspectional, and regulatory

(besides plastics re-circulation, and incineration) infrastructures have served to deepen marginalisation, and render different aspects of plastic recycling practices difficult. In this regard, my ethnography supplements an ongoing story of 'muting', or a systemic reduction of possibilities for the recycling community. But my ethnography does much more than this, empirically and conceptually. Remember Kantaben's strategy to set out for foraging earlier in order to subvert the municipal waste-worker's sweeping routine at the Sabarmati Riverfront? Over time, and in collaborative practice, I learned about many more of such strategic hacks, and re-ordering of process – spatio-temporal, but also with new civic alliances (including state officials) and cosmetic devices to satisfy (yet deflect) the authorities, penumbral circulations of plastics, and new social and material (shadow) arrangements that keep recycling processes going on. Re-invented process might incorporate radical possibilities (mutations – opportunities opening up) but also entail re-entrenchment of certain uneven patterns of extraction and abandonment (muting – closing down possibilities).

I offer here an empirically attuned re-working of assemblage theories, to discuss ongoing plastic processes, infrastructures, and the complex yet routine re-enactments and re-combinations of multiple sociomaterial ontologies of plastic in the process. While I am interested in how different plastic processes, products, and networks come together, or are routinely mediated and mutated in practice, I am also acutely mindful of persisting legacies, i.e., sociomaterial arrangements (like caste), that are not easily amenable to transmutation. How do we theorise mutability and immutability, and their complex inter-digitation, fungibility, shape-shifting, and inextricable co-becomings together? This is where a renewed attention on plastic processes, and how plasticities and lack of plasticity are routinely enacted with/in the material becomes conceptually generative. I

combine these different possibilities with the notion of plastic mut(e)ability. This is the conceptual proposition of this thesis, where-in, the continual opening up, yet closing down of possibilities are offered attention under the contextual specificity of different plastic processes (often multiple processes inter-twined, and co-becoming – as we shall see).

With plastic mut(e)ability, I acknowledge mutings, i.e., structural recalcitrance and processual resistances (say, marginalisation and abandonment of recycling practitioners not simply through pre-existing socio-economic, political patterns, but also re-enacted in different ways, demonstrably, through new waste reforms and the formalisation of processes), that close down possibilities. Again, I also focus empirically on processes with plastic waste that mediate and mitigate some of these mutings – plastic mut(e)abilities, say, as ongoing recyclabilities of plastic through re-invented process, that enact and enable remaindered capacities of those muted. That is, mutings co-exist with mutations that (re)open possibilities. In this way, I show how new sociomaterial mutings are instituted as processes of plastic waste renewal are re-invented. For instance, I trace how re-ordered, re-organised exchange and circulation relations that keep plastic supply ongoing for *peethawalas* and recyclers, also render some of the foragers redundant. Again, the routine siphoning off of recyclable plastics from incineration-based municipal circulation networks point apparently towards a denial, a closing down of incineration opportunities. But I go even further in my empirical analysis and show how ongoing plastic recyclabilities and recycling networks actually maintain the incineration-based neoliberal arrangements of resource extraction (say, through sub-contracted labour) and abandonment (say, of workers' rights or civic duties).

Plastic mut(e)ability, as elaborated here, offers an ethnographic commentary on how infrastructures emerge. The infrastructure, in this case, refers to the state-promoted SWM system, within the contextual specificities of Ahmedabad city, and particular forms of national politics. It details how legislature is interpreted across scale, how information is passed on between ministries, departments, State and Centre (federal), public to private, interpreted, implemented – mediated – ever so unevenly and incoherently. As a result, processes (say, sequestration, segregation and circulation of plastic waste up to the incineration plant) do not materialise as planned, and a wide range of actual local entanglements and networked arrangements are constituted that exceed the original state planning. By studying the processual becomings of plastic waste, plastic mut(e)ability offers a grounded analysis of civic neoliberal infrastructuring⁸ – the actual emergence of infrastructural networks, actors, communities, and sociomaterial processes. In its critical ethnographic analysis of a large-scale public-private infrastructure of plastic waste collection, segregation, and processing, through its actual everyday trials, passages, and frictions, this thesis maps onto the concerns of waste management planners, policymakers, citizens, and activists.

⁸ See Chapters 6 & 7 especially, for detailed conceptual engagement in these regards. For now, see noted works like (Harvey, 2012; Harvey & Knox, 2015; Anand, 2017; Anand, Gupta & Appel, 2018; Kallianos, 2018; Karasti & Blomberg, 2018) that have treated infrastructures – the supposedly ‘sunken’, even imperceptible, normatively stable material environments that condition and orientate (as if superficial) circulation (Star & Ruhleder, 1996; Star & Bowker, 2006), as more lively and contingent (see especially (Amin, 2014)). Within this new wave of ethnographic works on infrastructures, the latter are seen as actual entities – even assemblages – that need maintenance, and which are replete with disorders, failures, disrepair, even amenable to ongoing mediation, subversion, pliability, work-arounds, and ruination (see (Rai, Saigal, & Thorat, 2015; Simone, 2019)).

Plastic Mut(e)ability as a Concept for Story-ing Plastic's Ubiquity:

'It matters what we use to think other matters with' (Haraway, 2016). Equally, 'it matters what stories tell stories; it matters whose stories tell stories' (Haraway, 2019).

"This image has been removed by the author of this thesis/dissertation for
copyright reasons".

Fig. 4: From (Heidbreder, Bablok, Drews, & Menzel, 2019), where the authors plot the growing number of social science publications on plastics from around the world in the past 25 years.

Plastics are estimated to be ubiquitous. Over the past 2 decades, a growing number of environmental surveys and scientific studies have discovered and measured the 'presence' of plastics in the world – in its nooks, corners, crevices, biological and geological folds. Plastics – in various forms – have been found to occur from the isolated mountain passes of the Mount Everest (Spoon, 2013) to

the deepest ocean floor in Mariana Trench (Chiba, et al., 2018), Arctic ice sheets (Obbard, et al., 2014) to coasts (Costa & Barletta, 2015), rivers (Weiss, et al., 2021) and soil (Rillig, 2012). Plastics – especially in micro and nano sizes, have been found ingested, if not enfolded in the bodies of marine organisms (Goldstein & Goodwin, 2013), with chemical additives, derivative compounds leaching out, transferring and potentially accumulating in bodies up the food chain (Thompson, Moore, Vom Saal, & Swan, 2009). In 2021, microplastics were discovered by Raman spectroscopy in the human placenta (Ragusa, et al., 2021). It would be an interminable exercise to list the multitude of sites, ecosystems, bodies, and organs where plastics (its traces, derivatives) might occur in measurable amounts.

Crucially, plastic's ubiquity is not simply a phenomenon of 'something or someone (that) seems to be everywhere' (as the Cambridge Dictionary would define 'ubiquity'). What renders this ubiquity – that is, plastic's 'everywhereness', 'commonness', 'pervasiveness', 'omnipresence' (to dredge up the thesaurus on 'ubiquity') – complex (and contentious) is the material's (manifold and inextricable (De Wolff, 2017)) entanglement with a range of inter-twined worldly relations and practices, that include the biological, racial, personal, social, cultural, commercial, economic, political (including colonial and post-colonial), environmental, ethical, legal, and so on (see (Roberts, 2010; Freinkel, 2011; Gabrys, Hawkins, & Michael, 2013; Hawkins, et al., 2015; Hawkins, 2020; Dey & Michael, 2021; Liboiron, 2021) among many others). Therefore, plastics can *mean* and *do* different things to different stakeholders, under different circumstances; they are ontologically multiple, enacted by the specificity of relations, and processes (Mol, 1999; 2002). There is no one plastic, but plastics are many things at the same time, and critically, these ontologies overlap, inter-leak, conflict, and coalesce,

across processes, relations, bodies, sites, and scales. It is this fungible, malleable – sometimes transient and fleeting, sometimes durable and intractable – quality of plastics, i.e., its mutability, which makes this utterly complex, specific yet distributed thing so difficult to grapple with, hard to contain, control and regulate, and renders it rife with generative and dangerous possibilities.

This thesis joins an emerging body of critical and careful social scientific scholarship that takes plastic's complex and uneven ubiquity seriously and grapples conceptually with its sociomaterial stakes and possibilities. I think of Gabrys, et al. (2013), Knowles (2014), Hawkins, et al. (2015), Liboiron (2016), McKay, et al. (2020), Coleman (2020), Farrelly, Taffel, & Shaw (2021), Liboiron (2021), among many others, with acknowledgement of past works like Barthes (1971), Meikle (1995). To this scholarship, it proposes a situated re-examination of plastic's mutability – an ongoing adoption of different functions and forms, entailing different sociomaterial contents, assuming capacities to do/be different things in the world – studied previously as *plasticity* (Bensaude Vincent, 2013; Michael, 2013; Millar, 2018).

To be sure, we do not pre-assign plastic's mutability a fixed ontological status. On the contrary, we shall take theoretical lead from Gabrys, Hawkins and Michael (2013) on an 'empirical ontology' of plastics, and pursue different occasions of plastic's mutability (even immutability, limited mutability, unplanned and undesired mutabilities and 'mutings') as they become apparent within the specificity of context, process, situation, processual resistances, conditions, actors, networks, infrastructures, policies, stakes, and possibilities. It is a contextually attuned study of plastic mutabilities that makes remaindered sociomaterial agencies – mut(e)abilities – apparent. In thus picking up and

studying together these processual emergences of plastic as situated, yet intertwined, ontologies, we find the means to story an inter-linked and unfolding sociomaterial reality, and its intricately complex politics. As such, plastic's mutabilities (also mut(e)abilities) recount a set of multi-sited, multi-scale, and temporally emergent sociomaterial phenomena, that collectively and continually enact unfolding histories of plastics.

In effect, plastic's (infinite) mutability enables an explanation of plastic's proliferation as the preferred material for design, industry, market-building, and commerce (Hawkins, 2012; Bensaude Vincent, 2013; Altman, 2017; 2018). In particular, plastic's mutability means that the same matter could be deployed across sectors and markets as (part of) different product configurations, and variants: e.g., PET – a thermoplastic (potentially transformable by application of heat), produces bottles for packaging beverage (Hawkins, 2013), thus generating cultures of convenient, mobile drinking; later these bottles may be broken down and re-produced (recycled) as transparent containers of snack and food, abundant in Indian retailer markets. Polyester fibre may also be derived from them for preparing cheaper, low-maintenance yet fashionable clothing for the masses (Stanes & Gibson, 2017; Pathak & Nichter, 2019), cushion fibres, shoes, and so on. Cutting through socio-cultural categories, genders, class and affordability, differential uses, needs, aspirations (Meikle, 1995), certain processes and forms of mutability enact plastic's desirability, acceptability, and proliferation across demographics, regions, supermarkets to street-side vendors, urban to rural via the mufassil, and so on, in a vast and complex socio-economic realm as India (Dey, 2021).

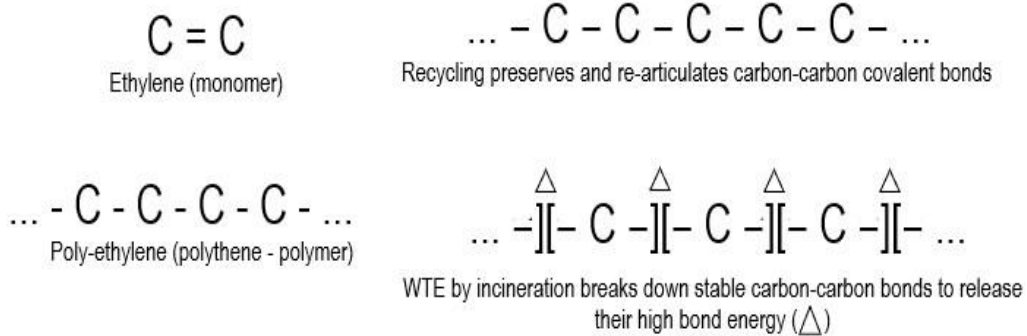
However, the ongoing accumulation of plastic waste in the environment enacts plastic as immutable and persistent. Yet, a variety of sociomaterial reactions, degradations, compounding – mutabilities – continue. These may range from leachates, particulates, and additives being released from plastics, or chemical compounds produced, say, from uncontrolled incineration (Demaria & Schindler, 2016). Again, plastics tend to accumulate within and clog urban sewage networks potentially leading to stagnation and floods with massive damages, loss of lives and livelihoods (Pathak & Nichter, 2019). Plastic constituents (e.g., additives), releases, and derivatives potentially contaminate (potable) water, air, and soil. As such, they get inhaled, ingested, and imbibed by a number of living beings, leading potentially to undesired corporeal entanglements and mutations. Such physico-material mutabilities of plastic waste entail concerns, cares, and (calls for) action.

A set of laborious and enterprising technical, social, and economic practices mitigate some of these undesired mutabilities; they enact and mediate another networked mutability instead (that of plastic recyclability). These practices range from ‘localisation’ (a term I shall use to signal the ongoing mediations on plastic ubiquity; elaborated below) – foraging and gathering (also buying), cleaning, segregation, aggregation – to shredding, melting, grinding, and so on; they enact de-centralised and self-organised plastic recycling networks. Recycling, simplistically described, seeks to preserve the hydro-carbon bonds in plastic and attempt re-moulding pre-existing polymeric configurations into feedstock and products of different forms, sizes, shapes, and functions, for different markets. Various socio-political, economic, and ecological processes (livelihoods, claims to urban place, community, urban sanitary/aesthetic orders, etc.) are co-dependent on and elaborated with these processes.

On the other hand, we describe an emerging infrastructure of solid waste management devised by the state in partnership with corporate-style private firms, that aspire to solve the waste problem cost-efficiently, and profitably. It draws critically on further mutabilities of plastics, enacted by re-circulating, re-localising, and re-valuating these materials across different sites and scales of generation and accumulation. This is with capital-intensive large-scale techniques of Waste-to-Energy (WTE) (notably incineration, that seeks to break down hydro-carbon polymers at a molecular level and release their high bond energies to generate commodifiable electricity).

However, we shall study how such infrastructured processes face various resistances, frictions, and become re-mediated at specific locations, times, and situations to emerge differently as originally planned. In effect, they might enact reduced opportunities for profitable incineration, and further plastic recyclabilities – as we show, by bringing together (re)new(ed) civic alliances, protests, inventive subversions, and shadow re-circulations, exposing some of the limitations and points of persistence in neoliberal infrastructures of silver-bullet solutionism of the complex ‘plastic problem’. Plastic mut(e)abilities, as discussed through this thesis, elaborates not so much on a ‘global’ plasticity, but it will appeal to a wide, transnational readership. As we zoom into a specific, globally (and nationally) mediated location – Ahmedabad city, we unpeel and analyse its unfolding sociomaterial realities – social, environmental histories and futures, as they emerge continually through plastics and ongoing plasticities. This thesis will offer careful, and empirically situated insights into what life is, and might become in the ubiquitous company of plastics, materials that tie all of ‘us’, our communities, pasts and futures together, however unevenly.

Amenability of polythene into multiple (set of) techno-economic processes



NB: Attached to each carbon atom (C) are two atoms of hydrogen, but they are not shown here

Fig. 5: A simplified illustration of recyclability and incinerability in polythene. While recycling is largely a low-heat process, that merely re-shapes plastic objects without breaking down or radically modifying their polymeric structures, WTE, by incineration, is a controlled process under high temperature and pressure, that disintegrates stable molecular configurations, to potentially convert released heat energy into saleable electricity through various techniques. Amenable potentially to multiple processes of techno-practical mutation, polythene links and co-elaborates a complex set of politics and sociomaterial possibilities between them. Courtesy: Author

Thesis Plan:

I break down my empirical, conceptual development, analyses, and arguments along a number of thematic chapters. The following, Chapter 2, (re-) familiarises the reader with some of the necessary theoretical frameworks that this thesis draws on, and seeks a generative conversation with. In particular, in fleshing out

and situating the conceptual heuristic of plastic mut(e)ability, I expand on examinations of process, especially of plastics as process. I draw on particular process philosophies, and discuss theories of hybrid (human, non-human, material porous and mutually constitutive) ontologies, symmetry, topological relations, associations, object-making, and othering, that constitute process. I highlight Actor-Network Theory (ANT) and assemblage ontologies, and relevant post-ANTs, in order to inform questions and conversations throughout this thesis between an empirically-derived concept – plastic mut(e)ability – and various forms of studying situated ‘assemblages’. That is, how stable patterns and modes of material-semiotic circulation of different sorts (say, plastic objects, processes, networks, infrastructures) come into being, how they stabilise (territorialisation), or become de-stabilised and mediated (re-territorialised).

Chapter 3 expands on the particular practical, relational, and ethico-political details, conditions, and concerns of empirical enquiry. It lays down some of the iterative processes, actual methods (and circumstances) of inter-personal positioning, generating and (re) examining empirical information (and becoming shaped by them). These descriptions constitute an empirical-practical trajectory – a plastic trajectory – that leads to the present forms of conceptual analysis as presented in this thesis.

Chapter 4 sets up the pre-reform ‘histories’ underlying the present thesis. It briefly describes some of the methods of situating and re-localising garbage in Indian cities, with focus on Ahmedabad, under para-colonial and post-colonial regimes. The latter drew inevitably on pre-existing and ongoing (but compounded) caste and gendered legacy networks of allocating work by birth, and socio-spatial ideals of segregation. Through this brief history, I perform a necessary disaggregation

of the local political economy and a situational fleshing out of governance issues, that enact not a common, but an uneven distribution and experience of garbage ubiquity (its hazards, but also opportunities). The more recent (late 20th century) and rapid emergence of plastic waste – its sticky, wide-spread abundance, and complexity – is shown to perturb some of these traditional ubiquities and patterns of localising matter, bodies, work, and society across urban space. As mutable, malleable plastics (say, in their occasioning of diverse products and markets) manifest as intractable discards accumulating in the city, finally, I describe their reclamation and recycling processes. I elaborate on some key (re)localisation practices, establishments, techniques, sites, processes, actors, legacies, and their dense inter-linkages, which make (some) plastics recyclable, thus, partly reducing the plastic residues accumulating in the urban bins and commons.

Chapter 5 traces the development of the SWM infrastructure in India, especially its historical accretions in the city of Ahmedabad in its present form (2018-2019). This chapter provides empirical details on some of the policy deliberations, and pragmatic calculations within law-making circles, and ensuing legislative, techno-practical, and bureaucratic-regulatory infrastructures, national and regional programs that sought 'efficient' incinerability (notably through plastics) for private profit as a public solution to the waste problem. These ends are aspired to through attempted plastic sequestration from source, segregated containment (as 'dry'-'wet'), re-circulation, and technical re-mediation at large scale. I highlight how these state-mediated discursive and pragmatic practices of solid waste localisation preclude an exclusion and denial of access to (plastic) waste to foragers, and furthermore, leaves out *peethawalas* – the cornerstone of the recycling networks – from official legislature, rendering their processes of registration and conditions of legitimate practice difficult. I call these constitutive

processes of othering and their marginalisation and silencing (to secure and stabilise the processual interests of the dominant infrastructure) as ‘muting’.

Chapter 6 and 7 together constitute empirical analyses of further plastic mut(e)abilities occasioned post-reform. They highlight sociomaterial mediations and re-territorialisations that variously negate systemic mutings, and instead occasion tactical mutations within plastic processes, and networks of practice. As such, various inventive work-arounds (*beeja* arrangements) and improvisations on infrastructures are generated, which elaborate ongoing plastic mut(e)abilities. Chapter 6 draws on some of the responses vis-à-vis the new reforms within recycling communities – *peethawalas* and *kachre binnewalis* (foragers). This refers to re-organisations with wider civil society and other constituencies (including state representatives, politicians, and MSWM officials), and attempted performative make-overs for professional re-identification. This is to ensure minimum disruption to their practice and ongoing professional reputation but also occasionally to re-position themselves within these networks (we present such a case with foragers), etc. all in order to fit into the new infrastructures of waste management regulation and inspection. The inventive re-deployment of a number of ‘cosmetic devices’ and techno-social performances is highlighted in this regard. The chapter demonstrates how remaindered (muted) actors re-assemble sociomaterially to posture before the ‘state’ and thereby continue recycling legally under the new system (now as ‘authorised’ actors). Their muting is somewhat negated, rendered impermanent. However, mundane negotiations for recycling remain.

Chapter 7 presents cases of friction, and mundane mediation of the municipal SWM system as it interacts with other infrastructures in course of its everyday

occasioning, especially with regards to point-to-point waste collection and dry-wet segregation. This chapter discusses ensuing delays, irregularities, uneven priorities, abandonment, and 'shadows' within civic service provisioning and its awkward standardisation. Therefrom it discusses a range of penumbral practices and improvisation occasioned within urban communities, sub-contracted municipal waste workers, state representatives, and the recycling communities that unevenly congregate to make-do, devise infrastructural hacks, work-arounds and alternative techniques, developing new associations, spatio-temporal patterns and practices that re-localise and re-circulate plastic waste from the state-planned municipal networks of privatised incineration towards the 'informal' foragers and *peethawalas*. As new/ re-ordered plastic localisation and mediation networks feed raw materials to keep plastic recycling practices and a few of its co-dependent livelihoods ongoing, I argue that the municipal infrastructure is somewhat muted. That is, with less plastic (with admixture) available for incineration, its energy output, cost-efficiency, and profitability are reduced. However, the situation points at a deeper systemic abandonment of citizens and recyclers (muting, again). This is notably by outsourcing and skirting responsibility for plastic waste left unpicked, and ubiquitous by the neoliberal system, only to be picked up later by informal recycling means. The actual emergence of civic SWM infrastructure and the complex inter-digitation and co-becoming of different plastic processes in the city thus occasion a range of different sociomaterial and political possibilities across sites and scales.

In conclusion, Chapter 8 summarises the key empirical and conceptual insights, and reflects briefly on theoretical implications of the thesis. I also share concerns, reflect on research limitations, think how the research development may have

been performed differently – empirically and conceptually, and examine some future avenues of research. I conclude with a few policy recommendations.

Chapter 2: On Theories

“I heat an iron in the furnace
Then mould it
With the use of a hammer
I straighten it

Then I make hooks
Each one separately,
I string them all together
And make a chain out of them

If I can make the chain
Why cannot I break it?”

- Sunil Abhiman Awachar

(translated from Marathi by Yogesh Maitreya)

In his lucid verse, the poet voices the inner thoughts of a *lohaar* (blacksmith). Perhaps squatting by the furnace at a tiny workshop in the city’s dingy underbelly, the *lohaar* contemplates the process of making iron chains – hook by hook. The underlying metaphor here alludes to the ‘chains’ of (out)caste Dalit identity, which allocated the *lohaar* to profession at birth, and subjected them to societal oppression and economic exploitation by default at the hands of the upper caste who, typically, wield power. Caste, as B. R. Ambedkar – the champion of Dalit rights and advocate for political equality – writes, ‘is not merely a division of labor. It is also a division of laborers’ (Ambedkar, 2002, p. 263). Embedded in the *lohaar’s* inner monologue is a theory of power, a processual understanding of stability and change. The *lohaar’s* caste identity is reproduced through practice and the very process of making chains – each metal hook moulded and added to

the string – substantiates the ‘chain’ of events that stabilises Dalit-ness: socio-economic and political positions of oppression and marginalisation. In this regard, the *lohaar* is muted by his own professional practice. However, the *lohaar* is not hopeless, and locates a method for generating alternative sociomaterial realities. Ironically, this path to freedom also lies through practice, albeit in the practice of disentangling hooks. Breaking the ‘chain’ might happen by picking apart the string, hook by hook, unit by unit, straightening them out, remoulding them, and potentially putting them back together in new order, producing different objects and economies on their own terms. The possibility of mutation but also of muting both lie embedded in the practice of unmaking and remaking chains.

What is at Stake?

I came across this powerful poem by Dalit painter and poet, Sunil Abhiman Awachar, during my fieldwork in India with the mediators of discarded plastic. Instead of iron, my interlocutors’ profession involved chains of another kind – hydrocarbon chains, or polymers. Whether employed as authorised municipal workers, or independent recycling practitioners, my interlocutors were also Dalit, socio-economically marginalised, exploited, but inventive, and entrepreneurial. In particular, I worked closely in Ahmedabad with communities of plastic localisers and mediators, including owners and workers at a plastic aggregation and segregation centre (*peetha*), and professional recyclers who belonged overwhelmingly to the Dalit sub-caste of *chamaars*. *Chamaars*, as mentioned earlier, are a practice-based social community with presence across South Asia, who are ritually mandated to clear animal carcasses off the agrarian commons, and practice leather-based crafts, traditionally. With urban migration, however, some had managed to distance themselves from the ancestral profession, though

many continued to face discrimination in the city. My interlocutors in Ahmedabad had a similar history (more about that below). Reduced access to mainstream professions and capital led to my interlocutors reclaiming and renewing material leftovers for livelihood.

From the late 1980s, as plastic discards proliferated in the city, new possibilities emerged. Plastics were new, modern industrial materials, which, unlike iron or leather, did not carry the cultural-economic baggage of caste. Plastics were not constrained, theoretically at least, by the resistances posed by nature as with other materials. Through a range of embodied technical practices (which we shall detail later), these marginalised *chamaars* and their dense socio-practical networks localised and mediated ubiquitous and abundant plastic debris in various forms and made the materials amenable to recycling processes. Thus, plastics were made mutable, 'chain' by 'chain', into new products that could be sold at new values. Plastic's ongoing mutability made limited social and economic transformation look plausible. In the communities where I worked, and who I knew from before, plastics helped generate more enterprises, jobs, and led them to defend their place and residential rights in the city. Re-moulding plastic chains, for these communities, were thus inextricably linked to the actual enactments and speculations of sociomaterial mutation. Plastic's mutability, as enacted and elaborated in this setting, seeks a deeper examination of these plastic processes – their conditions and potentials, especially when threatened or disrupted.

In effect, with the new solid waste management (reforms) instituted across India, and in Ahmedabad city in particular, the access to plastic waste – so essential to recycling processes – came under intensified mediation from the state and its private contractors. There were new rules, obligations (with penalties), sites,

machines, routines, and organised work, that sought to effectively deny access to foragers to plastic waste generated from households, shops, and accumulating in the urban commons. Again, the new legislation mandating registration for recycling actors, ostensibly excluded *peethawalas* and similar traditional aggregators, segregators, and mediators critical for recycling operations. We shall discuss later how their systemic negotiations and registration (authorisation) was rendered difficult. As such, there were various resistances across the stages, and aspects of the recycling process. Therefore, to continue to recycle plastics necessitated addressing and re-mediation of these conditions.

On the other hand, state-sponsored private infrastructures of SWM, depending on plastic waste for high incinerability and profitable functioning, sought to put in place elaborate systems to securely localise and mediate plastic waste. However, in their actual quotidian occasioning, these infrastructures were rife with delays, operational failures, protests, limited access in certain locations, etc. They were routinely mediated by other infrastructures and interests, amenable ever so easily to co-option, methods of wilful subversion, and crafty concessions leading to plastics getting siphoned off, or becoming mixed with all sorts of other materials, losing their calorific value and incinerability. The recyclability, or the incinerability of plastics, i.e., plastic's mutabilities – to be more general, were not simply given. These material qualities, as they emerged through my research, were contingent.

Plastics have been theorised as materials with an essential character of infinite mutability (Barthes, 1971), amenability to any process – in theory, with capacity to take on any form and function; this character is termed as *plasticity* (Bensaude Vincent, 2007; 2013). It is as if this is the very condition of being plastic, intrinsically linked to plastic's ontological status. However, many authors have

taken a more realist and empirical view of plasticity, arguing that plastic may not necessarily be infinitely mutable, after all. In these regards, we could draw on the works of (Michael, 2013; Hawkins, et al., 2015; Dey & Michael, 2021; Dey, 2021; Liboiron, 2021) and others, where contextually-situated analyses of molecular enactments (say, how specific plastic objects and realities come together, and are de-formed/re-formed, with differential effects) visibilise the resistances, and limits to processual mutabilities in plastic. The empirical realism in Barry's formulation of 'informed materials' (Barry, 2005) is often cited as a case in point (e.g., see (Hawkins, 2013)). Discussing the pharmaceutical 'invention' of drugs, Barry analyses a non-linear and iterative, multi-stage process of molecular modelling, data curation, and categorisation, whereby molecular matter within R&D laboratories is accreted – informed – by various kinds of functional, technical, and pragmatic data. This information is attuned to particular production constraints, market, regulatory demands, etc. just as it is responsive to material specificities. Barry calls the latter material 'histories', alluding to specific derivations, configurations, and capacities of matter as they emerge and occur. Thus, actually-occurring molecules are always already informed, and as such, they do not concede readily and evenly (if at all) to every inventive process.

In this regard, Michael draws attention to the context, site, and situation of plastic processes at hand. While a somewhat Promethean 'infinite transmutability' may be afforded by petrochemical factories and laboratories (supported not least by expert knowledge, capital, and power), Michael discusses cases of limited plastic mutability (Michael, 2013). Drawing on the difficulties of DIY-craft, repurposing and 3D printing with plastics at home in modern-day England, he stresses on the resistances to practice by the various limitations of site, procurement of suitable materials, tools, knowledge and technical expertise, physical abilities, motivation,

and so on, but also on the processual mediations posed by matter itself⁹. In thus linking process and plasticity (what plastics might become) to a range of contingencies and infrastructural relations, Michael invites a pragmatic consideration of plastic's mutability. However, he also alerts us to multiplicity and differences: plasticity emerges as 'a plastic concept, its content and utility varying under different circumstances' (2013, p. 33). An observation that echoes, for example, in the multi-sited research of Hawkins et al. with Polyethylene Terephthalate (PET), as PET's malleability to production specifications do not translate to the recycling villages of Vietnam, where workers struggle to salvage recalcitrant PET matter (Hawkins, et al., 2015).

Attention to process, and how plastics are enacted as/in-process, both materially (say, with different polymer-types, additives, in varying proportions, forms, sizes, etc. as required by the process) and socially (say, through use and practice) – sociomaterially, also leads to an ontological proposition for these complex materials. Gabrys et al. (2013) wonder, for example, if plastics must be understood pluralistically, i.e., as ontologically separate – each plastic produced in a given context by incumbent relations and processes, or if, alternatively, plastics are better understood as constituting a singular family of materials with multiple variants¹⁰, their collective union enacted albeit by the supposedly

⁹ Design philosopher Manuel De Landa also conceives of materiality as relational and emergent, thus not fixed. Matter, according to De Landa, imbibes a range of possibilities (a more abstract notion of 'properties'), which may be 'expressed' (material 'capacities') selectively under particular circumstances: conditions of force, tools, technical manoeuvring, physico-chemical conditions, and so on (De Landa, 2011). It is only through the contextual combination of a range of sociomaterial forces, and mediations, that specific material configurations may express particular capacities.

¹⁰ Annemarie Mol raises, on various iterations, similar philosophical questions on ontological multiplicity. See (Mol, 1999; 2002), for example. The questions of ontology, and of multiple ontologies, have received renewed attention in anthropology and sociology over the recent decades, a broad and uneven corpus of scholarship labelled as the 'ontological turn'. See (De Castro, 2015; Graeber, 2015; Todd, 2016; Holbraad & Pedersen, 2017), among others, for a range of scholarly positions, alignments, and contestations within these debates.

ubiquitous quality of mutability. Grappling with material capacities that may be considered as inherent to plastics while also levelling with the emergent nature of plastic's properties and unfolding capacities in the world, Gabrys et al. argue against a dichotomy that foregrounds plastics as one thing (fixed) or the other (emergent). Instead, drawing on process philosophy – e.g., (Whitehead, 1978; Fraser, 2006; Halewood, 2011), they propose an ontology of plastics that is empirically grounded. As such, what plastic is (even its supposed mutability), is contingent upon the practical context, its ontology emerges by 'thinking through' sociomaterial specificities (see also (Henare, Holbraad, & Wastell, 2007) for recent social scientific turns in developing an empirical ontology of matter and materiality). The focus is shifted from the abstract to the actual, the practical, and the ethnographic – towards 'developing an empirical ontology of how multiple plastic realities are enacted and their effects' (Gabrys, et al., 2013, p. 4).

My research joins this body of realist studies of situated plastic processes, their sociomaterial stakes, enactments, effects, and possibilities¹¹. In order for me to develop a grounded set of analytical arguments, however, I highlight a few conceptual underpinnings, and specify theoretical frameworks on which I draw. As the reader may already have noted, one of the key contentions for analysing plastics and plastic processes are their inherent hybridity. By hybridity, I mean the co-constitution of the human and non-human, nature and culture, society and matter, people, (emancipative) politics, and plastics; the entities and collective networks that I am interested in are hardly 'pure', instead, they are always already heterogeneous. Second, I begin to trace a theory of power and difference drawing

¹¹ Especially in the political possibilities elaborated with plastic (waste) – say, how different civic communities and practitioner-networks, including state agents, come together and mobilise around urgent matters of plastic waste disposal, collection, re-circulation, and processing – my thesis will interest a now-established sub-field of material politics (see (Bennett, 2010; Braun & Whatmore, 2010; Barry, 2013) among others).

on the empirical specificities of my fieldwork, one that enables discussing the opening up and closing down of possibilities, persistence and change, or the coming and holding together (or not) of different hybrid entities. In particular, one that will allow conceiving of capacities to act (not least to enact plastic mutability), but also muting – marginalisation, reduction in capacity to act, non-representation – of certain actors as particular plastic processes are occasioned. Lastly, we harness a geometrical framework where the flow and fixity of information and matter are not necessarily pre-defined (say, reliable directionalities as in Euclidean geometry) but potentially more promiscuous in everyday processes, and where these materials may get transformed in these processes, potentially as unplanned and unpredictable. In effect, my work will begin to iteratively draw on various theoretical resources, also adapted in light of knowledge from my fieldwork. Such a contextually-attuned theoretical framework will prove useful as we study the actual everyday interpretations, interferences, improvised practices, complex mobilities, and frictions characterising the solid waste management infrastructure put in place across scale by the state and its (private) agents. Indeed, as we shall find out, things often do not go as planned, rules/texts get translated unreliably, plastic (waste) escapes, suffers admixture, gets siphoned off despite explicit systems enacted to contain its various manifestations. The 'infrastructure' emerges as a complex assemblage, folding in, co-opting, becoming co-opted, and composed with other actor-networks. Yet, movements of destabilisation and denial of processes link continually and inextricably to a range of sociomaterial opportunities opening up.

Drawing on Actor-Network Theory (ANT), Post-ANTs, and their Critiques

Attunement to the more-than-human (animals, technology, material...) as co-constitutive of the 'social' (conceived by default as 'hybrid'), production and (de-)stabilisation of knowledge, formation (but also dissolution) of networks and associations, and the complex circulation of matter and information (especially non-linearly) receive fundamental attention in Actor-Network Theory, which arose in the 1980s through the social studies of science. Far from a neatly packaged analytic recipe that can be applied across research contexts, however, many of ANT's proponents, like Latour, later dismissed ANT having ever been a 'theory' at all, perhaps an ontology instead. For Mol, ANT is 'a set of sensibilities ... a rich array of explorative and experimental ways of attuning to the world' (Mol, 2010, p. 265). In this regard, Michael highlights a contextual adaptability and practical orientation in ANT, which for him, is 'a complex, and oftentimes disparate, resource ... that opens up a space for asking certain sorts of methodological, empirical, analytic, and political questions about the processes of the (more-than-)social world' (Michael, 2017, p. 3). Emerging from studies of scientific knowledge construction, translations (say, from the laboratory) and circulation of texts, stabilisation of communities of expertise, enrolment of publics and network building, and the ensuing domain of politics (see, for example, (Callon & Latour, 1981; Latour, 1983; Callon, 1984; Latour, 1987; Law, 1994; Latour, 2005; Latour & Woolgar, 2013)), over time, ANT has travelled across the world, combining with a wide range of texts, generating interest across a broad variety of practical contexts and research disciplines (but also becoming re-moulded, re-discovered,

redrawn, and challenged in all sorts of ways)¹². Emerging therefore in a piecemeal manner, attuned to specific contexts, ANTs (always multiple) have drawn on antecedent theories, and philosophies, discovering ‘influences’, histories, legacies, and retrospective links from figures as diverse as Whitehead, Serres, Tarde, Greimas, Elias, Garfinkel, Goffman, Deleuze and Guattari, Derrida, Mol, Badiou, and Connolly (notably not much of Kant, Comte, Marx, Weber, or Durkheim here). To this list of white, Euro-American, (mostly male) experts, one could add – since the frameworks of ANT permit – knowledge from other sources, not least from practical experts. Thus in this thesis, foragers like Kantaben, Veenaben, *peethawalas* like Gauravbhai, plastic recyclers like Aqibbhai and Anandbhai (introduced below), or from Awachar’s fictional or real *lohaar*, all of whom had a great deal to teach me and orientate my conceptual understanding (as ‘theories’ do!) about objects, bodies, networks, infrastructures, and politics being (re)moulded through process.

For ANT, ‘hybridity’ is not merely an observation but a stronger ontological proposition that, for some proponents like Latour (1993), is a pre-condition to planetary being. Humans and non-humans are not tenable categories as being is always already entwined, and emerging, in a permanent betrayal of purificatory projects, say, of caste, gender, or a colonial modernity that seeks pure – mutually

¹² See (Michael, 2017), for example, for a cursory survey of the range of sites, research contexts, and disciplines that two key ANT texts – Michel Callon’s ‘Some Elements in a Sociology of Translation: Domestication of the Scallops and Fishermen in St. Brieuc Bay’ and Bruno Latour’s ‘Reassembling the Social: An Introduction to Actor-Network Theory’ – have (been) attached to, and their theoretical, conceptual, and empirical emergences across disciplines (from Sociology, Anthropology, Science and Technology Studies – STS, Geography, Management and Organisation Studies, Cultural Studies, Political Science, Political Theory, Social Psychology, Design, History, Philosophy, and so on). ANT has since been adopted in a rich and wide-ranging array of research problems from ‘the politics of migration in Southeast Asia, the role of romantic narratives in gay relations, ... the representation of intellectual disability’ (Michael, 2017, p. 1) to education (Fenwick & Edwards, 2010), rubbish politics in Buenos Aires (Newell, 2010), nuclear waste disposal in northern Europe (Hietala, 2018), storm drains (Ranganathan, 2015; Sreenath, 2019), and the caste and technoscientific politics of manual scavenging in India (Khatarker, 2021).

exclusive – classifications, like society and matter (see (Shotwell, 2016; Liboiron, Tironi, & Calvillo, 2018)). Materials, animals, microbes, technologies (plastics not least) proliferate and constitute lives, their conditions, and very ontologies (say, a manager is no longer a manager if stripped of their technology – phone, computer, printer, chair, desk, and so on (Law, 1994), similarly, a modern consumer is difficult to enact without plastics). Hybridity is thus normative, the state of being itself, albeit unfolding in a ‘world of becoming’ (see (Stengers, 2010; Connolly, 2011)). Paraphrasing Whitehead, ‘prehensions’ congregate – come together – ever so routinely to constitute ‘actual entities’ (including categories), which may take various sociomaterial forms (see (Whitehead, 1978; 1985)).

This is not to say that purified categories do not exist. On the contrary, they do. But purification needs doing, maintenance, and work and ‘is under pressure’ (Michael, 2017, p. 43). As such, ANT is concerned instead with how entities are constituted and shaped, how categories come into being, how associations and networks are formed, ordered, how these ordered patterns are stabilised, and how – through what processes – they disintegrate, or emerge in complex, unexpected ways¹³. In short, how ‘reality’ itself is enacted. These are processes that Deleuze and Guattari would call ‘territorialisations’ and ‘de/re-territorialisations’ (Deleuze & Guattari, 1988): continual processes of ‘opening up’ and ‘closing down’ of possibilities. They deploy the analogies of roots and rhizomes to illustrate this point; roots – say, as more linear patterns of ontological organisation – are not necessarily detached from rhizomes – say, more

¹³ To be sure, ANT has undergone many critical iterations and emerged over time. To be sure, earlier formulations of ANT have been critiqued (see (Martin, 1998) for example) as overly linear, discrete, and centralised in their formulation of entities, networks, and agency/control (say, that of scientists within scientific projects, dissemination of information, network-building, etc.). These critiques and concerns have co-constituted what-one-might-call ‘post-ANTs’. See (Michael, 2017) for a development of these debates, and critical emergences within ANT.

heterogeneous, nomadic inter-linking of/between/within elements. Instead, roots are particular – if not polemical – instantiations of rhizomic movements. Thus, patterns may not only emerge, betraying their fixity, but their ‘movements of deterritorialization and processes of reterritorialization ... (are) relative, always connected, caught up in one another’ (1988, p. 10). These processes of sociomaterialities coming together to co-produce knots and realities (again relative) may only be accessed immanently as ‘events’, occasions which may have unexpected outcomes (not least for the researcher, who may also emerge transformed from the ‘research event’ – see (Fraser, 2006; 2010)). With Deleuze and Guattari and other parallel formulations of complexity, iterations of ANT shed some of their more classical network-metaphors, and adopted much more non-linear, heterogeneous, and dynamic formulations of patterned sociomaterial arrangements: ‘assemblage’ (*agencement* in French).

ANTs – classical or later formulations, do not presume a hierarchy between categories and instead propose notions of ‘symmetry’, where no pre-conceived hegemony (say, between human and non-human, between fellow humans, between nature and society) is admitted. Instead, orders, patterns, just as categories, are encountered immanently in their actual assemblages. As such, categories – say, self, other, body, society, tribe, race, gender, culture, matter, local, global, infrastructure, and so on – that have tended to dominate mainstream social scientific formulations, are not readily accepted. They are not denied, but studied through case studies and in practice. Furthermore, with the assumption that these are not fixed, but somewhat malleable – in theory at least, and are amenable to emergence.

Underlying (but also enacted by) processes of heterogeneous and nomadic coming together, entangling and disentangling, of things, are frameworks of circulation that exceed a linear geometry along pre-formed patterns (territorialisations). We draw on the notion of ‘topology’ – as found not least in the hermeneutics of Serres (see (Serres, 1982a; 1982b; Serres & Latour, 1995)) but which has since been elaborated in rigorous empirical and theoretical iterations (see (Lury, Parisi, & Terranova, 2012)). Topology admits an immanent inter-linking of points (subject-objects, texts, spatial sites, temporal moments) in contrast to the more rigid associations, permutations, and combinations permitted within pre-defined Euclidean geometries. For Michael and Rosengarten (2012), transformation of the relations between points are not necessarily fixed or causal, in a linear sense, but open and immanent: topological. Indeed, as will be apparent in the ensuing analytical chapters on the mundane life of plastic waste management infrastructure in Ahmedabad, India, a number of actors and constituencies, including those not included within formal rules and normative legislative frameworks, co-mingle beyond pre-planned relationalities drafted by the state. In actuality, sociomaterial interactions exceed set patterns, new (parallel, hybrid) routines, sites of plastic waste localisation, communities, and ethico-political relationalities come up, and sociomaterial associations look much fuzzier and more penumbral on the ground than a normatively planned infrastructure would expect. In this respect, my observations echo ethnographies of non-linearity, disruption, and non-normative emergence in infrastructures like (Appel, 2012; Amin, 2014; Anand, 2017; Kallianos, 2018). Topology enables us to talk about these non-linear, iterative, even subversive, associations, that immanently emerge and enact the infrastructure in practice. As we consider the ‘fluid movement of entities across different patterns of associations’ (Michael,

2017, p. 62), say, plastics across different pairs of interested hands or practical networks, or governmental rules translated in actual municipal interpretation and practice, seemingly distant things – people, objects, sites, regions, communities, caste-groups, experiences, social memories, legacies, practices, tools, techniques, (non) financial incentives, and relations – may be brought in play to closely relate, align, ally, co-inform, conspire, but also conflict, enacting present processes and networks in complex iterations. As Hawkins (2013, p. 51) does with regard to plastic's disposability, we deploy topology 'to map the myriad entities, and ... regimes that become connected in the multidirectional enactments' of plastic's recyclability or incinerability.

Earlier formulations of power, control, and coherence within actor-networks have hinged upon the reliable circulation of texts whose meanings remain stable, and which can combine numerous representations into bodies of knowledge that resist problematisation (Michael, 2017). Latour calls these binding texts (say, messages, instructions, manuals, mandates, rules) 'immutable mobiles' (Latour, 1987). In my thesis, we will encounter many such texts that aspire to enact coherent sociomaterialities and infrastructures (solid waste management rules, template application/reporting forms, (sub) contracts, standards, devices, socio-ritual mandates along caste and gender lines, etc.). But we shall also observe how these get modified in limited ways through localised re-interpretations and improvisation (even undesired and unexpected developments). Somewhat reminding of centralised regimes of control (perhaps Foucauldian (Foucault, 1975)), technologies of network control (with discourse – as Law calls them 'modes of ordering' but also tools, machines, people, positions, and devices that

faithfully contain and convey meanings and therefore, hold networks together¹⁴) have undergone critique, not least from other ANT proponents (Law, 1994). The notion of 'mediation' has since been proposed (see (Latour, 2005)) to address some of the ways in which meanings are 'reconfigured as they are passed along, thereby proliferating and complexifying associations (as opposed to simply reproducing them)' (Michael, 2017, p. 47). Mediators, Latour writes, 'transform, translate, distort, and modify the meaning or the elements they are supposed to carry (Latour, 2005, p. 39). Chapters 6 and 7 pre-occupy themselves with localised occasions of mediation, and a crisscrossing range of sociomaterial mediators, which trick, subvert, by-pass, but also stabilise/re-intensify the centralised SWM infrastructure, and the recycling networks of plastics.

ANT-assemblage ontologies have been critiqued for not being cogently critical (Brenner, Madden, & Wachsmuth, 2011). These are especially in relation to fundamental notions of radical symmetry which accord equal potential for representation to the human and the non-human (thus, 'flatness') and pre-conceives no specific arrangement of sociomaterialities and power within associations, conceiving these instead as situationally knotted in particular configurations, to be encountered in actual events and studied in their specificity. While such an empirical sensibility and practical attunement has made ANT adaptable to study a wide range of contexts, the same approaches have been challenged for allegedly ignoring socio-economic and political pre-dispositions. Birch (2013), for example, seeks further attention on how political economies shape technoscientific networks themselves. Unlike political economic critiques, for instance, that make class relations prominent, or processes of socio-economic

¹⁴ Different authors have called them 'intermediaries' (see (Callon, 1991) for example).

exploitation and change distinct and explicit, ANT (especially classical ANT) has been claimed as 'politically useless' (Rudy, 2005), naively 'objective' (Brenner, et al., 2011). Marxist iterations in waste studies in urban Global South – as 'urban political ecology' (UPE), however, see value and have taken an ambivalent approach to ANT (Holifield, 2009). An older wave accepts hybridity, especially the enlisting of 'nature' 'in urbanisation processes under neoliberal capitalism' (Cornea, et al., 2017, p. 3) (see also (Swyngedouw, 1997)). In addition, recent 'second-wave' UPE accepts the agency of non-humans in the propagation of power but also destabilisation across scale (see (Mitchell, 2002; Gandy, 2005; Gidwani, 2008), also (Foucault, 1982) on the enactment of power in practice). However, UPE rejects 'other aspects of the (ANT) approach as uncritical and insufficiently explanatory' (Holifield, 2009, p. 639).

This is partly because ANT approaches in empirical research do not necessarily depart from standard social scientific categories (say, neoliberalism, corporations, colonialism, racism, sexism, etc.) and pre-defined scales of analysis. In this regard, feminist scholar Haraway offers a more generative critique; for Haraway, gender, class, or race (we can add caste) are not just constructed categories; but they also intersect, and inter-relate in complex manners to generate actual lived realities (Haraway, 1994). Haraway sees no problem in drawing on established categories, especially if they generate potent political critiques, as long as one is circumspect about their 'situatedness' (Haraway, 1988; 1998), not least as both the 'conditions and the outcomes of networks' (Michael, 2017, p. 64). Haraway's critique partly echoes Latour's ripostes to mainstream social scientific critiques¹⁵, but also offers post-ANTs

¹⁵ Latour writes, for instance, on the situated, networked, and constructed nature of critique itself (note, reflexively that the ANT-theorist is not absolved from this critique either (Michael, 2017)). In his

pathways to generate more explicit (besides situated) critical analyses. In his defence of symmetry, Latour points out the granular level of actual micro-interactions within sociomaterial associations that social theorists do not operate at, but comment authoritatively on ('fallacy of misplaced concreteness') (see Latour's critique (2003) of 'reflexive modernity' (Beck, Giddens, & Lash, 1994). Echoing this insistence on the finer micro-socialities and the enacted natures of actual citizenship, Woolgar and Neyland demonstrate through situated case studies of the mundane – from new wheelie bins to speed cameras, how Foucauldian 'technologies of self' are far less straightforward as they are subject routinely to flexible interpretation, contestation, and implementation in actual practice (Woolgar & Neyland, 2013).

Many argue that the point is not about the substitution of one set of research ontologies with another, but instead about thinking with and recovering from them innovative ways of studying positions, situations, and contextual realities, and posing questions that actually matter. For example, authors have raised limitations on imagining urban realities based predominantly on narrowly construed capitalist relations (Grove, 2009), especially within the complex intersectionalities in post-colonial cities (Ranganathan, 2015). In this regard, political economic critiques may actually complement ANT approaches in that the latter helps in pursuing 'questions that Marxist approaches might not open up' (Holifield, 2009, p. 639). Authors have since attempted to assemble Marxist

discussion of the 'factish' – a portmanteau of fact and fetish, Latour (1999; 2010a) rejects the premise that 'the social theorist has privileged access to "deep societal causes"' (Holifield, 2009, p. 647). In his 'Compositionist Manifesto' (Latour, 2010b) – which revises many of his earlier approaches, also in the now-classic essay 'Why Has Critique Run out of Steam?', Latour articulates critique as composition, embroiled in partial but generative networks of texts, meanings, and histories. He writes, 'the critic is not the one who debunks, but the one who assembles. The critic is not the one who lifts the rugs from under the feet of the naïve believers, but the one who offers the participants arenas in which to gather. The critic is... the one for whom, if something is constructed, then it means it is fragile and thus in great need of care and caution' (Latour 2004, 246).

critical theory and ANT-assemblage approaches (including a somewhat ‘weak ANT’) (e.g., (Castree, 2002; Gareau, 2005; Perkins, 2007)), while others like Holifield (2009) insist these are best kept separate.

Situating Plastic Mut(e)ability¹⁶:

In this thesis, I align with a post-ANT-assemblage line of thinking and doing. Mainly because my work draws on the centrality of plastic processes within human networks as elaborative of corporeal, social, economic, and political possibilities, notably ones that (aspire to) deny and partially mitigate pre-existing sociomaterial configurations. Hybridity is the premise. Symmetry is a useful – if not necessary – conceptual and political tool. Topology is dangerous, but also ripe with hopeful possibilities, not least for subversive sociomaterial and political alliance, especially when recycling networks are governmentally muted: denied (access to) raw materials, and *peethawalas* subjected to re-intensified infrastructures of regulation and potential exclusion from the formal infrastructure. However, I adopt a composite theoretical approach with regards to the critiques and concerns around classical ANT, and in so doing, align more properly with a post-ANT literature.

The complex sociomaterial legacies, relations, and instantiations of power that plastics and plastic processes enact, and are (/become) embedded in, assume key empirical and conceptual position in my thesis. As such, I do not eschew political economy, or large, powerful infrastructures that seek to circulate, and govern societies and materials (especially plastics) in particular ways. However, firstly, I situate and empirically describe some of these networks within various

¹⁶ Mut(e)ability, as a portmanteau, finds earlier academic usage in archaeology. Therefore, I do not claim to have invented the term. Instead, I pick up and re-purpose it. I briefly explain the term’s origin below.

contexts of their occasioning – across scales, and in so doing, present the readers with a complex picture of their intersectional, fragmented, and mutually overlapping, conflicting, and associative socionatures. As such, I use nouns like colonialism, capitalism, neoliberalism, public, caste, gender, etc. but I situate these categories, and show their complex compositions, erasures, discontents, and routine (albeit limited) transformations. I demonstrate, for example, how capitalist evaluations of plastic waste within large-scale infrastructures of incineration in India are not separate from, but are instead closely folded into, shaped by, and feed into purificatory political projects like Hindutva, and ongoing socio-economic practices of caste marginalisation. Again, I show that ‘informal’ recycling practices are not simply technical, or economic enterprises¹⁷ but networked practices with significant social, and political entanglements, stakes, and possibilities (as echoed above with Awachar’s poem).

In the process, my ethnographic data emerges as a key theoretical device in that it articulates sociomaterial configurations (read, territorialisations) of power (including infrastructures) in their contextual and practical specificity. This is done in very concrete terms pertaining, say, to how these sociomaterial layerings of power materialise, what they import to particular plastic processes, how they enable or deny possibilities to particular plastic practitioners, communities, and networks. In these regards, Chapters 4 and 5 present the ‘historic *production*’ (Ranganathan, 2015) of plastics (waste) as matters of ‘public’ concern, but also

¹⁷ Authors have debated the situation of material salvage labour and enterprise vis-à-vis post-colonial capitalism, especially in India. However, their political economic frameworks remain oddly fixated on ‘waste’ as a broader phenomenon and critical category for local and global capitalism. See (Sanyal, 2013 [2007]), for example, or (Gidwani, 2015; Gidwani & Maringanti, 2016) who add considerable nuance to political economic critique of waste-labour. However, they do not comment on the actual everyday forms of sociomaterial mediation, or their complex concatenation with a range of other socio-economic processes like caste, gender. As such, some of the mundane transformations within these categories, processes, and networks of work, including mediation of stigma and ‘valueless’ nature of waste, receive inadequate attention in these works.

as recombinant material, socio-economic, and political resources enacted around more modest practical and entrepreneurial contexts of re-use and recycling. Chapters 6 and 7 show how infrastructures are mediated in practice, and how alternative political possibilities, representations, alliances, material circulations, plastic processes, etc. emerge in more localised ways from the shadows – the different forms of abandonment, exclusion and violence entailed by a neoliberal system. I argue that these localised enactments are not parallel or ancillary, but constitutive of the actual infrastructure itself. Also, in devising *beeja* (alternative) solutions (Chapter 7) that work around the delays, leftovers, points of non-service and discontents of state-sponsored privatised waste management, citizens and (non-subsidised, informal) recycling communities end up enabling the system that is designed to fail them (Hodges, 2017, p. 326). As such, I offer not an opposition, but an alternative reading of political economies and their ongoing (albeit transformed) legacies of marginalisation and abandonment. This is in recognising political economy as processual – complex, intersectional, folded, contextually situated, emergent, but always partially and specifically encountered (in this case, by me or narrated to me by my interlocutors, or through desk-research and readings). My focus is not so much on the abstract (or contentious debates on the abstract), but instead on the concrete (or the plastic if you will!) and the actual. By socio-economically, spatio-temporally and politically situating different assemblages of plastic process, I aspire for my ethnographic analysis to offer situated critiques, or to simply ask some meaningful questions.

As such, I show how some of the assemblages of plastics within different socio-political networks are continually and relationally emerging: transforming (mutating), but also getting muted. I show that plastic processes do not occur in a vacuum. Instead, they are continually drawing (materiality, sociality) from,

overlapping, intersecting, intervening, becoming composite, aligning, but also conflicting and getting denied in all sorts of ways, with a range of other sociomaterial interests, compulsions, networks, and infrastructures (including state policies and programs here). The heuristic of plastic mut(e)ability, used as a concept, helps me perform this work, i.e., of ethnographically enacting mutating and muting sociomaterial processes and networks with plastic. The concept emerges from my empirical data, where multiple occasions of plastic's processual (im)mutability, and their multifarious, multi-scale realities and effects are encountered (essentially in a partial, piecemeal manner) through an ethnographic 'plastic trajectory'. With plastic mut(e)ability, I map a complex and inter-linked domain of plastic processes – how different plastic are made and re-made, and especially how these processes combine, or conflict, in order to open up or close down possibilities (differentially, for different constituencies). In other words, plastic mut(e)ability helps us in critically and carefully studying the complex and recombinant nexus of cross-scale, cross-site relations and processes that keep plastics mutable in a variety of ways (or not). In the process, a range of sociomaterialities (infrastructures, enterprises, livelihoods) are de-territorialised and re-territorialised. Thus, we arrive at a broader story of emerging public life in Ahmedabad city (within rapidly 'nationalising' India), where plastics are involved in the unfolding of collective more-than-human life and its complex politics in an uneven and unevenly plasticated world. I argue that plastic mut(e)abilities offer a generative path in conceiving and story-ing plastic processes, in critiquing and recovering there-from some problems and potentials of plastic's complex ubiquity.

Mut(e)ability, as a term, is not novel. It was perhaps first used as a portmanteau between 'mute' and 'ability'. A term borrowed from archaeologist Michael Shanks,

it was originally meant as abilities of 'mute' objects like stones and artefacts to 'speak' through the poetics and practices of the archaeologist (see (Schnapp, Shanks, & Tiews, 2004; Malley, 2012). I recover and re-use the term, but subvert its meanings in fundamental ways. Firstly, I disregard etymology and use the term to embody a particular case of mutability – the ability or the likelihood for change/transformation. Second, I am happy to retain the original meaning, ability of the mute, albeit with the crucial rejoinder that I conceive the 'mute' as 'muted' instead. 'Muted', as opposed to 'mute', recognizes the process of muting – a denial of possibilities and opportunities. It therefore visibilises the vital point that muted forms of being are enacted and not essential; they may even be amenable to (limited) further mutation. As such, mut(e)abilities, conceived with plastics, stand for occasions of plastic's mutability, or plasticity (as some writers propose – see above), that are open to situated empirical and conceptual elaboration. At the same time, it holds potential for articulating remaindered agencies, or sociomaterially construed processual possibilities, and their mutings. Enacted in process, plastic mut(e)abilities are context-specific and therefore, multiple (Michael, 2013). Their content and utility vary according to context, as they enable different stories of situated sociomaterial change and persistence. For a situated elaboration based on a different empirical context in rural India, see Dey (2021).

Enacting therefore a complex sociomaterial ontology, with plastics, this thesis aligns with post-ANTS, which 'place ontology in relation to practice, acknowledge the multiplicity of these practices and their performance of particular realities, and address the politics by which such ontologies (or realities) interact with one another' (Michael, 2017, p. 120). In furthering an 'empirical ontology' of plastics (Gabrys, et al., 2013), plastic mut(e)ability is premised (in this case) within a complex post-colonial politics, where multiple plastics are inextricably embedded

and involved in the elaboration of multiple communities, practices, 'publics', public spheres, and infrastructures. Unlike an 'ontological politics' (Mol, 2002), where multiple ontologies might get managed within a common framework of medical practice, or a hospital, or by a vision of 'future' within a laboratory (Brosnan & Michael, 2014), however, the ontologies of plastic strike as far more widespread, difficult to contain, or regulate, thus non-coherent. This is not to say that attempts at commoning multiple plastic ontologies are absent. In fact, they are, as Chapter 4 and 5 shall elaborate on the aspired drawing together of multiple plastic processes (production, circulation, trade, waste disposal, processing contracts, etc.) under a common legislative and techno-practical infrastructure within a broader unifying framework of ethno-political commitments towards 'Clean India'. But as we shall see (Chapters 6, 7), this ambitious vision does not translate reliably across scale and sites of practice. Multiple plastic processes and ontologies often find themselves intertwined in subversive ways, potentially despite the confines of formal law, and the apparatuses of governmentality. That is, different enactments of plastic may emerge topologically. For example, dry (plastic) – wet (food waste, etc.) containment chambers are routinely breached within municipal waste collection vehicles as such segregation, though critical for profitable incineration, emerges as impracticable; underpaid municipal waste-workers siphon off plastic waste by hand and store them separately to sell these at roadside *peethas* for recycling. Again, citizens – dissatisfied with delays in the formal municipal waste collection – find and devise alternative pathways to send plastic waste to recyclers, *peethawalas* and *kachre binnewalis* in an essentially piecemeal manner; these circulations often ensured by the silent co-operation of underpaid [and bribed] law and order agents acting on their own volition. As such, we show how different

plastic processes, and networks (recycling, incineration) merge and emerge together to configure new possibilities. Therefore, with plastic mut(e)ability, there is an elaboration of a complex aggregation between multiple plastic processes, and we expand on the complex, topological (if not subversive) linking together of multiple plasticities. E.g., between the malleability of plastics at a design and production stage and its recalcitrance at the stage of post-use value recovery (Hawkins, et al., 2015), or domestic re-use and re-purposing (Michael, 2013; Dey & Michael, 2021), grassroots activism (Dey & Michael, 2021). One could ask, what other forms of coming together might plastics enable? Could these perhaps cater to concerns around environmental as well as socio-economic and political justice?

In this regard, plastic mut(e)ability offers a necessary articulation of muting – othering, the curtailing of abilities, and the reduction in processual possibilities – as necessary enactments of mutative processes and networks (not least with plastics). For example, in Chapter 5, I show how the pragmatic calculation of value and cost-efficiency from incineration processes led state-mediated neoliberal regimes to ‘manage’ recycling agents (like *peethawalas*, foragers), effectively to keep them out, potentially unable to access or process plastics legally (for competing techniques of recycling). In Chapter 7, I show how the enactment of standards of municipal waste-collection devices (re)produce a non-representation and marginalisation (from civic services) within low-income (and Dalit) neighbourhoods. Again, I discuss actual enactments of incineration processes, where-in certain quantities of plastics never reach the incineration plants, or where plastics get mixed with materials that reduce its incinerability. These developments would visibilise an apparent denial of profitable and cost-efficient incineration process. Again, I elaborate how alternative penumbral

networks of plastic localisation and flow emerge, which sustain recycling processes in a re-invented way. But even in these improvisations, one will note how some traditional practitioners – notably, *kachre binnewalis* – get shunted out, with their livelihoods potentially endangered. (Renewed) possibilities of plastic mutation opening up are thus inextricably linked to relative realities and relational experiences of new forms of muting – the closing down of possibilities (de-territorialisation).

In its conceptualisation of muting, thus, as constitutive of associative processes, this thesis aligns with further post-ANTs and cognate ethnographic research, not least, on the exclusion of infrastructures and the violence of standards – e.g., (Star, 1991; Bowker & Star, 2000; Lea, 2020). For Law (2004), writing on the processes of social science research, any practical methodology entails an enactment of the ‘other’: those that it fails to include within its conceptual, technical frameworks. Especially for plastics, which are embedded in such a dense nexus of multiple sociomaterial relations, any action with plastics (say, moving plastic waste from here to there) is necessarily political, and polemical, potentially constitutive of (but also denying) recombinant interests and positions along the lines of caste, class, gender, ideology, region, religion, and so on (Dey & Michael, 2021). For practical networks of plastics (recycling, incineration...) to constitute (territorialise), or re-constitute (re-territorialise), mutings are inevitable, since these are not simply outcomes but are constitutive of the very processes and their supporting infrastructures. These reckonings will serve as necessary reminder for us to be circumspect about the possibilities elaborated by ongoing plastic processes.

Finally, in discussing a series of processes and processually enacted ontologies of plastic, plastic mut(e)ability draws attention to a temporal dimension in analysing plastic's multiplicity. In view of plastic's potential persistence, one could ask how – through what other processes – plastics might get enacted, and what forms of realities, and politics might thus unfold over time. With plastic's ubiquity potentially enabling the coming together of plastic ontologies to co-produce realities despite (perhaps beyond?) state or neoliberal control, one might speculate on the possibilities of 'futures' through alternative modes of sociomaterial aggregation. Especially in view of the mutative possibilities of plastic, but also potential mutings, one could ask what forms of sociomaterial inequalities, and hierarchies, get produced, or become re-entrenched through ongoing processes of plastic. The thesis will shed light on some processes of sociomaterial mutability. It will not offer definitive answers as there are none. However, in its meditation on ongoing plasticities of plastics, and their multifarious sociomaterial, policy, and political implications, the thesis shall raise questions and make multiple empirical and analytical observations to potentially mobilise around. To be circumspect, the thesis is also necessarily limited (and afforded) by my own socio-practical positionality, history, and technique. Partial and polemic, it is a drop in the ocean, that joins fellow researchers across disciplines, activists, practitioners, policy-makers, and politicians, in grappling with the complex, unevenly ubiquitous phenomena that plastics embody, and engender.

In conclusion, I have set out my theoretical sensibilities in this chapter. I have situated the key heuristics and the conceptual framework that I shall work with, but I have tried to do this cautiously, exercising a careful improvisation in close attunement to the specific historicities and political economies that enact my empirical context. More conceptual literature, for instance that on infrastructure

in its ontological complexities, will be evoked later in the analytical chapters that deal more properly with such research themes. In the next chapter, I elaborate on the actual conditions, and methods of knowledge production which will offer the reader an ideally robust insight into my process, processual networks, positionality, etc. helping them identify some of the key 'events' (alongside their partial compositions, and motivations) that served in the crafting of this thesis.

Chapter 3: On Methodology

A Plastic Trajectory

Plastic makes a difficult object for anthropological research. Firstly, more than a material with an inherent set of properties, plastic is more-or-less an umbrella term used loosely to denote a range of synthetic materials with a diverse set of properties. That is, there is no clear delineation as to which material is plastic and which is not¹⁸. Furthermore, as a plastic object interacts with human users and mediators, as it gets tinkered with and subjected to a range of physico-chemical agents, non-humans, and so on, in course of its worldly circulations, it is not certain that the object will maintain the integrity of its form and properties. Instead, in degrading or becoming compounded with a range of other chemicals and bodies, its materiality may itself become complex and emergent, (ethically, techno-practically) difficult to extricate, 'know' and measure by existing techno-scientific practical standards (Liboiron, 2016). Finally, a plastic object might be part of a wide range of design, commercial, economic, practical, social, waste management, and regulatory relations, where they may find engagement, acquire materiality, meaning, and value in many different ways (Gabrys, et al., 2013)¹⁹. Therefore, more broadly, plastic is ontologically multiple (Mol, 2002), that is, it is

¹⁸ Techno-scientific forms of identification are no less complex, as diverse fields of expert knowledge, texts, manuals, and regulatory frameworks define and classify plastics differently. In this regard, we must also cite more localised techno-practical standards and public knowledges, which might tend to identify, calibrate and categorise plastics in different ways (see (Henderson & Green, 2020; Pathak, 2020; Schönbauer & Müller, 2021), for example, on public perceptions of plastic). In effect, one of my early interlocutors, the manager of a plastic waste aggregation warehouse in Mumbai, had confidently explained to me: PET bottles were 'plastic', but polythene bags were not – they were *kachra* (devoid of value). '*Kachra*, but still plastic?', I had asked for confirmation. 'No!', was the firm retort. My interlocutor's categories of 'plastic' had me confused. Later, upon wider inquiry within the material salvage, revaluation, and exchange networks, the vocabulary appeared common. It seemed to constitute a shared techno-practical vocabulary that made complete sense, locally.

¹⁹ For instance, a plastic 'carrier bag' may be a market device for designers, commercial strategists and manufacturers (Muniesa, et al., 2007; Hawkins, 2012), a matter of convenience for a consumer (Dey, 2021), a matter of waste management once discarded (Altman, 2018), an object of risk and governmental regulation (Pathak & Nichter, 2019), or of care and ethical ambiguity (Hawkins, 2001; Dey & Michael, 2021).

enacted by a wide range of practical relations. These relationalities are not simply material, but social and political as well, not fixed but complex and emergent: mutable. To research plastics is to also research these complex (more-than) human worlds.

Starting my research design, one of the first challenges involved the identification of the object of my study, i.e., to delineate the 'field' of my research. Social scientific researchers of plastics have, in the past, 'fixed' the material, or the object, that they sought to study (see (Westermann, 2013) for polyvinyl chloride – PVC, (Knowles, 2014) for flip-flops, (Hawkins, 2012) for food packaging, (Hawkins, et al., 2015) for polyethylene terephthalate – PET (water) bottles, (Coleman, 2020) for glitter, (Dey, 2021) for polythene 'carrier bags', among others), much like the object of Mol's own study on ontological multiplicity – atherosclerosis. However, following my previous professional commitments and continuities of plastic experience, my interest lay not in any particular polymer-type or object configuration – but on plastic itself as a sociomaterial phenomenon, that was distributed yet specific and malleable. For similar reasons, I resisted the temptation to study plastics exclusively 'as waste' (see (Pathak & Nichter, 2019; McKay, et al., 2020) for problematisation), as waste sought to orientate subject-object and value relations in very particular, though varying, ways (Hawkins, 2006; Liboiron, 2019). On the contrary, during my earlier career as a field engineer for plastic waste management, but also in personal life, I was routinely encountering techno-practical, discursive, and socio-political mediations that re-enacted discarded plastics as 'new' objects of use, re-use, concern, care, domination, socio-economic mobility, mass mobilisation, and so on (see (Dey & Michael, 2021; 2021)). Was there a way I could study the material as well as

social (including cultural, political, economic) mutabilities (rather than pre-fixed ontologies) of plastics, I wondered.

Also, crucially, given the complex nexuses of relations that plastics constitute (and enact), can the researcher be detached and fixed in their specific research-relations with the plastics they study? The ontological complexity of plastics may be overlooked in some aspects of positivist research, but this was neither my intention, nor a choice. Indeed, how does 'one' even study plastics, as the researcher is hardly a coherent entity? The researcher relates to plastics not only in the context of research, but also in a variety of other significant contexts: say, as consumers, kin, artists, activists, planners, and so on (see (Roberts, 2010; Dey & Michael, 2021) among others). Perhaps the human researcher may even have ingested plastics or imbibed its many additives and derivatives to bio-physiologically emerging effects. Each of these relational contexts and mediatory experiences leave their marks on the researcher, who becomes co-constituted, in part, by all the plastics populating and interdigitating in their lives. As such, where does plastic end and the human begin? Such a 'hybrid' rendering of plastics enacts research methodology as necessarily ontological (see (Latour, 1992; Latour, 1993), for example, on a networked elaboration of the human and non-human hybrid). It also necessitates choice in the conduct of ethnographic research, which therefore, must emerge necessarily as a form of speculation, and a narrative performance, which is at once partial in its delineation, piecemeal and problematic in its grounding, framing, and claims (Law, 2004; Parisi, 2012).

To be sure, from the 1980s, following globalisation discourses, and the increasing significance of studying connected, spatio-temporally extended phenomena (say, like a Chernobyl disaster and radioactive fallout), disciplinary meditations in

anthropology on object, place, time, and practice have had to undergo necessary revisions. In this regard, perceptions of, training, and practical tact in ethnographic fieldwork have also been animated by generative critiques and prescriptive changes (see (Gupta & Ferguson, 1997; Faubion & Marcus, 2009) for some of these iterations). Not so much a pre-existing reality, but the object of study – the ‘field’ itself – is increasingly understood as ‘constructed’. Amit succinctly elaborates on the nature of ‘construction’ of the field: ‘... in a world of infinite interconnections and overlapping contexts, the ethnographic field cannot simply exist, awaiting discovery. It has to be laboriously constructed, pried apart from all the other possibilities for contextualization to which its constituent relationships and connections could also be referred’ (Amit, 2000, p. 6). From this point of view of anthropological study, the field is not independent of the fieldworker anthropologist, but is linked intrinsically to (and limited by) their intentions, positionalities, techno-practical abilities, compulsions, and so on (Karasti & Blomberg, 2018). In my delineation and definition of ‘plastic’ and practical performance of ‘fieldwork’ on plastics, therefore, I join this emerging movement of methodological work in the discipline, where identification, access, positionality, and boundaries of the ‘field’ are not so much fixed entities as processes in development, that are critically and carefully reflected upon, and which fundamentally shape the research output and representational work.

My onto-methodological research perspective also overlaps with and echoes a feminist stance in knowledge production, where the ‘personal’ is not considered as separate from the performance and emergence of research, instead constitutes a vital component in its elaboration. It situates knowledge and grounds its claims in the partiality of its context (Haraway, 1988; Stacey, 1988; Prins, 1995; Strathern, 2004). Yet, in the case of plastics – as discussed above, the

process of 'construction' is not as much autonomous a process as it is reciprocal, where plastics (conceived more broadly as sociomaterial) lay certain claims on the researcher and therefore, play a crucial role in the design and development of the empirical enquiry.

In particular, critical writings on the ubiquity of plastics (see (Knowles, 2014; Hawkins, et al., 2015; McKay, et al., 2020; Dey, 2021; Liboiron, 2021)) remind us that despite plastic's omnipresence, the proliferation and use of plastics are uneven, exposures and experiences (say, of plastic waste) are specific and varied across geographies, markets and demography, mediated by (more-than-human) forces and flows, specificities of bodies, but also deeply ingrained in social and material legacies. As such, the category of 'we' – when it comes to include this researcher and his readers – is necessarily partial, unstable, and emergent, as is the form of engagement or experience of plastics specific and different. Therefore, in going forward to describe how 'field' was delineated (say, why *this* experience of plastic was preferred over *that*), and how particular plastic practices and practical nexuses were accessed, I practice critical reflexivity on the body-politics and geo-politics of embodied empirical plastics research. These would inform the reader about my socio-practical positionality, mobility, methods, and choices made vis-à-vis which plastic practices, practitioners, and networks I was able to access, 'know', or stand with (TallBear, 2014), with full disclosure on the terms, conditions, and power relations underlying these processes of knowledge-making.

Practically, the 'natural' choice for me was to follow (Cook, et al., 2006) plastics, not in any pre-fixed form but as they mattered to me at the time of beginning my doctoral fieldwork. I went back to the sites, problems, and people during my

previous professional engagement (2014-15, as an engineer) in Rajasthan where my encounters with plastic's local and global entanglements and techno-social (im)possibilities had me shaken in my faith on acquired scientific and technical expertise, and had me eventually re-train as an anthropologist. The 'new' start would have to start to make sense of the 'old', and then see where it would take me. However, my methodological tact of 'following the thing' cannot simply be categorised into a prescriptive strategy for 'multi-sited' ethnography (see (Marcus, 1995; Marcus, 1998; Falzon, 2016)). This is because the 'thing' itself is not fixed, but emergent (as I demonstrate below), embedded in a complex of overlapping but also diverging relations across multiple sites, which the researcher might only realise immanently during practice. As such, a pre-calculated route performing multi-sited comparison was not deemed helpful at the outset, as it would entail biases and complications that the subject did not need. My trajectory was more improvisational than pre-planned, if not fortuitous to an extent. This does not necessarily mean absence of plan or itinerary going into fieldwork, as indeed, the main 'object' of research was plastics with the broader geography of India chosen as the 'site', where the study was to take place. Furthermore, particular situations in Rajasthan were to be my starting point with provision for regional expansion. By improvisation, I seek to highlight the fact that my preliminary plans were responsive to change, and in actuality, shaped by emerging meanings and encounters with specific plastic assemblages, that made more sense to pursue within the ethico-political boundaries of my practice. Indeed, my trajectory was also mediated by actualities and the very messy nature of immersive long-term fieldwork with its ethical priorities.

Finally, my onto-methodological experiences necessarily define representation and concept-building which is pursued through the ensuing chapters. As I put

down field experiences and sociomaterial relations on paper, order, and mould them into an argumentative (but also performative) narrative, I make conscious and calculative decisions to selectively visibilise and promote certain cases (and relations). In other words, I ‘anecdotalise’ them in particular ways to suit the intellectual and ethico-political demands of the thesis (Michael, 2012). Here, I am mindful of the ‘absent presences’ (Law, 2004), the abundance of plastic encounters that were constitutive or formative of my experience but which I have failed to record, or remember – not just due to situational demands, or by technical limitation, but also due to the sheer sensory saturation and physico-emotional fatigue of being continually surrounded by plastics. I shall have to downplay many events and anecdotes, or not present them here, intentionally – even those that I remember or those that are recorded, as these are either to be re-enacted later to develop different narratives, and intellectual arguments, or are never to be revealed due to the ethical concerns and cares their authors shared. Therefore, one could call my ethnography as a form of ‘plastic’ trajectory one, where conceptual work is guided and shaped not only by specific plastic encounters but also by the situational, relational, and practical demands and choices of representation by the ethnographer. Instead of a more-or-less pre-specifiable route through a series of cases, plastic trajectory iteratively ‘traces a fortuitous (research) path through a range of plastic encounters’ (Dey & Michael, 2021, p. 147). It is guided by multiple modes of fieldwork practice, positionalities, compulsions, forces, and choices. It is inventive to a degree, but also reactive and responsive, and allowed me the opportunity to produce situated knowledge by becoming (moved and guided by) plastics (and people) that I encountered.

In what follows, I elaborate on the sociomaterially-grounded technical, practical, and ethico-political aspects of the process of empirical enquiry and analysis, and

specify some of the choices, positionalities, and priorities that have guided my knowledge-making. All names of people (save public figures), and local organisations – unless stated otherwise – are pseudonyms, adopted to protect my interlocutors. Place-names and the names of caste, and community groups, are however retained.

Finding Ahmedabad (Again):

When I arrived in Jodhpur again in early 2018 to pick up threads from where I had left, the 'field' had moved on and it was dangerous to conduct fieldwork in the region on the subject of plastics. Right-wing Hindutva politics had re-intensified ahead of the State Assembly elections later that year, and in anticipation of the conviction by the Jodhpur High Court of a popular Muslim actor on charges of poaching animals that the locals held dear, there was general unrest in the air (Safi, 2018). Tension was palpable especially among environmental activists in the local Bishnoi community who were my primary contacts. Plastics were seen increasingly as *go-hattyara* (cow-killers), as these unsuspecting animals roaming the residential neighbourhoods of the city and surrounding villages ended up feeding on plastic litter and were suspected of dying pre-mature deaths from these ingestions. Cows were held in divine esteem and tended to be used as political instruments for vigilantism and community polarisation within the ethno-religious Hindutva discourse, subject to heightened 'public' protectionism (see (Adcock & Govindrajan, 2019)).

Any elaboration on the more mutable aspects of plastics met with discomfort and occasionally, male aggression. On one occasion, I was charged by a local of siding with cow-killers (with problematic allusions to the Muslim communities who were presumed to feed on cow-meat), for my more morally ambiguous stance on

plastic materials. My thesis was quickly turning into a discourse on religious fundamentalism and its discontents, a radical thematic shift that I was unable to accommodate within the existing intellectual and ethical frameworks of my research. Indeed, fieldwork practice had started bordering on emotional duress for participants (and for myself) which I needed at all costs to avoid. Furthermore, casteist ideologies underlying the division of labour and of labourers meant that the hazardous responsibilities of removing and processing plastic waste fell invariably on Dalits, usually local *chamaars* and *bhangis*²⁰, who were also socially marginalised (for a rich and historically critical discussion on caste being a pattern of 'dividing labour but also labourers' see (Ambedkar, 2002)). My plans to accompany waste-pickers and recyclers (and therefore to learn from their experiences of living with and handling plastics) met with strong opposition from village-elders and *panchayat pradhans* (local government heads) in rural Jodhpur, who were unwilling to have 'one of theirs' (my non-Dalit identity was evoked here) to walk and rub shoulders with Dalits. Despite untouchability being made illegal by the Indian Constitution, there was tacit understanding, if not verbal injunction, that to work with 'untouchables' was to attract hostility and to court marginalisation within these close-knit (semi) rural communities.

I was facing a practical impasse, when one of my old acquaintances – a plastic recycler from Ahmedabad city, the nearest metropolis to Jodhpur and the capital region of Gujarat – Rajasthan's neighbouring state, urged me to revisit the city.

²⁰ Chamaars and Bhangis would constitute sub-castes within the broader group of Dalits, or social outcastes who are excluded from the ritual discourses of the caste society (or the *varnashrama* – see below). Chamaars are Dalits whose traditional occupation within agrarian societies would have been to clear cattle carcasses from the territories and premises of upper-caste land-owners, and to pursue leather-work (leather translates in most North Indian languages to *chamra*, hence the social designation of the group handling leather – *chamaar*). Bhangis are typically Dalits who are assigned the abject work of clearing human faeces and disposing these at distant locations away from upper caste habitation spaces.

Back in 2015, when I was working as an engineer designing a plastic recycling facility for a cluster of villages in the rural Jodhpur region, I had visited Ahmedabad, especially Ramapir no tekro, a ‘plastic village’²¹ in the heart of the city, in order to follow plastic recycling enterprises and the practical networks of material mediation and exchange for which this particular place was known. Local recyclers and aggregators (*peethawalas*), but also an NGO – Manav Sewa – had offered me vital practical knowledge and professional contacts, and over time, I had managed to work with and keep in touch with many of these practitioners. Through ongoing WhatsApp, Messenger chats and occasional calls, I was aware of some of the professional anxieties pervading these networks following the new state regulations on their practice, as these acquaintances were made aware iteratively of my professional and disciplinary shifts. In Ahmedabad, I could reconnect with old contacts, find my way back into the thick of plastics and plastic-based practices – especially at Ramapir no tekro, re-align with my research agenda, and importantly, practice ethnography in a safer environment, and in socially acceptable ways.

My acquaintance’s suggestion made sense also in terms of the techno-political history of Ahmedabad and its place within the wider political context of neoliberal reforms in solid waste management. Indeed, Ahmedabad – Narendra Modi’s own political constituency – was the primary target for the successful implementation of the latter’s pet-project, the Clean India Mission, and the city, under Mr. Modi’s

²¹ Ramapir no tekro was not vernacularly called a ‘plastic village’, but with more than 20 plastic exchange, aggregation and segregation centres (as of 2018), and over 500 plastic foragers, all resident in and operating from this place, Tekro would be akin – if not similar to – to Hanoi’s ‘plastic villages’ which Hawkins et al. (2015) describe, and where large quantities of plastic of different kinds from across the city would be gathered by practitioners and sorted, cleaned, dried and re-packaged (a process I call ‘localisation’ – see Chapter 4) for onward processing by the materially-diverse and multi-modal techniques of plastic recycling. As such, Tekro’s spaces, societies, and materialities are largely clustered and unevenly shaped around the processes of plastic.

Chief Ministership of Gujarat (2001-2014), had emerged as an important site for techno-cultural experiments and privatisation in solid waste management infrastructure, a policy later put in place country-wide following Mr. Modi's election as India's Prime Minister in 2014 (I elaborate on these political historical relations, connections, and policy developments in Chapters 4 & 5). Furthermore, once a peri-urban marshland, Ramapir no tekro sheltered Dalits (especially *chamaars*), variously displaced during Ahmedabad's turbulent 20th century history. It now occupied central urban location, and residents set up and maintained the largest concentration of plastic localisation and mediation enterprises in the city, which offered livelihood, fuelled claims to property, and afforded limited economic and political power to the community. Tekro offered a conceptually generative setting where 'social' rejection and resilience found articulation through concerted, networked 'material' practices of re-mediating plastic rejects. Following consent from my academic mentors, from my recycling acquaintances, and written agreement with Manav Sewa to work temporarily as a volunteer for them within the community at Ramapir no tekro (in exchange of urgent housing accommodation in close proximity to the marshlands), I moved from Jodhpur 200 miles down south to Ahmedabad to pursue further empirical enquiry.

My birth, upbringing, formal education, and formative years in India had familiarised me with the broader history of the country and that of Ahmedabad city, which also happened to be the primary workplace of the iconic Mahatma Gandhi, since his full-fledged entry into the national politics of India's freedom struggle. The city played significant roles in the eventual shaping of India's colonial and post-colonial experiences; though my understanding of the city's history was indeed particular, and specific to my (and my family's) socio-economic situation and mobilities. In any case, Sabarmati Ashram, Dandi Bridge,

Wadaj were familiar names that I had heard of while growing up, and all these sites were located within a kilometre from Ramapir no tekro which eventually became a key field-site. My earlier professional visits and contacts with the city had also informed me more about the city and its royal, industrial, and political pasts – not only from local acquaintances but also from texts and museums.

However, there were many aspects about the city that I did not know. I was neither able to know ‘everything’ during my fieldwork, nor was this my aspiration, and in any case, much of my knowledge and understanding changed in course of time as I (re-) related with specific places, people, objects, materials, and infrastructures (see Fig. 6). Furthermore, my research focus on plastics and plastic processes served to ‘frame’ some of the broader associations and premises of my necessarily partial enquiry and opportunistic re-entry to Ahmedabad (see (Law, 2004; Michael, 2017) on othering within research methodology, also (Callon, 1999) for a helpful articulation of ‘framing’ and its partiality). Indeed, when I revisited Ahmedabad in 2018, I was already part of a pre-existing but emerging set of sociomaterial relations. I was in interaction with a set of people, places, and practitioners that enacted (and were enacted by) plastics in particular ways. Therefore, my prior and partial embeddedness within these relations necessarily pre-lineated and orientated much of my upcoming research enquiry, albeit with improvisation. By virtue of these existing contacts with recyclers, *peethawalas* and some *kachre binnewalis*, I was also pre-informed to an extent about the new municipal solid waste management (MSWM) infrastructure being implemented at the time in Ahmedabad as across India. Rarely resident in India myself between 2015-18 (except for professional and personal visits), my practical, material, and ideological relationality with the MSWM system (introduced from 2016) and its regulatory and inspectional

infrastructures was shaped more significantly not so much by personal experience, but by how my acquaintances and interlocutors in the plastic recycling networks related to this infrastructure since it was introduced. As such, I was always already pre-positioned to it, as it were, and my thesis was coming together, accreting, assuming substance, shape, and persuasion even before I may have known it.



Fig. 6: Re-relating. The Sabarmati Ashram of Ahmedabad, the community-living experiment and residence of Mahatma Gandhi is an iconic place which I had earlier read about in history books, or visited as a curious tourist. But here I was in 2019, foraging with another of my mentors, Duliben, for plastic waste left behind by a public meeting held in the Ashram premises. Courtesy: Author

In any case, while I could physically access Ahmedabad, and the various plastic practitioners located there-in across the city – including in the former marshlands of Ramapir no tekro, despite prior familiarity, it took me further efforts to re-position. I wanted to ‘know’ these communities, establishments, sites, processes and practical networks better. ‘Know’ socially, materially, and practically, in order to identify their inter-linkages, alliances, conflicts, and to re-acquaint myself with the broader sociomaterial relations, infrastructures, and histories that they were

embedded in, and which eventually lent meaning and materiality to the plastics that were re-mediated there-in. I say 'know' to the extent that I felt confident enough to write about the people, the plastics, and the practical, infrastructural phenomena with sincerity and ethical integrity. In the following section, I detail some of the methods of contextual empirical enquiry.

Knowing: On Methods

At Manav Sewa, my responsibilities were very limited and restricted mainly to distributing food and grains to the residents of Ramapir no tekro, and assisting in the pedagogy of local kids. This left me sufficient time during the day (and the evening) for my own research pursuits and the kinds of social contact my research demanded. In effect, my initial period of engagement with Manav Sewa proved foundational to my research enquiry; it helped me acclimatise, revive connections, identify the multifarious plastic processes and processual networks of interest, and strategic points of contact for access, while having a roof above my head. The association and shelter gave me vital preparatory time before I could launch into the thick of ethnographic practice.

My new residence at the Manav Sewa volunteer's house lay at the interface between the commercially prominent Ashram Road (right across the Sabarmati Ashram) and Ramapir no tekro, which lay behind, across a narrow patch of marshland. The volunteers' residence lay close to a narrow inroad through the marshes into the settlement at Tekro. This was an alley which many residents – especially plastic foragers from Ramapir no tekro used early in the morning to access large municipality bins and street litter along Ashram Road (and beyond) and return with their collects to sort and sell them at the numerous aggregation centres (*peethas*) of Tekro. Living in this interstitial space familiarised me with the

foragers' respective sortie timings, routines, and routes, and helped me make further contacts with some of them. Manav Sewa held weekly gatherings and community meetings with many of these female foragers of Tekro (who call themselves *kachre binnewalis*); I was allowed to interact with them, ask questions about their practice, seek their opinions and experiences of the new regulatory changes, municipal decisions, and infrastructural developments as they were being implemented in the city through 2017-2018 (indeed, as part of wider national policy). This allowed me the chance to reconnect and revive relations with many of them (from earlier contact), forge new connections, and offered scope to record their practical challenges, anxieties, and apprehensions during the tumultuous early days when MSWM and 'cleaning' infrastructures were being implemented in Ahmedabad aggressively as part of the Clean India Mission. I was speaking simultaneously to *peethawalas*, and recyclers and these narratives populate and inform my descriptions of the early challenges perceived by the recycling 'network' (broadly defined), who found themselves underrepresented in legislation and faced practical challenges in sourcing recyclable plastics. I present these across Chapters 5, 6, and 7.

However, some of these narratives also appeared somewhat incomplete (for example, foragers who spoke of insurmountable challenges to their practice were, nevertheless, still working and returned each day, with sizeable collects), if not performative, and I soon realised that these were partly mediated by the sociomaterial conditions and nature of our interaction. Again, following Manav Sewa's disruptive entry into the *peetha* business (I briefly elaborate on this in Chapter 6), my association with them proved distrustful to some *peethawalas* who chose not to engage with me (considered a representative of their competitor), share potentially sensitive commercial, techno-practical information.

Although my prior acquaintance with some *peethawalas* was helpful in assuaging some of these fears and establishing trust, my status still remained ambiguous. *Kachre binnewalis* also saw me as an NGO representative and chose to share selective and strategic information particular to the clientelist relationship, and to secure support – whether financial or tactical. In any case, the quotidian challenges and regulatory demands these practitioners faced in course of their practice were real, and these more detached forms of interactions nevertheless helped me identify the broader premises of my research around process and formulate its conceptual grounding. Notably, with the new regulatory infrastructure presenting challenges to the traditional salvaging practices and networks of urban solid waste mediation, how were the latter responding to these challenges, I asked myself. In what forms did these difficulties manifest? How did practitioners nevertheless keep their operations ongoing (or not)? What was at stake in these practical, social networks that made plastics recyclable? Again, what did the ‘new’ waste collection and processing system comprise – of what techno-processual vision, practices, practitioners, networks, infrastructures, sociomaterial organisation, contracts, and so on – and how was plastic waste supposed to be mediated and enacted under this new framework? What sociomaterial possibilities were being generated or denied in these intersections?

In my spare time, I was reading more carefully into environmental law and Solid Waste Management Rules (both current and past, and across municipality, State, and national levels), and engaging with policy, planning and academic literature to better understand the historicity and the emerging inertia in India’s (and Ahmedabad’s) MSWM policy direction towards privatisation and preference for large-scale end-to-end Waste-to-Energy (WTE) based infrastructures, and its discontents. I was also reading local newspapers – both in print and online, and

followed news about garbage accumulation, municipality plans, programs, communication, and protest. My studies were not merely bookish, even during this early phase. I had (academic) friends and fellow scholars in Ahmedabad (and elsewhere), who spoke to me on the topic, and introduced me to more scholars, resource persons, and practitioners – including municipal officers, administrators, politicians, industrialists, city planners, waste entrepreneurs, activists, civil society members, who informed me about the planning, the preferences and the practicalities of the new system that was being/to be put into practice in the city, each from their own socio-practical perspectives.

I also studied historical and sociological processes in the city – to better understand and contextualise its presents and futures within a complex past, where British colonialism compounded various pre-existing and subsequential social, economic, political, and spatial processes and patterns of producing and stabilising difference. In this regard, the Gandhi Ashram of Sabarmati, presently a museum and archive centre, gave me access to key archives about the city and national history, as did several online and offline archives, and local scholars reveal rich troves of information. My focus was on the various practices, programs, arrangements, and networks of removing waste and reviving ‘waste’ materials – especially those that mobilised lower caste identity and gender, and how plastics disturbed or fit into these cross-scale processual legacies. While archives and expert accounts offered valuable details, I also verified and triangulated much of this formal history with oral narratives of communities left out of such hallowed historiography²². As such, some of my historical scholarship,

²² Ramapir no tekro – as the settlement is now known – emerged from the marshes between a distributary of the Sabarmati (the Chandrabhaga), a cremation ground, and a colonial prison, when the boggy grounds were filled, made arable and eventually settled by successive incoming groups of marginalised Dalits – both through the colonial and post-colonial periods. Peripheral to the nearby Wadaj village, settlers of the marshes, depending on their sub-caste identity, tended to the nearby

especially about a historically left-out place like Ramapir no tekro or its enterprising Dalit population, is drawn from careful analysis of oral narratives, while being cautious nevertheless of their performativity (say, as recounted to me, an outsider, and a scholar), amnesia, or opportunistic discourses²³.

As a new resident in the city, I was speaking to my neighbours (not only NGO volunteers but also local residents who worked at the Ashram, or ran local businesses), to local shopkeepers, tuk-tuk (colloquially called auto-rickshaw) and taxi drivers, municipal waste collectors, sweepers, and so on, but also with (particular socio-economic constituencies of) residents from other parts of the city, who I came to know through their association with Manav Sewa. I interacted with my friends in the city, and with their friends and families, and as such, my

cremation ground, some tended to the *gaushala* (cattle barn) belonging to Gandhi's Ashram, some cleared garbage from the Wadaj village, while some set up cottage industries in clay pot-making, or performed limited agriculture and animal husbandry. However, despite their location and vital contribution to local society, the communities of Ramapir no tekro were not explicitly mentioned in any historical record that I could find. In course of my limited archival readings, I would notice consistent black-boxing of the place and the community from mainstream accounts of history. For instance, even though the marshland community was located right across the road from Gandhi's Ashram, where some local residents are even believed to have worked, I could not find their mentions in Gandhi's archived writings, correspondences, and letters, which are otherwise held as treasure troves by scholars seeking insights into the history of Ahmedabad and on India's freedom struggle, more generally. In the historical deed, through which Gandhi purchased land for the Sabarmati Ashram, the marshland is marked as a 'wasteland' under the colonial regime of land evaluation. Much of my historical sense of the place, which finds limited mention here, and especially in Chapter 4, derives from oral narratives by present-day residents of Tekro, who recounted to me rich, layered histories of settlement and work that themselves, their ancestors, and older generations of settlers had performed to make Ramapir no tekro the place that it was. A noted historian of Ahmedabad and biographer of Gandhi, also long-time director of the Ashram, had this to say during one of our later email conversations (08 July 2020): "I am rather ignorant of that community and its history during MKG's (MK Gandhi) times. I cannot recollect any mention of such a settlement in the Chandrabhaga during MKG's times in any document that I have studied. There might have been a settlement but that would have been a settlement around the cremation grounds of the dalits who tended the cremation area." Despite the community's new-found entrepreneurial power and limited economic prominence through plastic recycling, their relationship with elite knowledge-societies of the city appeared tense, at best, as I later elaborate.

²³ For instance, one *peethawala* would present himself as superior to a competitor, say, in terms of the ethics of their respective employment practices. Again, one local resident would recount a version of history in settlement and land-claims, portraying themselves as early settlers, not incidentally, countering their warring neighbour's claims and rights to the same land. As such, by no means did I treat 'the voices of the people' – so to speak, as innocent or authentic by default. Indeed, the lack of 'formal' history and 'official' documentation did present its scope for more localised claims, counter-claims, revealing messy knowledges and socio-economic dynamics, which needed careful comparison, sorting, and cross-checking across multiple sources.

'social' circle of knowledge production was expanding to include various communities of plastic practice. In these regards, I got to learn different perspectives on plastic, plastic product use, plastic (waste) accumulation, foraging, collection, and processing practices, as well as the Ahmedabad Municipal Corporation's (AMC) (and the Central Government's) new policies and programs in MSWM. Plastics and the different networked practices, and infrastructures of plastic waste mediation were, after all, more-or-less ubiquitous – omni-present and all encompassing, yet diverse and divergent. They were experienced, felt (whether in care or concern), practiced, and engaged with by each and every one, in specific ways, and everyone had something to say. Again, as a resident, sorting garbage and putting out (and drawing in) bins, I was also participating in the accreting waste infrastructure myself, and recording my own experiences with it (say, with regards to the regularity, or irregularity of waste collection services). As a consumer, I had particular relations with plastic packaging, products, and discards (which I carried to the *peethas*, and not hand in to municipal waste collectors). I was gathering piecemeal information from *here* and *there*, piecing together a necessarily fragmented, but personally experienced, embodied, body of emerging data, which interpreted, enacted and critiqued plastics, alongside the state of the city, the state, practical communities, and above all, infrastructures – their changing forms, patterns, inter-linkages, enchantments, promises and failures (Harvey & Knox, 2012; Amin, 2014; Anand, et al., 2018; Kallianos, 2018; Michael, 2020). In thus accessing data across sources, negotiating, and managing relational multiplicities, I was – perhaps inadvertently – following some of Star's prescriptions on studying infrastructures (Star, 1999). Although, in its early days of implementation, the municipal solid waste collection and processing practices, techniques, and networks were barely

streamlined, stabilised, or silent (perhaps as expected of normative infrastructures (Hodges, 2017)) and often attracted attention as noisy, smelly, messy, and irregular, rife with delays and postponements (although, irregularity emerged as a more permanent phenomenon (Dave & John, 2018; Kidwai, 2021) – this point is elaborated empirically and conceptually through Chapters 6 & 7).

My methods of gathering different kinds of information, recording, and turning them into data were barely systematic – in any strict sense, even during this phase of relatively detached conversational enquiry, as my personal and professional lives overlapped, contested, co-mangled in all sorts of ways, and I dipped in and out of texts, contexts, objects, sites, times, and relations, moving between participation and non-participation, engagement and disengagement, curiosity, and fatigue. I performed interviews (including semi-structured interactions and improvised chats) with different practitioners and constituencies, also including informal interactions in group (say, during weekly Manav Sewa meetings). Most of these were unrecorded for ethical reasons, or simply because I had no means available in that situation to record, and thus resorted to my embodied memory to remember. Occasional recordings were rarely performed through gadgets – which many participants found threatening, if not distracting. As such, I would take down quick notes in my notepad, or type keywords on my phone – depending on whichever device was available. My everyday also involved plenty of observation – whether fortuitous or expected, in course of my being physically present in the city as a resident and a researcher. In course of my personal mobilities across the city (say, to see a friend), but also on intentional investigative purposes (notably on a scooter in the morning which one *peethawala* would kindly lend me for 2 hours every morning, and I would re-fill fuel in exchange), as I ferried through parts of the city, I would observe different

points of garbage accumulation and collection by different agents, material transfers, and so on, identifying routes, routines, patterns, (ir)regularities, bottlenecks, and delays. Recording would often involve quick note-taking on my phone – sometimes halting the scooter to take down keywords – in the haste of situations just to remember fleeting but valuable moments, with careful elaboration later in the day at my computer, or in my notebooks and charts, remembering and reflecting upon these earlier observations. Writing field-notes, divided and sub-divided into folders, constituted the most significant method for remembering and recording date-wise and site-based information, events and interactions. It enabled such multi-sited, multi-source, cross-scale information to merge together, however unevenly, and co-emerge in time – come alive in different forms, expected and unexpected (Narayan, 2012; Pandian & McLean, 2017). I reserved weekends to myself for more analytical and reflexive writing (I tried to maintain separate folders for such writing) where I compared, triangulated, analysed and synthesized information collected during the week from across various sources (e.g., policy texts, interactions, observation, media reports, books, etc.) tracing overlaps, conflicts, and patterns, but also marinating in mess.

A note on translating vernacular tongues is also warranted here; my respondents mostly spoke Gujarati and Hindi, rarely English, though their speeches were occasionally fused with common English words (say, 'spoil' with regards to contaminated batch-processing of plastic consignments as we shall see below). I myself translated these utterances to English in my notes, attempting to retain their emotional tones and spirit as closely as possible. On occasions, I have retained local words that were significant, or untranslatable (say, *beeja*, or *binna*).

From mid-2018, my fieldwork routines and relationality of engagement changed significantly, as I started to engage directly in and focus on the various practices of localisation and mediation that made plastics recyclable. I reduced my 'volunteering' commitments to and associations with Manav Sewa, and moved out of the volunteer's accommodation that I was kindly offered. Instead, I rented a cottage nearby, still at the edge of the marshland, close to Ramapir no tekro. Such a performative distinction in positionality would prove crucial, as this allowed me to engage more autonomously with the communities of recycling practice based in the marshlands of Tekro, relatively independent of Manav Sewa. I started accompanying *kachre binnewalis* during their morning rounds – with due consent, acting as an active aid as they foraged plastics, sorted them cursorily, and carried them to the *peethas* for exchange. As I learnt about the city, spaces, times, and practices of plastic localisation (and challenges) anew, I offered an extra pair of hands, and supplementary labour to my mentors, who stood to benefit financially (more collects, more income) from these arrangements. I also sought apprenticeship in sorting, cleaning, baling plastics (against no salary) at one familiar *peetha* in Tekro, offering my labour and limited knowledge faculties in return. Eventually, I also ended up running errands, attending to ad-hoc tasks as they emerged at the *peetha* (say, accompanying a consignment of plastics to a recycler, accompanying a plastic collection round in the morning, accompanying the *peethawala* to meetings, etc.) and proved myself useful in a variety of ways during the regular work-day.

I would perform these more laborious modes of practical engagement 3 days a work-week, keeping most of Thursdays for my body to recover, and using Fridays to continue many of the earlier forms of observation of practice, and interviews with different other practitioners. Albeit with much reduced intensity. Evenings

were times for me to take notes, remember, record, and reflect on events and interactions of the day, while weekends, as earlier, were for reading, reflecting, and synthesizing aggregated information. This was the ideal routine, of course, as some interview schedules had to be adjusted to availabilities. Again, on many occasions, physical and mental fatigue took over, and I struggled to maintain intensity and regularity, playing catch-up ever so often. Indeed, through all these processes, my body, and its specific ways of experiencing space-time, relating, accessing, and responding, its own temporalities of remembering and processing information, but also complaining, emerged as the most important 'ethnographic instrument' (as writer Rebecca Altman described ethnographic research and writing about plastics in a personal chat²⁴). As such, respecting bodily tantrums and self-care were equally important parts of the process.

Walking in with *kachre binnewalis*, or for *peetha* work in the morning, working, eating lunch, and spending social time with the local residents, until I headed back to my cottage in the evening, I was practically spending the whole day at Ramapir no tekro for at least 3 days a week. This allowed me to closely observe the everyday life of infrastructures (including, roads, housing, sewage, water, and most notably, the solid waste collection infrastructure) in this socio-economically marginalised place. While my positionality as a (reasonably) elite resident and researcher in the city led me 'naturally' to relational experiences with the AMC's MSWM system in more affluent quarters, and those resident in them, a practically-embedded positionality vis-à-vis Tekro visibilised aspects of lived experience at a place that traditionally outlay historiography. To be sure, my frequent morning mobilities on a scooter opened up to me various cross-sections

²⁴ Altman clarifies on the genealogy of this phrase which was passed down to her from her sociology teacher at Brown University, Ann Dill, and as such, describes herself 'less a source and more a conduit'.

of the city's MSWM system across a wide range of neighbourhoods – including in low-income areas and other 'informal' settlements. However, despite following objects (say, waste collection trucks) and focusing on place-based patterns, more often than not, I, the ethnographer, ended up 'where the action (was) not' (Law, 1994). Contrarily, being tied to the daily routines of Ramapir no tekro, I was able – to an extent – to experience myself (and not simply observe) how the standardised MSWM infrastructure, in its everyday 'frictions' with the sociomaterialities of Tekro, reproduced historical patterns of civic abandonment. I represent some of these observations on MSWM infrastructure in Chapter 7.

Learning the different technical practices englobed within plastic 'recycling' and application put me in a different relational position vis-à-vis the practitioners. As I became the mentee, the supervisee, trying and erring, revealing my vulnerabilities, my mentor-co-workers (*kachre binnewalis*, *peetha*-workers, *peethawalas*) emerged necessarily as the experts (at times, the supervisors at the *peetha* workplace). This gave me a chance to build upon pre-existing relations and forge new bonds of trust, through direct relations of mentorship and engagement, embedding myself in a web of sociomaterial obligations, quite different from the power relations and moral grounds that foregrounded my previous brief initial position as an NGO volunteer performing 'service' (*sewa*) for social upliftment²⁵. Sticking to a 9-6 routine as regular workers (albeit I did this for

²⁵ Members of the civil society working in Tekro – including Manav Sewa – drew lineage necessarily from Harijan Sevak Sangh (HSS), which was started by Gandhi as a way of encouraging upper caste Hindus to perform *sewa*, i.e., community engagements for 'social upliftment' and eventual integration of Dalits – who Gandhi, controversially, called Harijans – into the social mainstream as an atonement for historical sins of marginalisation and oppression committed by their ancestors (see (Gandhi, 1954)). Manav Sewa founders, who I spoke to, had very particular ideologies underlying their notions of engagement and views on community identity, needs and priorities. Resident recycling establishments (*peethas*) did not draw favourable comments and were identified instead as hotbeds of illegality and exploitation where female waste-pickers (*kachre binnewalis*) were allegedly cheated on weight, price, and unfair rules of credit. Mentions of poverty, crime, lack of hygiene and education, gender inequity, etc. also occur frequently in NGO representations of the place and the community on their websites, annual reports,

3 days a week, while my co-workers worked 6 days a week), exposing myself to similar (surely uneven) bodily efforts, routines, fatigue, and risk as other co-workers, sitting down and sharing food, cooking for and being fed by co-workers and members of the community, helped me interact with practitioners on more equal terms, at least in the workplace. Sharing work (including carrying sacks of collected materials for foragers, or foraging from certain streets on their behalf) and responsibility (including during my employment at the *peetha*), being exposed together to street-dog attacks and making it through safely, working in long shifts with co-workers, waiting in shared anticipation of a recess, hurrying together through lunch, etc. drew co-operation, solidarity, and trust. These lengthy processual engagements also led to long hours of chat – sometimes simply to avoid boredom. These settings also offered me plenty of time and occasion to observe, and with due consent, (re-) formulate questions, and seek elaboration over multiple iterations.

This more egalitarian practical positionality, crucially, also enabled me to explain to my mentor co-workers over several contextual iterations, about myself (including my personal life), my profession, my academic discipline, my research project, etc. I could explain to them the nature and value of our ongoing interaction, the consensual basis of representation of information, the conditions of anonymity, secure usage of data, etc. in more grounded language and in shared contexts of activity, vulnerability, and risk. In the process, I would also encounter and ponder new facets of ethnographic practice myself. This form of carefully (re-)iterative engagement – which practice presented me, eventually

justifying intervention. These representations often diverged from accounts presented to me by Tekro residents themselves during my later more direct and socially-embedded forms of interaction with the community independently of Manav Sewa.

offered many of my interlocutors a sense of ownership of and responsibility in my research, re-mediating the power relations between the researcher and the researched to an extent (Nader, 1972). My interlocutors would almost always talk back, ask me questions, seek explanations, comment critically on my analysis and on socio-economic inequalities enacting our respective worlds: 'You and I are both removing lids off bottles. We are doing the same task all day. Yet, you will get Rs. 1,00,000 (the rough equivalent of my monthly studentship in Indian National Rupee) and I will get Rs. 6,000.' Eventually, when interlocutors consented to the use of certain details, they did so with a sense of control over information. Even to this day, some of my interlocutors call me and inquire about my work, my life, inquire after my parents and partner, the progress of my dissertation, offering further help and clarification, as we inform each other of the various developments on respective personal and professional fronts.

Engaging in practice opened up new areas of learning and potential knowledge-making. On the one hand, immersive, routinised, and relational body-work (see (Myers, 2008), for example, for embodied participation in the practices of molecular modelling), would help me acquire processual awareness and material information in my body: embodied knowledge. As I honed my sensorial and physical skills over time – developed muscular memories and bodily compartments around specific plastic materials, techniques, and technological devices, I came to understand some of the minute spatio-temporalities, sociomaterialities, nature of forces, techniques, etc. enacting different kinds of plastic practices within the broader framework of 'recycling'. By participating in different practices of localisation and mediation (which prepared plastics for the recycling factories) but also traveling with plastic waste and prepared consignments in small trucks, interacting with recyclers in their 'factories' in the

process, I got to learn about the city's recycling networks, practitioners, and the multifarious lateral and intersecting network relations (say with other infrastructures), constraints and improvisations enacting them. Embedded engagement (however partially) in these networks enabled me to understand some of the co-dependent, and overlapping relations between practitioners, rules of mutual conduct, flow of information, material and money, obligations, cares, practical hierarchies, and power relations underlying and immanently enacting these networks. In other words, I came to understand the corporeal and the 'social' that enact the 'material' (say, recycled plastic) and vice versa. I present this knowledge through Chapters 4, 5, 6, and 7.

While earlier, more detached, forms of interaction informed me of professional challenges only partially, direct practical engagement helped me encounter and learn about these challenges as they presented themselves practically in situations. In the process, crucially, I was able to observe, learn, and understand ongoing processes of improvisation, deflection, negotiations with bureaucracy, forging strategic alliances ('topologically' across multiple constituencies and infrastructures), devising alternative techniques, performances, and obligations notably to cope with the emerging demands and constraints on the process (not least with regards to the new MSWM regulations and inspectional infrastructures). Practitioners, who barely made a publicity of these improvisations to their practice during my interviews (especially as a Manav Sewa volunteer), were happy to elaborate on these techniques during consensual settings of co-work, practical co-operation, and learning. Over 8 months of embedded practice, spread discontinuously over two tumultuous yet significant years (2018-2019) of introductory state regulation, I was able to closely observe some of the fine-grained (cosmetic) adjustments, re-negotiations, re-

organisations and inventive responses in material localisation and processing practices that marked the city's recycling networks, re-enacted them, and kept them ongoing in legitimate ways under the new circumstances.

My long-term multi-modal engagement with recycling practice, alongside close quotidian studying of the incineration-based municipal infrastructures of solid waste management in the city enabled me to observe how these practical constituencies, networks, and processual infrastructures of plastic were barely separate. Instead, they co-mingled; complemented and supplemented each other routinely in necessarily unequal, and uneven configurations, to mediate and maintain these plastic processes (albeit with limited transformation). In effect, I pursue these becomings of plastic processes (and in turn, of plastics and public life) through the conceptual lens of plastic mut(e)ability. Mut(e)ability elaborates how the MSWM infrastructure itself emerges, i.e., becomes infrastructured (Harvey, 2012; Harvey & Knox, 2015; Karasti & Blomberg, 2018) – in practice over time – day, week, month, year, and space – across specific sites of practice. As the reader will find out, 'authorised' incineration networks and 'informal' recycling networks eventually merge together and emerge in complex ways. Mutabilities of plastic processes – as I present them – do not deny the deleterious roles (mutings) played by a neoliberal system of re-organising MSWM. Instead, they visibilise the insidious and compounded forms in which the remaindered networks and processes of recycling are actually co-opted in larger processes of privatised profitability and lack of public accountability through infrastructure.

Through association, I became partly involved in some of the improvisational responses and new developments within the recycling processes myself, aiding *peethawalas* (also *kachre binnewalis*) in various ways. Aiding *peethawalas*

included interpretation of regulatory rules, translation, proxying, providing company during meetings, note-taking, etc. but also practically, say, by accompanying the *peetha*'s small truck early in the morning as it went about collecting plastic waste from hotels and housing societies who preferred liaising directly with the recycling networks than with the irregular and often unreliable municipality waste collection system. These engagements, which were necessarily supportive, were offered only when requested, and were limited by what my ethico-political bounds as a researcher would warrant. In any case, my supportive role constituted supplementary forms of participatory, practical learning and reciprocal, iterative knowledge-making, which enacted plastics and inventive processes more closely than my earlier more detached interviews and chats could ever afford. This form of practising reciprocity also helped build trust. Eventually, these cross-cutting mobilisations, improvised practices, and inventions in recycling practice but also the unplanned emergences of the MSWM system constitute key material and analysis that informed my thesis more substantially (see Chapters 6 & 7).

If I had to quantify my 'contact' with different human participants, I performed 32 partly-recorded interviews. These were necessarily semi-structured (with a basic set of questions, later improvised following my interlocutors' responses, and priorities identified in-situ), and involved interactions with industrialists, politicians, municipal officers (both at AMC and at the Ahmedabad Cantonment Board – ACB), recyclers, *peethawalas*, *peetha*-workers, *kachre binnewalis* (both active and retired), garbage truck drivers, social workers, activists, scholars, local elders, and residents. However, unrecorded interactions (though some were reproduced from memory later in my notes) with many of these practitioners and resource-persons easily outnumbered recorded interviews. I am unable to put a

definitive figure on these informal interactions, comments, chats, work-time banter, whispers, but extended over two years – and ongoing eventually over phone, these would amount easily in the hundreds. My notes also contained elements of auto-ethnography, where I recorded some of my own observations and experiences of plastic practice, and encounters with and following the MSWM infrastructure (as a resident and as a researcher). Finally, a note on images.

Figures included in the thesis play narrative roles in that they illustrate arguments, situations, locations, and positions, make a point, or offer evidence. Sometimes, they actualise thick description (Kharel, 2015) (e.g., Figs. 23-26), are evocative (as in an elicitation), touching upon additional chords – historical or emotional (Pink, 2021) (e.g., Fig. 10), or invite readers to a sensory experience (e.g., Fig. 15). Rarely, a photograph (e.g., Fig. 34) is analysed for its contents in a more conventional sense of visual ethnography (O'Reilly, 2009). Sometimes, self-made computer-generated images (e.g., Fig. 33), screenshots from public documents, and satellite images (from Google Maps and Microsoft Bing Maps) are deployed to visualise macroscopic patterns (e.g., Fig. 13), offer an infographic for better communication and retention of information (e.g., Figs. 5, 12, 18). Photographs taken by me, are taken by consent, and do not portray any individual (I further expand on positionality below). All images are credited, and sources recognised. Copious captions have been added for context and better access. All third-party copyrighted materials sans permission will be removed from the repository copy.

On Positionality and Mutability:

According to feminist scholars, all empirical knowledge is situated by the particularities of the context in which it is produced, and is mediated by the specific positionality of the researcher (Haraway, 1988; Rose, 1997; Sultana,

2007). Positionality entails the researcher acknowledging the various aspects of their identity – say, as linked to one’s class, caste, gender, regional provenance, nationality, race, colour of skin, clothing, linguistic abilities, technological equipment and savviness, educational qualification, socio-professional association, organisational affiliation, kinship, political connections, ideologies, and so on, especially as these socio-corporeal markers intersect with and manifest in the varying contexts of field research to mediate the quality of research encounters. These markers are however not fixed, but are often relative, subjective, contingent, and contested, as they emerge continually within the material specificities of the research context (Narayan, 1993; Nagar, 2002). However, positionality might also involve positions and jobs which the researcher is accorded or is able to choose in relation to the communities, practices, and objects that they wish to study (Tyler, 2007), and positions that the researcher must declare (for instance, intentionality for research or institutional affiliation).

My positionality as a PhD student with research interests in the MSWM system, regulatory frameworks, and local enactments of waste policy, with specific regards to practices with plastic and plastic waste were mentioned, by default protocol, during interactions (at least stated orally, if sharing an information sheet was not feasible). However, such an identity was hardly ever fixed, monolithic, or interpreted in any reliable pattern, but was enacted specifically in course of my trajectory, as I slipped ‘in’ and ‘out’, unreliably and unpredictably composite, and always ‘hybrid’ (see (Bhabha, 2012; Majumder, 2018; Shakthi, 2020), among others, for various ways of theorising the hybrid, especially with regards to the shifting regimes of belonging, identification, and positionality of a post-colonial

identity). I was one and multiple, male, middle-class, *savarna*²⁶, an anthropologist with affiliation to a British university, a former practising engineer, a person with dark skin colour, small figure, able body, Bengali ethnicity, linguistic belonging, etc., friend, colleague, stranger, and kin. Some of these markers took precedence in particular contexts, while others receded into the shadows, only to come up later and re-mediate continually shifting positions between the self and the other, the insider and the outsider, the savvy and the ignorant, the 'one of ours' and the 'not one of ours', the trustworthy and the morally ambiguous (whether reflecting caste identity, nativity, practical, organisational affiliation, or others).

For instance, in the case of my re-introduction within the recycling scene of Ahmedabad, some of my prior professional credentials as a former engineer and a friendly acquaintance of shared Indian Bengali ethnicity persisted and often tended to overshadow my 'new' identity as an anthropologist affiliated to a British university. Indeed, these were people, communities, and practices that I was familiar with 'before I became anthropologist' (Rabinow, 2007). Though I made it

²⁶ The term *savarna* loosely translates to a member of the caste society who is included within the 4-tier *varnashrama*, or the ritual caste structure drawn from the Vedas (the oral treatises often recognised as foundational to particular forms of Hinduism) composed (in order of precedence and hierarchy) of Brahmins (knowledge makers, priests, scholars who produce and maintain social knowledge of the caste society), Kshatriyas (rulers), Vaishyas (traders) and Shudras (skilled workers). Dalits are excluded from the *varnashrama* and are supposed, by ritual injunction, to not marry into, reside separately from (but not own land and property), and be subservient to the members of the *varnashrama*. This way, *savarna* castes would enjoy precedence over Dalits, and draw socio-economic capital across various multimodal relations of domination. This kind of a structural notion of caste is reflected in earlier anthropology, most notably identified with Louis Dumont's writings (see (Dumont, 1980)). However, a fixed notion of caste identity and hierarchy has been contested (see (Srinivas, 1956; Gupta, 1981; Ambedkar, 2002)) and more immanent (if not fluid) changes in identity, identification, and hierarchy have been studied in course of situated historical processes, political movements, social, economic, and cultural policies, identification (say, the Census of India) and development projects undertaken by the state, etc. (see especially (Jaffrelot, 2003)). However, despite untouchability and discrimination on the basis of caste having been illegalised under the Indian Constitution and various affirmative actions and political movements re-shaping the landscape of representation and social change, caste and its identities, claims, divisions and discontents continue to persist, albeit compounding in different ways (see (Mosse, 2018; Teltumbde, 2018), among others, for an overview). As such, the term *savarna*, though evocative of an abstract structural identity – albeit with persisting powers to mediate inter-personal and inter-community relations, is still deemed a useful term, at least discursively. Especially for an emancipative Dalit politics, where identification of violent discourses of difference are deemed pre-conditional to mobilising collaboratively towards more egalitarian social and epistemic futures (see (Omvedt, 2008)).

a point to (re-) iterate my research interests, intentions and affiliation during social introductions and interactions, many a times, my scholarly identity attracted a laugh or two, and at Ramapir no tekro, it earned me the nickname 'Popat Lal', inspired from a local television soap character, a ridiculous figure who acted smart, nonetheless. The reference – first made by a *kachre binnewali* – stuck, and till date I am known by the name within the communities of *kachre binnewalis*, *peethawalas*, *peetha*-workers and other residents of the marshlands, but also in the inter-connected recycling networks. My shared race, skin tone, language (basic understanding of and conversational skills in Gujarati), dressing style, accents, nationality, awareness of cultural references, and generally amiable, reciprocal modes of personal association perhaps made me unfit for identification as a scholarly entity, not least one affiliated to a Western university. One whose performance of the self belied markers of detachment and authority perhaps expected/desired of such a profession. Indeed, on one occasion when two Western scholars (notably a white male and a female) visited Ramapir no tekro, local NGO workers accompanying them into the *peetha* where I was working introduced me in the first instance as 'a former engineer from Bengal', and not as a scholar with active affiliation to a Western university.

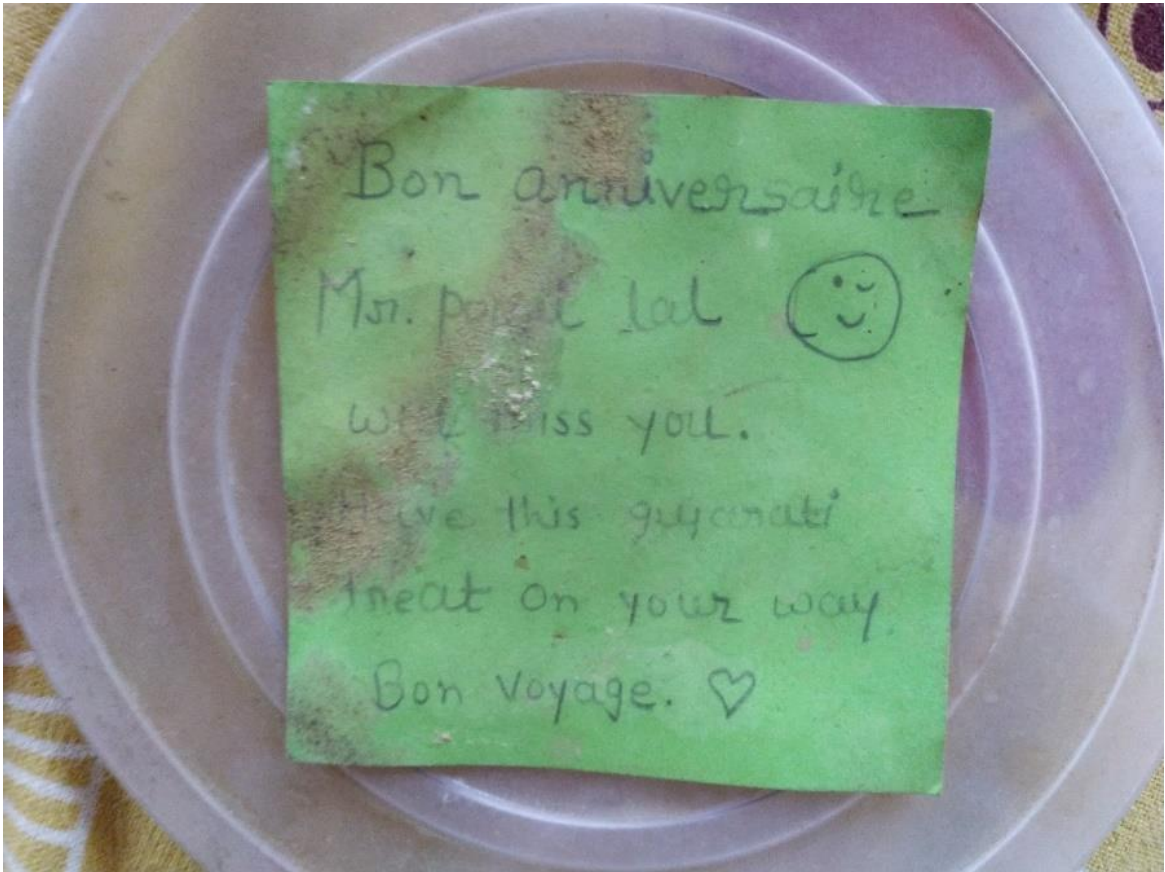


Fig. 7: 'Bon anniversaire (and bon voyage), Mr. Popat Lal'. An intern who had worked at the peetha where I worked had packed some khakhra for my onward journey, as I prepared to leave Ahmedabad after the last day fieldwork on 1st December 2019, which was also my birthday. Courtesy: Author

To be sure, my social standing as an academic and stated professional affiliations assumed prominence on many occasions. My positionality as a research student was stated while soliciting interviews, and re-iterated during interactions; however, certain aspects of this 'identity' were retained in practice. For example, my association with a British university was interesting to a municipal officer, a recycler, a local NGO employee who sought educational and professional advice for their kin seeking an entry visa into the UK. My technical knowledge (but also prior familiarity) eased access into the networks of plastic recyclers. My familiarity with technical terms and ability to respond in informed discussion about the mechanics and thermodynamics of particular plastic processes drew enthusiastic

engagement and confidence from some of these technical practitioners, as did my understanding of the regulatory frameworks mediating their professional practice. My training and experiences would again be deployed as some *peethawalas* found my knowledge on the subject area of waste regulation and English/Hindi/Gujarati linguistic skills helpful in making sense of the new legislation and in translation/transliteration, turning me into a resource person whose voluntary service was solicited. My social and scholarly associations opened up, as elaborated above, access to privileged networks of knowledge-making, policy-making, and practice. Being a social scientist again eased my interaction with and further access into local scholarly communities and faculties in social sciences (e.g., at Ahmedabad University, CEPT University) and with independent scholars and retired researchers. In any case, my affiliated scholarly identity was hardly monolithic, but fragmented, multiple, and relationally expressive in specific encounters and interactions.

Speaking of institutional associations, we also see how my links with Manav Sewa initially eased access into the community of Ramapir no tekro; however, once in, it also presented ethico-political and practical challenges, playing an inhibitory and mediatory role as members saw me as an NGO representative and chose to share selective information strategic to their clientelist/competitive relationship with the organisation. Later many of these perceptions changed, as I reduced my commitments with Manav Sewa and engaged in more independent relations of learning and responsibility with plastic practitioners on relatively autonomous terms.

While certain aspects of my positionality proved limiting on occasions, some of these attributes were also subject to limited mutability. In these regards, I am also

acutely aware of the various affordances of my identity, which enabled me to secure certain positions (and positional mutabilities) vis-à-vis practices, practitioners, practical networks, and infrastructures. As a result, I was able to *choose* the range of relational roles and positions that I did, which in turn, allowed me to access different facets of plastic processes, and practices.

For example, it was my financial ability to afford rented housing in central Ahmedabad which enabled me to become more independent of Manav Sewa and its community engagements in the first place. Again, my able body (but also gender) allowed me to walk long miles in the night through city streets, carry heavy sacks, perform arduous hours of compressing plastic mounds into neatly packaged consignment units ('bales'), and so on. My intellectual and linguistic skills, including training and experiences as an anthropologist and a former engineer, all constituted abilities that necessarily afforded me to be useful in particular ways that were practically valued, and which made my active presence and benevolent contributions within particular contexts desirable in the first place. Sometimes, my gender presented itself as prohibitive, as I elicited initial ridicule and critical whispers within certain pockets of the community, as I engaged in techno-culturally gendered *peetha*-roles (like plastic-sorting). However, my female mentor-co-workers would soon devise a technique to 'neutralise' my gender, notably, by starting to call me '*bhoiya*' (little brother), thus, tactically infantilising my publicly-performed identity, locally, and reframing my interpersonal positionality as one sexually unavailable and non-threatening. When eventually compounded with 'Popat Lal', or used interchangeably as 'Popat bhoiya', I was not only infantilised, but also performed as caricatural, one whose presence was even amenable to humour, not to be taken too seriously. This was a form of positional mutability that spared me any further gendered resistance

within that setting, allowing me to continue learning, observing, reciprocally participating in practices, and eventually, making knowledge.

Finally, if I was able to secure certain positionalities and access within the 'thick of things', it is due to my interlocutors, mentors, and co-workers, and their generosity. Despite my *savarna* identity, my Dalit co-workers and mentors treated me as a brother, invited me to ceremonies (marriages, birthdays, birth ceremonies) as 'kin'. Not out of choice, but my rugged, soiled clothes (say, en route home after working with plastic waste all day), dark skin tone further tanned in the sun, even led some unfamiliar locals mistake me for a resident of Tekro (and thus, invariably, a Dalit) and initiate conversations with me as such, before I dispelled misunderstanding. Indeed, once home, I could afford a long shower to wash away the dirt, clean up clothes, change into fresh pyjamas, treat myself to practised techniques of self-care, thanks to amenities (say, secure water supply) unavailable to most Tekro residents. While I could revert back to being anthropologist, and be part of elite social circles, the same were inaccessible to my mentor-colleagues of the workplace. I write, however, as an ally in solidarity with Dalit socio-political struggles. The knowledge produced here visibilises some of these people, their practical expertise and wisdom, struggles, and resilient inventions, as I observed them. Yet it does not undermine the powerful patterns of (re-) producing sociomaterial difference these practitioners and their limited plastic mut(e)abilities are subjected to.

On Ethico-Political Positions, and (Practical) Concerns:

There is a rich plethora of anthropological writings and reflections on ethnographic practice 'at home', although authors have also questioned the basis of categorisation of the home and the world, the inside and the outside, as these

positionalities are shifting and rarely stable (Narayan, 1993). Despite prior familiarity, I can hardly call Ahmedabad 'home'. My re-entry into the city, in 2018, involved much re-adjustment, re-negotiation, and acquaintance with new people, sites, and stories, just as much as it entailed re-relating and re-familiarisation, as highlighted above. However, fieldwork in the city for me entailed significant involvement with individuals, communities, and sites, that I was already – more or less – familiar with, even before I trained as an anthropologist. As such, I owe these relations much more than what a researcher is normatively expected to owe those that they research. In any case, I am an Indian national, born and bred in the country, thus, experiencing – albeit unevenly – the living remnants of violent British colonial pasts as my research participants themselves do. Yet, although my doctoral research is my project (say, with regards to ownership of data), I am nevertheless a research affiliate funded by a British university studentship, aspiring to participate in global knowledge economies and societies in my area of interest. As such, I am obliged to address my positionality vis-à-vis some of the global inequalities mediating how empirical knowledge is constituted and dissipated. Furthermore, my 'field' about multiple overlapping practices with plastic waste also involves marginalised communities with uneven access to power, unequal knowledge claims, and recourse to institutional support. These differences are mediated not least by locally pre-existing socio-economic 'systemic' legacies (say of gendered, class-inflected enactments of caste), where, as a male, *savarna* person, of middle-class upbringing, I am directly, or indirectly, implicated.

Such an intersectional personal-professional positionality – at once bio-political, socio-political, and geo-political – with distributed cares and responsibilities towards academia, overlapping societies, and research participants obliged me

to make certain choices vis-à-vis the making and sharing of knowledge and resources, and representation. Acknowledging the unevenness of the (post) colonial experience (say, across caste groups, genders, regions, etc.) and the obligation for knowledge to be mindful – if not corrective – of these differences, I have adopted an anti-caste, anti-colonial, feminist research ideal in practice, whereby, knowledge is produced under more reciprocal, consensual, iterative, and equal conditions. Participants – especially those with less access to scholarship and history, figure prominently in my conceptual work and with a sense of dignity and ownership over their representation, which rather than fixing alterity, presents their marginality as produced in particular ways. In framing marginalisation and deprivation (which I later call ‘muting’) as relational, emergent, and even amenable to limited transformation (‘mutabilities’), my conceptual work responds to the historiographic responsibilities of post-colonial representation which the likes of Spivak (1988), Prakash (1990), Bhabha (2012), etc. have written about.

In my ethico-practical responsibility towards participants (both previously familiar relations and new relations made on the field) but also as a matter of care, I followed the principles of transparency by making full disclosure to my research participants, especially about my (changed) professional position (as an anthropologist), my university studentship and funding, the empirical interests of my project, possibilities of eventual use of information shared in private, ongoing informed consent, etc. That data would be anonymised (or used against pseudonyms), not used commercially but only towards a PhD dissertation for the time being (unless further consent was sought), that no participant information was stored or used by the university, etc. were points that I highlighted. For securing anonymity and respecting our ongoing relationship of trust, I decided not

to photograph any interlocutor for research purposes. Photographs were taken preferably of particular events, and sites of interest, and only those images where individuals do not figure in prominent and (locally) identifiable ways are shared here. As an Indian citizen and voter, I have right of access to public offices, and public domain information. I did nevertheless secure right to use information shared in person by public servants and office-holders, orally, if not with information sheets. Municipal (waste) workers, bureaucrats, government officials, and politicians are not identified, unless they are well-known figures, and only those statements that are non-sensitive and already present in the public domain are identified.

Indeed, as elaborated in my thesis (see Chapters 6 & 7), many state inspectors, officials, municipality (waste) workers, employees of private contractors, managers, etc. improvise practically upon their prescribed professional guidelines. Although their actions are firmly embedded in local socio-economic and political contexts and constitute necessary practical entailments of theoretical guidelines and governmental rules, as I have explained, their actions might appear extra-legal to an uninformed reader. As such, I have adopted narrative tack not only to protect their identity (including with anonymity, pseudonyms, obfuscating identifiers, dividing up one character into two), but have also used thick description to duly situate their practices within the complexity of actual events. Recycling practitioners – including *peethawalas*, *peetha*-workers, *kachre binnewalis*, recyclers – consented (and some insisted) that I present a ‘real life’ picture of their practice. This would not only include their practical challenges, vulnerabilities, but also inventive improvisations. Again, narrative tack has been adopted to de-link any potential identifier. In effect, some participants were specific in their demands for anonymity. Furthermore, many of the improvisations

and workarounds to regulatory frameworks were collective responses, involving multiple individuals, establishments, and community networks (including local residents, politicians, bureaucrats, municipality officials, municipality waste workers, and so on). Highlighting the collective forms in which such practical-pragmatic knowledges were produced, shared, and collaborative action enacted are key not only to conceptualise the emerging modes of sociomaterial becoming with plastics, but also valuable in duly collectivising responsibility and risk. Again, in no case, actual names have been mentioned, and identifiers are obfuscated. Even with anonymisation, the affective gendered suffixes to names (notably *bhai* – brother, and *ben* – sister) have been retained to respectfully guard the idioms of relatedness that tended to mediate my relationship with various interlocutors.

However, anonymity – a necessary condition for research ethics – also generates its own concerns especially over the potential muting of individual voices and the obfuscation of authorship over valuable knowledge by already-marginalised entities. Their insights and critical, careful feedback deserve due citation as expert knowledge. This is an ongoing point of reflection that I plan on re-visiting and re-thinking, in consultation with my research participants and peers.

In the process of making full disclosure, communicating critical information, and securing participatory consent were often impossible to manoeuvre with the aid of standard information sheets – a device that is expected to be circulated by field-researchers with ‘human participants’ within Western academia, including by my university. An information sheet is a printed body of texts, elaborating upon the research project and process, and making clear expectations, rights, and responsibilities underlying the research process for its different participants and stake-holders. A potential participant is expected to read and sign the sheet to

declare informed consent to participation. However, such a document did not make intended sense for many of my interlocutors who were not literally educated to be able to read and understand its contents. Furthermore, many interlocutors did not know what a university was, what 'research' meant, or understand the various implications of research participation. As such, to 'inform' – with any sincerity – demanded much more than sharing and securing signature on a printed page with words. Finally, a document with incomprehensible words seeking a signature or thumb impressions also understandably evoked suspicion and distrust. As such, as mentioned above, I often resorted to ongoing communication and long periods of familiar contact, and co-work, for elaborate explanation and information and to seek verbal consent if any information we discussed could be re-deployed for research (see also (Perez, 2019) on 'situated ethics' and similar concerns shared about the use of information sheet in contexts of 'extreme inequality between researchers and their research participants').

Furthermore, researching plastics and plastic waste infrastructures involved so many different interlocutors and situations of interlocution, that it was often impossible to share an information sheet during some of these interactions. This was especially true for fortuitous encounters (say, at a road-side tea-stall, or with a fellow-pedestrian waiting on traffic congestion created by a municipality garbage collection truck). Needless to say, I was unable (and unwilling) to record these interactions by any technical device. However, since much of these mundane encounters were potentially interesting for research, I made it a point to introduce myself to interlocutors as a researcher of plastics and plastic waste processing and regulation, whenever possible. In any case, these quotidian experiences also rightfully constituted my own life in the city (the personal and

the professional inextricably entangled), and I have reproduced non-sensitive information as fieldnotes, and anecdotes, without identifying individuals.

My association with the 'field' pre-dated my arrival in India in early 2018 for fieldwork. It did not end with my geo-physical departure from Ahmedabad in the end of 2019. I continue to maintain contact with many of my research participants (including those from Rajasthan), albeit making sure not to use privately-shared, potentially-sensitive information in publications without due consent. My relationship with most interlocutors has been reciprocal, and the obligations of sincere reciprocity continue to mediate and shape our ongoing mutual commitments. As I was writing up (in the UK), the pandemic wreaked havoc within many of these practice-based communities in India. Few of my acquaintances passed, some fell seriously ill, and most lost livelihood. *Peethas* and recycling 'factories' closed down for months as the new centralised disaster management rules kept these establishments out of the list of 'essential' operations permitted to continue, on grounds of public health emergency (Dey, 2020). As an extensive, intricately linked network of everyday practices of plastic (alongside co-dependent ancillary activities, cares, livelihoods) came to a grinding halt, many of those whose work practices my concepts draw key material from lost their work and livelihood. It was difficult to separate data from the people to which they were due, the expert practitioners (mentors, teachers, friends) who I learned from, and who took keen interest and a sense of ownership in my project. Writing, during this time, emerged as a necessary duty in professional care. Performing personal care-work, I maintained regular contact with, organised relief for, and provided support to many participants and their families during this time. These responses were performed with limited abilities, as I myself struggled with personal loss, grief, physical and mental fatigue, and meagre financial resources.



Fig. 8 (above): Reciprocity: One of my mentors and a peetha-co-worker, Nilu Ma, had parcelled some fish curry and chapati for me. This was in 2019. I might be missing home, she thought, 'home' in this case, referring to the riverine region of Bengal (where I grew up in, and have family), where fresh-water fish constitutes a staple diet. The fish curry was Nilu Ma's way of caring, which also re-enacts my identity and place-based belonging. Courtesy: Author. Fig. 9 (below): I was packing self-made gobi curry (cauliflower) and sweets for co-workers, including for Nilu Ma. Note the essential deployment of plastic containers and packaging in performing both occasions of social care. The convenience and washability (if not disposability) of these objects proved essential in the secure transport, storage, and workplace sharing of fluid food with oil and spices that might otherwise get stuck or spill out. Courtesy: Author

Conclusion:

Plastics scaffold our everyday life and actions. A plethora of plastic objects shape who we are – as participant-members in societies, economies, and ecologies. Surrounded by plastics all the time, and yet, conducting a long-term, practically engaged empirical enquiry on plastics and human communities performing various plasticities, fieldwork, for me, was a complex and richly formative experience. Like a densely embroidered cloth that I am still wearing, its delicate and inter-dependent threads are difficult – if not impossible – to lay fingers on, sort and pry apart, gauge and re-formulate into any kind of intelligible catalogue of practices. Crucially, plastics are mutable. The threads (objects) we catch are slippery, they become something else before we know it.

In this chapter, I laid down an ethnographic trajectory that highlights nevertheless key chronologies, sites, decisions, relationalities, and events, that substantially shaped and guided my enquiry. I laid bare practical, intellectual, ethical, and political considerations, calculations, made under particular circumstances and contexts, which assessed the study of particular plastic practices as (non) feasible, and enacted particular stories of sociomaterial plasticities as valuable, more worthy of pursuit than others. I reveal ‘background’ processes of empirical, conceptual research. In the process, I shared some of my complex positionalities, and critically reflected on my responsibilities towards different communities and socio-practical networks, including for knowledge-making. Such disclosure and critical reflexivity on the actual situations, positions, and choices of research will, I hope, help my reader to better situate the conceptual knowledge that follows. It will help them find feet in ‘my’ world of ubiquitous and mutable plastics, and in grappling with my trajectories; in particular, follow the urban sociomaterialities,

mutabilities, and mutings that plastics constitute in the city of Ahmedabad and beyond.

In the next chapter, I elaborate on certain experiences, overlapping processes, networks, and enterprises that have enacted (plastic) waste in Ahmedabad city. I will focus on the period that predated the new SWM reforms. Disaggregating crucial historical configurations and aspects of social, regional, and national politics will offer necessary political economic stage-setting. This will inform latter analyses of the messy overlaps, contestations, and circulatory collaborations between multiple plastic processes and infrastructures – old and new.

Chapter 4: Un-‘common’ Ubiquities: A Legacy of Politics, Place, Practice, & Plastics

This chapter sets a pre-reform historical scene. Firstly, it shows that experiences of garbage and its patterns of localisation in the city of Ahmedabad have always been uneven. Next, it elaborates how plastic – the recent ubiquitous phenomenon within the urban socio-landscapes of India – complicates these experiences, also generating new possibilities. I conclude with an elaborate description of some of the overlapping practical sites, skills, methods, relations, and networks that make plastics (waste) recyclable. These processes of plastic draw on but also re-enact a range of socio-economic, cultural, spatial, and political realities. This chapter thus adds valuable political economic context to more recent processes of reform and re-adjustment, continuity and change, sociomaterial mutings and mutations, that animate and enact the practical networks of plastic.

Setting the Scene: Un-‘common’ Ubiquities

‘...The city is virtually an open dust bin. Garbage strewn all over ... is a *common* sight.’ (highlight mine) – wrote a judicial activist perturbed by the sanitary state of affairs in Delhi – India’s national capital, as part of his ‘public interest’ litigation (PIL) filed in 1996 against the ‘Union of India and others’ – including the city’s Municipal Councils. These public agencies, according to the litigant, Dr. B. L. Wadehra, ‘wholly re-miss in the discharge of their duties under law’, which is ‘to provide clean and healthy environment to the residents’²⁷. The litigation, which draws together the subjects of ‘cleanliness’ and ‘health’, was lodged within two years of a widely-discussed and alarming plague in the Gujarati city of Surat, where rats, breeding in uncollected refuse within choked drains, were considered the culprits behind the public health crisis. The event had caused widespread

²⁷ Supreme Court of India, Dr. B. L. Wadehra vs Union Of India & Others on 1 March 1996, cited as: SCC (2) 594, JT 1996 (3) 38.

terror – resulting in one-third of Surat’s population to flee, spreading panic ‘throughout the nation’ and across the world (Doron & Jeffrey, 2018). The news made it to the New York Times front page; the Time and Esquire magazines discussed the plague with alarm. Although the plague was eventually diagnosed to be not bubonic, the complex link between the occurrence of material refuse and public health had been etched in public narratives. According to some quasi-political organisations, ‘garbage strewn all over’ had become a matter of international shame and national prestige as India sought a prominent place in the world economy, post-liberalisation in 1991²⁸. Narendra Modi, India’s present Prime Minister and a prominent RSS ideologue and political activist at the time, recalled visiting Surat during and after the plague, ‘to the places where more plague cases were reported, particularly in areas where the poor lived’ and educating these residents ‘not only about personal hygiene but also about social hygiene’ (from (Doron & Jeffrey, 2018, p. 268)).

Dr. Wadehra’s PIL was one of many civic lawsuits filed during the 1990s, which would collectively identify certain ubiquities of ‘garbage’ as problematic to the public. Several such angrily-worded lawsuits were filed across India, and a vision of ‘domestic waste’, ‘strewn all over’, ‘left on open land’ in ‘large volume’ (borrowing phrases from another PIL, lodged by Almitra Patel in 2000²⁹) were also linked to more mundane health hazards like respiratory illnesses, throat infections and ‘other illnesses’ (idem). While holding the state to account, the

²⁸ *Organiser*, the weekly periodical of the Rashtriya Swayamsevak Sangh (RSS), the ideological organisation of the Indian right-wing, discussed at length the ‘growing decay of the big cities of India’ in its 09. 10. 1994 issue.

²⁹ Almitra H. Patel and Another Petitioners Vs. Union of India and Others, Writ Petition (C) No. 888 of 1996, 1–2 (2000).

litigations, public discussions and mobilisation at the time also seem to point toward a perceived lack of responsibility on part of (certain) citizens.

“This image has been removed by the author of this thesis/dissertation for copyright reasons”.

*Fig. 10: The ‘deadly’ Surat Plague made it to the frontpage of the New York Times.
Courtesy: New York Times Archives*

The 1990s were a turbulent moment in post-colonial India’s state bureaucracy and local governance infrastructure in the cities as several key constitutional

amendments were made which allocated, fixed, and uniformised the relations of public distribution of goods, services (including sanitation), but also civic responsibility. Large urban centres were formerly governed non-uniformly by local municipal laws constituted by the Provinces (a colonial administrative category, later dissolved, merged and recomposed into 'States' which would collectively constitute the 'Union of India'). The Delhi Municipal Corporation Act, 1957 (cited in some of the above litigations), the Bombay Provincial Municipal Corporations Act 1949 (BPMC Act – which included present-day cities of Mumbai and Ahmedabad and also established the Ahmedabad Municipal Commission – AMC, under its jurisdiction) are cases in point, which laid out bureaucratic frameworks for municipal duties and their dispensation within these cities³⁰. Sanitation and sanitary reforms pre-occupied city-planners, reformers, and officials during the colonial period (see below; also (Chaplin, 2011; Yagnik & Sheth, 2011) for specific deliberations in Ahmedabad) and continued – evidently, post-Independence. Under the BPMC Act 1949, for example, the AMC commissioner was allocated quasi-independent charge to provide for the removal of 'filth' (defined to include 'sewage, nightsoil and all offensive matter'³¹), with the powers to enact and enforce bye-laws to make service provisions, while municipality residents were to comply with local civic arrangements. Filth, collecting in municipally-provided receptacles and 'spots', was thenceforth municipal property.

³⁰ Provincial municipal laws were often uneven, as they were constituted originally at the prerogative and reflected the priorities of local colonial governments under the British Crown. Although many of these laws were immediately re-enacted post-Independence (1947) to break away from colonial policies and to reflect nationalist developmental discourses (McFarlane, 2008), the improvisations still drew on imperial notions of the self (say, modelled on London's two-tier government with regards to the expectations from citizens to exercise individual rights as a mode of integrating into democracy as 'self-government' (Legg, 2007)). Sometimes, original terminology, standards and governance offices were inherited (Doron & Jeffrey, 2018).

³¹ See the Bombay Provincial Municipal Corporations Act, 1949, pp. 5.

Following a slow national impetus in urban development, post-Independence (these policy preferences are contextualised below), the Central Urban Development Ministry was set up in 1986, leading to landmark changes in the architecture of urban governance. The 74th Amendment, institutionalised in 1992-3, to the Constitution of India, is a landmark federal legislation in that it brought sweeping reforms to the subject of local urban government. In particular, sanitary provisions were made ubiquitous and necessary, obliging State governments to constitute urban local bodies (ULBs) in order to provide ground-level public services³². The Amendment enacted a major transfer of duties from the State government to constituent ULBs, responsabilising the latter in the executive domain of governance. This included what-was-technically-termed ‘solid waste management’³³ (SWM), classified as ‘basic urban function’ under a newly introduced Twelfth Schedule amendment³⁴. The Amendment prescribed a

³² Based on the population size of the urban territory in question, the 74th Amendment recommended three levels of ULB to be constituted – Municipal Corporations for cities with population exceeding 1 million, Municipal Councils for smaller cities or towns with population less than 1 million, finally, *nagar panchayats* for territories transitioning from ‘a rural area to an urban area’ (74th Amendment, part 9A, paragraph 243q (a)).

³³ The term ‘solid waste management’ makes its first formal appearance within governmental literature in India during this decade. The term, which subsequent laws and rules later defined inconsistently to include solid-state materials like plastics, papers, etc. was not common within legislative and bureaucratic vocabulary earlier. In effect, the EPA (1986), which provided the legal basis for subsequent enactments of the country’s Solid Waste Management guidelines (to be discussed in detail through the next chapter), does not explicitly recognise or define the category of ‘waste’. It defined the ‘environment’ as a set which included ‘water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property’. The lone umbrella term ‘pollutant’ was evoked and defined in terms of material occurrence and function. A ‘pollutant’ was defined as a ‘solid, liquid or gaseous’ substance, ‘present in such concentration as may be, or tend to be, *injurious* to environment’ (emphasis mine). The notion of ‘injury’, ‘harm’ and ‘hazard’ were frequently raised throughout the Act and linked this to a language of ‘presences’, ‘concentrations’ and their ‘allowable limits’, with the agency of definition of such standards and the delineation of boundaries of harm – their contents, interpretation of offence, or the subject and methods of implementation being left to state agents (ministries, pollution control boards, and courts). Therefore, the formal definitions of ‘harm’ (from garbage) could be subjective, and potentially contentious. In the above PILs, for example, we find particular articulations of hazard and harm by litigating citizens.

³⁴ The 74th Amendment (1992-93), passed after the establishment of a Central Urban Development Ministry (as late as 1986), is considered a landmark modification to India’s Constitution with regards to urban local governance. The Amendment may be consulted here: <https://www.india.gov.in/my-government/constitution-india/amendments/constitution-india-seventy-fourth-amendment-act-1992>

bureaucratic template with electable offices and independent bodies to further monitor compliance and push for public accountability in these services.

In litigating for newly re-constituted environmental 'rights' due to citizens, the likes of Dr. Wadehra were testing the very integrity and moral legitimacy of the fledgling post-colonial state. The Government of India soon acquiesced. In 2000, the Central Government issued its first-ever federal guidelines, the Municipal Solid Waste (Handling and Management) (MSWHM) Rules, notified by the Central Ministry of Environment (and Forests) under the Environmental (Protection) Act (1986). The management of garbage – thus far enacted non-uniformly and locally at rural *panchayat*, urban neighbourhood, city, and Provincial/State levels – was subject to uniformalised federal rules, making way for national-scale formalisation and standardisation in the management of ubiquitous garbage.

The above anecdote on 'public' anxieties, debate, mobilisation and the eventual state response and obligation in the domain of SWM reflects a certain complementarity between the democratic state and its civil society, often idealised in Western democracies (Chatterjee, 2011). However, the fact that civil society is heterogeneous, stratified, and fragmented, becomes apparent. Indeed, as grievances, articulations of harm, etc. were heard in court and eventually incorporated – often verbatim – into state guidelines (Paterok, 2019), the deliberations involved a particular enactment of the category of 'public'. These particularities were shaped evidently by subjects who were concerned by the aesthetics (and risks) of a particular spatio-material urban (dis)order. These are also mediated by (often overlapping socio-economic) constituencies of subjects with a practised facility and education in the rights and responsibility-based

('solid waste management', as a technical introduction within basic state functions, occupies the sixth position within the Twelfth Schedule).

language, techno-cultural devices, and infrastructures of the modern state (Chakrabarty, 2002), often privileging access to the media (Doron, 2016; Luthra, 2018). In formulating, articulating, sharing, mobilising and thus, pushing forwards their interests, ideals, and aspirations as 'public interest', a partisan 'public' is produced (Baviskar, 2011; Ghertner, 2012; Bhan, 2016).

In effect, such activism co-elaborates a limited form of public consciousness that Baviskar calls 'bourgeois environmentalism' (Baviskar, 2006; 2011; 2011). In its expectations, formulations, discourses, desires but also discontents with surrounding environments (its contents, contours), bourgeois environmentalism is exclusionary. It is remarkably different from an 'environmentalism of the poor', as discussed within a South Asian context (Guha & Martinez-Alier, 1998). Baviskar and others (e.g. (Chakrabarty, 1991; Gidwani & Reddy, 2011; Desai, 2012; Baviskar & Ray, 2015; Doron & Raja, 2015; Ghertner, 2015)) have located these demands and concerns in the emerging constituency of elite and formally-educated 'middle-class' tax-payers with access to the media and global connections, and in their spatial desires and expectations of 'world class' citizenship. These constituencies are informed and inflected by a rights and duty-based notion of the democratic self, with awareness notably of state duties 'to provide clean and healthy environment to the (tax-paying) residents' (from Almitra Patel's PIL). In their formulations of environmental rights and demands, a parallel allocation of civic (ir-)responsibility on the urban poor also becomes apparent.

As the above-cited authors, among others, have discussed, the bourgeois ideal of 'clean' and 'healthy' is shaped by repulsion to and exclusion of sociomaterial agents deemed to be morally, physically, economically, and culturally harmful. Although the contents of these categories of harm are unfixed, the authors have

identified dusts and smoke, putrefying solid waste, 'litter', open defecation, but also 'scavengers' and waste-pickers, squatters, slums, and crowded places as disruptive to this emerging urban order. Through the above instances of judicial and socio-political activism about garbage, we find another articulation of perceived harm, linked to the legal language of environmental 'pollution' (see footnote 33). In particular, bourgeois desires and discomforts are formulated typically in contrast with (if not separate from) the socio-economic and spatial needs and affordances of the urban labouring poor, often belonging to the 'low' castes. With limited access to housing, sanitation, waste collection, education, media, livelihood, etc., the spatial practices and needs of the urban poor remain unaddressed, if not undermined, in these elite formulations of 'public' interest. As such, their 'irresponsible' practices like throwing garbage on the street, waste-picking from the 'littered' commons, living and bathing on the sidewalk, street-hawking, inhabiting crowded areas, markets and slums, relieving oneself in the open draw into question more fundamental forms of state and civil society failure (see (Mistry, 1996) for some acutely dark humour based on the daily struggles of the urban poor, especially to find a secure place to defecate in the morning).

One could well wonder if the above-mentioned enactments of environmental rights – inequitable and unevenly represented as they were – are really new. Do these formulations draw critical continuity with pre-existing forms of inequality across socio-economic and political regimes? Authors like Chakrabarty (1991), Kaviraj (1997), etc. draw historical links to the bourgeois sociomaterial ideals of urban public space. They link these to irate mentions of 'bazaar', 'nuisance', 'painful insanitation', etc. rife in travelogues, official memoirs, and exclusionary 'sanitary' city-planning discourses of the colonial as well as nationalist eras of

governance, pre-Independence, which again unevenly responsabilised the poor and Dalits (McFarlane, 2008).

Indeed, garbage – in its complex materiality, and emergences through time and space – is perhaps as old as humanity (Doron & Jeffrey, 2018). As critical scholars studying garbage (also unevenly overlapping categories of rubbish, waste, dirt, filth, discards³⁵) have pointed out, garbage is both shared and contested, contentious in its shaping of space and order, and in the articulation of socio-cultural, political, territorial, and moral claims (see (Hawkins, 2006; Liboiron, 2019) among many others). Viewed in such a way, and as the above discussion suggests, the politics of garbage has had a long and contested history in the region of South Asia (as in other regions – see (Fredericks, 2018), for example), where the new articulations of civic grievance and desires of space and citizenship around garbage seem linked to and compounded by lateral and transversal socio-political relations of the past and present and fraught expectations of the future. It appears plausible that the ‘public’ claims of garbage ubiquity, say, as ‘strewn all over’, or as ‘left on open land’ in ‘large volume’ may be experienced and related to, held in favour, or decried, narratively discussed, and debated unevenly across different socio-economic constituencies in the urban population. Furthermore, if garbage and its removal is central to a

³⁵ These terms are not synonymous. They are loaded, significant and specific to sociomaterial content and contextual elaboration but also overlapping. The term discard, for instance – as captured by scholars identifying with the field of [‘Discard Studies’](#), seeks to reveal the power relations immanent in and emerging from the processes of discarding. Dirt, as Mary Douglas (2002 [1966]) articulates, has a more cultural and symbolic connotation, where dirt is conceived as ‘internal’ to the production of spatial, social and ritual orders. Filth, on the other hand, say, as Kaviraj (1997) points out, finds rather specific place and elaboration within colonial legislation about materials, bodies and embodied practices, deemed ‘offensive’ to colonial priorities and ideological prerogatives. The term waste finds wider use, say, from ‘the mechanism of exclusion, to acknowledge the unavoidable presence of waste as one of expressions of #climatechange’. The reader may find this public panel on ‘the state of waste/discard studies’ with Gay Hawkins, Zsuzsa Gille and Herve Corvellec, held as part of the recent ‘Opening the Bin’ Conference interesting: <https://www.youtube.com/watch?v=FKQmciMjkUY>

sociomaterial, and spatial ordering, then the burdens, labour and processes of garbage re-localisation and re-mediation become important too (Gidwani, 2010; Nagle, 2014). In the caste-stratified society of South Asia with sharp divisions of labour but also labourers (Ambedkar, 2002), traditional waste removers and cleaners constitute vital agents in the shaping and upkeep of socio-economic and spatial orders. But they are also subject to disgust, humiliation, and removal from the dominant productions of the 'public' (see (Guru, 2011; Gidwani, 2015; Doron & Jeffrey, 2018; Teltumbde, 2018; Butt, 2020))³⁶, patterns of othering around garbage observed elsewhere too, albeit unevenly (Simone, 2013; Nagle, 2014).

The decade of the 1990s – when the above public debates were taking place and federal-level solid waste management rules and policies were being discussed and drafted – is significant in India's post-colonial history of solid waste management. This is when a slow but sure groundswell in policy preference towards large-scale privatisation in solid waste management was also assuming force. Notably, this is one which involves increasing technologisation, centralisation of practical relations and the laying out of public-private partnerships aspiring solid waste collection, containment, and processing as neoliberal propositions in civic governance, predominantly via the tech-solutionism afforded by incineration-based waste to energy (WTE) plants. With these reforms, the question of garbage in the city stands to be re-mediated by the responsive (and responsible) state, and particular ubiquities might be reshaped and removed. Before we turn to these modes of ordering MSWM and the public domains in Chapter 5, in the present chapter, we wonder what social,

³⁶ Conceptual articulations like *infra*-economy (Gidwani, 2015), 'people as infrastructure' (Simone, 2013) capture the complex 'dual' nature of urban dependency on working bodies for the reproduction of economic and spatio-social orders, but also their deprivation and degradation as human beings. In Gidwani's conceptualisation, this degradation is not separate from, rather 'internal' to, the logic of urban ordering.

material, and practical relations but also livelihoods and needs may be at stake, which did not necessarily find inclusion within such 'public' representations and deliberations. These include, especially, pre-existing relations, practices, and legacies of garbage re-localisation. Indeed, if the state agents were 'wholly remiss' in their duties, how – through which people, hands and feet, techniques, practices, sites, infrastructures, legacies and histories – was all this garbage being managed all this while? With new MSWM infrastructures being introduced, how do pre-existing practical constituencies stand to be co-opted, or affected, by these new networks of work and public accountability.

In this chapter, I offer such a historical stage-setting. With particular regards to the city of Ahmedabad, once part of the Bombay Presidency, I first demonstrate that the perceived 'common' garbage ubiquities are, in practice, not-so-commonly related to. They matter differently to different populations. In this sense, I perform a necessary disaggregation of garbage's ubiquity. I show how garbage is abundant but evenly distributed, with differential stakes, claims, and dangers mapped across diverse bodies, sites, times, practices, and urban constituencies.

As such, I touch upon the various overlapping, inter-leaking regimes (formal and informal) in the local governance of offensive matter across scale and provenance. I discuss colonial modes of ordering urban space, governing spatial practices and belonging, materiality and allocating labour and civic responsibility. This is set alongside pre-colonial and colonially co-opted indigenous legacies of garbage removal and disposal, with special regards to the co-option of caste and gender in the ritual production of socio-spatial exclusion and exception, and in performances of waste-removal labour. I discuss how such legacies were compounded through nationalist, reformist and native industrialist articulations of

garbage as part of India's tryst with self-governance. Some of the pre-Independence patterning and uneven fractious chronicities in local governance continue and compound into post-colonial presents. I show how colonially-inflected class and caste legacies get suffused with new constraints and contingencies of urbanisation, industrialisation, eventually, to the neoliberal moment of the 1990s. In thus unpicking some of the overlapping processes shaping urban space and materiality, we present an uncommon ubiquity, notably with the production, disposal, removal, re-localisation, and bodily exposure to garbage being varied and contested, with harms and hazards being inequitably distributed. By studying historical patterns of garbage distribution, we also disaggregate a complex political economy, demonstrating that regimes, socio-economic constituencies (including gender, class, caste), institutions (including various arms, levels of the state) are actually distributed, and complexly folded.

I then show how the emerging industrial cultures of consumption from the 1980s and the materiality of ensuing solid waste – especially plastics, bothered some of the historically territorialised patterns of garbage distribution. Especially in reproducing uneven socio-economic pockets of consumption and disposal but also by complicating removal, new localisation of garbage, perceptions of harm and civic anxieties are produced in erstwhile segregated urban spaces and constituencies. To be sure, this is necessarily a partial and incomplete historical recounting, but it will offer the reader with an informed ground-view of the complex sociomaterial accretions which enact a fractious, fragmented urban space. This section constitutes the substrate, as it were, where the different entrepreneurial practices and later neoliberal reforms come to situate and lay their claims upon.

In the final sections, I elaborate on the enterprises of material foraging, mediation, and exchange which make plastics 'recyclable'. Given the scale, complexity, and heterogeneity of plastic waste in the city, my description will include gendered, caste-based professions which negotiate these uneven distributions and produce (re)generative localisations and objects of value. Mindful of the specificities, materialities, material demands, standards and stakes involved in situated processes of recycling (see (Gabrys, 2011; Alexander & Reno, 2012; Hawkins, et al., 2015)), my description is specific to particular clusters and networks of practice, that I accessed in Ahmedabad, and which have emerged in particular historicities, sociomaterialities, ethics, and claims to the city.

The recycling 'community' is essentially a decentralised, self-organised assemblage of foragers and gatherers, stockists, sorters, transporters, and 'recyclers' (named professionals with workshops and suitable machinery where recyclable plastics are recomposed into elementary forms before they are marketed as feedstock for fresh manufacture). However, practices tend to overlap unevenly across named practitioners, and my description attempts to grasp their complex, co-operative but also competing and conflicting inter-relations. The emergence of livelihood-based patterns of settlement and relocation in the city (the legacy of Ramapir no tekro) alongside these recycling processes is visibilised together with new idioms and ethics of spatial belonging, which mutes, mutates some of the traditional socio-economic norms to a limited extent. In this presentation of the unfolding *sociomaterial*, I echo observations from authors like (Gill, 2009; Reno, 2016; Millar, 2018; Nguyen, 2018) and others in elaborating a specific occasioning of mut(e)ability – disruption and change amidst otherwise marginalised communities, through the reclamation and re-mediation of plastic. In sum, this chapter sets out key reference points for

elaboration later in the thesis, with particular regards toward ongoing processes of muting, mutations, and mut(e)abilities.

Uneven Lineages of Local Governance

'...The natives have no idea of taking sanitary precautions. (...) A man will eat and drink and perform his evacuations actually on the very same foot of water, standing in it, or close to it; he has no idea of impurity as long as it happens to be Ganges water' (quoted from (Doron & Jeffrey, 2018, p. 18)), remarked a British medical officer stationed in India in the mid-19th century. The disgruntled officer was offering testimony to a Commission³⁷ constituted by the UK Parliament at a time when massive political unrest (notably, the Great Mutiny of 1857³⁸) and plagues (breaking out especially in the major presidencies of Calcutta and Mumbai³⁹) unsettled the British colonial establishment (Chaplin, 2011), but remarkably a higher number of Europeans died of disease rather than in action (Arnold, 1993). Following evidentiary lessons from the 1854 cholera outbreak in London, the 'quality' of water in India emerged as the prime suspect, and indigenous sanitary practices (especially those of subaltern 'natives' – typically poor and lower caste working quarters) were scrutinised. It was concluded that

³⁷ From the *Report of the Commissioners Appointed to Inquire into the Sanitary State of the Army in India; with Precis of Evidence*. London: Eyre and Spottiswood for Her Majesty's Stationery Office, 1863, 330.

³⁸ The revolt of the British employed Indian sepoys and several regional rulers against the British East India Company eventually prompted a transfer of colonial power from the private Company to the UK monarchy in 1858. Consequently, the British Crown was designated sovereign ruler of India, and the former 'Governor-General of India' was turned to the office of the 'Viceroy' to carry out recommendations of the UK parliament.

³⁹ The Presidency of Mumbai consisted of the cities of Mumbai, Poona (in the present-day Maharashtra State), as well as Surat and Ahmedabad (in the present-day Gujarat State). All the above cities had substantial military barracks and stations (also called cantonments), industrial and commercial establishments. Ahmedabad, in particular, had an influential indigenous industrial class, working in partnership with British officials for technology transfers – if not in the British colonial interests for commercial preservation and expansion. The Ahmedabad Cantonment Board, later evolved as a separate ULB, will feature more prominently in Chapter 6.

'the health of European soldiers and civilians could not be secured through measures directed at their health alone' (Arnold, 1989, p. 14).

A series of reformist state recommendations were made to secure the political, commercial, and sanitary interests of the colonisers and their indigenous partners and associates. This led, under the Viceroy Ripon in 1882, to the development of formal 'local governments' in the colonial presidency capitals, cities and towns with British business and administrative interests, and at the army cantonments, in line with emerging municipal consciousness and sanitary reforms in mid-19th century Britain (Dossal, 1991; Tindall, 1992; Kidambi, 2007). Local governance led to disruptions as landmark changes were introduced how space was made 'public': proposed for use, ownership, related to, but also administered and governed. Local governments were charged with the production and maintenance of order, which, in practice, took the form of segregated (European from non-European) elite quarters and barracks as 'little islands of purity in the miasmatic landscape' (Guha, 1993). Efforts were made to broaden and straighten roads, provide piped water to residences, establish separate, secure underground sewage networks (Harrison, 1994; Tam, 2013), etc. As Joyce argues, the circulation of air, water, waste, goods, traffic, and people, instituted through these infrastructural reforms – simultaneously enacted in England and unevenly across the 'Empire', were instrumental in the social production of a 'modern' – self-governing, hygienic, and moral – subject (Joyce, 2003). With the aspired production of sanitized order, introduction of new property right regimes, limitations on land-use and 'spontaneous' conduct, and the mundane technocultural making of a modernist urban biopolitics (Kaviraj, 1997), local resistances and financial constraints were also expected. In London – where reforms were initiated, as well as in India, the 'cajoling' of 'matter, minds, and bodies to enter

into delicate new configurations' (Otter, 2004, p. 43) involved cumbersome and contested processes (McFarlane, 2008). As such, local governments were empowered to collect revenues to finance sanitation services and public works, and also the authority to penalise 'nuisance' (Yagnik & Sheth, 2011) and violations. However, these institutions also imbibed modern accounting practices and the post-reform bureaucracy of checks and balances.

Run by elected boards of Europeans but also wealthy Indian tax-payers, municipalities emerged as new political fora which variously enacted and stabilized a new urban 'public' – simultaneously inclusive and exclusive. (What eventually became) the Ahmedabad Municipal Corporation, for example, had at least 30 members including bureaucrats, local industrialists and city-representatives from resident lawyers, administrators, clerks, doctors, and similar service-based professions who constituted a 'newly created, western-educated middle class' (Chaplin, 2011, p. 59). Cutting across the lines of (European/non-European) descent, the board tended to safeguard more immediate political, commercial and economic interests of its members (Yagnik & Sheth, 2011, pp. 113-14). In effect, due to a perennial shortage of fund and inadequate budget for large-scale sanitary works (Doron & Jeffrey, 2018), the colonial local governments were incapable, anyway, of acting for the wider good, thus, prioritising costly modern sanitary reforms mainly for the administrative, industrial, bureaucratic, and residential quarters of the ruling elite and armies. Therefore, large swathes of the indigenous population – especially the working poor, remained contained in peripheral 'slums', or the 'native quarters', with inequitable provision of modern civic facilities and practically, no municipal support. However, these disenfranchised populations were often intruded upon, penalised for 'littering' or for non-clearance of sewage lines, etc. and even evicted

from their residences when plagues and epidemics broke out (Doron & Jeffrey, 2018). Slum demolitions constituted routine practice apparently for taming the unruly, for producing re-ordered, 'beautiful', stable residential quarters (Kaviraj, 1997), justified as scientific and modern governmental measures to curb diseases, to stop the contamination of ground water, etc.

Indigenous public representatives, rich industrialists, and mass leaders also echoed similar public narratives to re-fashion space and civic order. The industrial-owner class of Ahmedabad assumed particular political prominence in the mid-19th century with the emergence and consolidation of the handloom textile mills⁴⁰. Between 1861 and 1946 (i.e., a year before India's independence), 74 mills had been established, with over 70,000 workers employed daily according to ledgers⁴¹. For the founder of Ahmedabad's first textile mill, Ranchhodlal Chhotalal – made a member of the municipality in 1869, and later its chairman (1883) and president (1885), 'piped water and a modern underground waste disposal system was the only way' to secure the development and expansion of industry and an industrial working class (quoted from (Yagnik & Sheth, 2011, pp. 172-73)). Noted contemporary social reformer, Dalpatram, in a well-known 1858 essay, deplored the citizens' sanitary habits and encouraged his *swadeshi mitro* ('native' friends – potentially the poor) to work towards a clean and healthy city with regular cleaning and sprinkling of water on public passages, and an insistence upon regular sweeping and garbage disposal.

⁴⁰ Indigenous industrialization through textile mills, laid out often with support from the British administrators and engineers, offered Ahmedabad city its unique modern landscape – dotted with chimneys and worker residences (called *chaalis*) – and earned the city the epithet: Manchester of the East.

⁴¹ According to the Census of India 1961, Vol. 5 – Gujarat, Part 10-A(i) Special Report on Ahmedabad City, 9-10.

Like Dalpatram, who considered the (colonial) government like a benevolent parent, duty-bound to bathe their children (the natives), despite the latter's 'wail and protest' (Yagnik & Sheth, 2011, p. 172), dominant nationalist discourses also idealised immaculate European civic orders, and reflected preferences for garbage-free, disease-free, spatial and social aesthetics in public life. 'During my wanderings', wrote Gandhi after a country-tour in 1925, 'nothing has been so painful to me as to observe our insanitation throughout the length and breadth of the land' (quoted from (Jeffrey, 2015)). Mahatma Gandhi – who launched his Indian political career in Ahmedabad, played a prominent moral organisational role in India's freedom movement and was later decorated as the 'Father of the (new) Nation' – regretted how fellow Indians would 'throw out refuse or spit, without pausing to consider whether (they) are not inconveniencing the passer-by' (Parekh, 1989, pp. 49-50), calling for a particular moral commitment to civic discipline. Following the legal transfer of power in matters of local governance to semi-independent Indian control (notably with the Montagu Chelmsford Reforms, 1919), the maintenance of sanitised public place became a matter of political contention. Within nationalist discourses, which sought Swaraj – responsible self-rule, individual and communal waste disposal practices or their removal were invested with the responsibilities of a larger political project (Chakrabarty, 1991). After all, since sanitation became performative of 'civilisation', the prevalence of particularly ordered – regularly cleaned, swept, 'refuse'-free – commons would self-evidence the Indian ruling elite's capability of modern governance, suggesting that the country's wider population had learnt disciplined conduct and civic responsibility, becoming 'civilised' at last. Garbage practices were thus linked directly to India's Independence struggles.

Colonial sanitary reforms in Ahmedabad, conducted at the behest of the municipality hit several roadblocks, and the public works were variously contested by members of the public themselves. Experts questioned the local suitability of underground sewage lines – given Ahmedabad’s vulnerability to earthquakes (Yagnik & Sheth, 2011), residents resisted the digging up of roads and the long public works (Badshah, 1899), municipal tax-collection also met with substantial resistance and tax-evasion was considered high and rampant (Vaidya & Johnson, 2001). Garbage collection was irregular, and certain parts of the city – like the mill-workers’ residential quarters or the *chaalis* – went unserved, considered ‘filthy’ and ‘uninhabitable’⁴². Writing a first-hand account on the living conditions at a city *chaali* in the early 1930s, G. V. Mavalankar – a lawyer from Ahmedabad and Independent India’s first parliamentary Speaker – shuddered, apparently, at the particular mill-owner’s irresponsibility in housing his employees ‘in such a hell and enjoying the money exorted from them’⁴³. This was after the large-scale mill-worker residences in the outskirts and neighbourhoods along the outer edge of the older city-walls like Saraspur, Asarwa, Gomtipur, Rakhiyal – once external to the recognised walled city-limits – had been incorporated within municipality jurisdiction in the early 20th century. Thus, while some locals supported the municipality, not everyone was convinced by the feasibility of reforms and its liberal visions. Some were unwilling to put up with the arduous and continual maintenance and financing of civic infrastructures.

⁴² The uneven patterning of civic infrastructure and garbage localisation in socio-economically inhabited space will be re-visited in Chapter 7, when we cut to the present-day discontents, mediation, and friction of the municipal solid waste collection and processing infrastructure in post-colonial 21st century Ahmedabad, which also result in uneven, partisan access, delays, irregularities but also scope for improvisation and workarounds.

⁴³ From *Rashtriya Chavalma Amdavad Municipalityno Falo* (Gujarati), pages 454-455, translated by (and quoted from) Yagnik and Sheth (2011).

Caste across Regimes:

A closer attention into the varied patterns of civic attention and its identified priorities (industrialists aspire to modernity for themselves but are unwilling to house their employees under clean sanitary conditions) would not only reveal the local prerogatives of class capitalism but also a parallel dynamic of differentiation. This was compounded, most prominently, through caste identity and manifested in the practical legacies of discriminatory housing and (practical) relations to waste. Elite upper caste society members got their home and private premises cleaned, often by Dalits (lowest in the caste-society hierarchy), but did not consider it their duty to offer support in preparing sanitary habitation conditions for the latter. In effect, it was considered normal for Dalits to live amid garbage and polluted matter, because they were made to handle these materials upon ritual instruction and by the compulsion of birth, and thus deemed permanently polluted (Guru, 2011; Doron & Jeffrey, 2018; Teltumbde, 2018). Caste elaborated an idiom of social segregation (say, through caste endogamy) which leaked into, shaped, and stabilised patterns of spatial and material ordering – one ‘anchored in time-honored practices and ideas of ritual purity and pollution’ (Doron & Jeffrey, 2018, p. 22). Caste rituals, and organisations of cleaning labour ran parallel to the idealised municipal civic order and were prevalent amidst the local populations. Indeed, the home has been studied as a place of residence and self-preservation, carrying ritual significances and hygienic functions (Bourdieu’s Kabyle house comes to mind (Bourdieu, 1970) but also Miller’s ‘Home Possessions’ (Miller, 2001)) and authors have written about domestic waste as objects of boundary-making, where households in India would tend to keep the indoors clean (in a moral and ritualistic sense), by keeping problematic substances ‘out’ (Chakrabarty, 1991; Kaviraj, 1997; Doron & Raja, 2015).

Responsibilities seemed to cease when formerly intimate but presently problematic substances were discarded beyond the threshold of the house, or beyond the farm, or one's endogamous caste territory (Chakrabarty, 1991). The 'outside' – common areas like roads and unclaimed land – was not always seen as “a separate juridical ‘body social’”, a civic entity in the European sense, ‘with which and about which things could be done, which could be in some cases a proper legal subject’ (Kaviraj, 1997, p. 99). The outside was not one's own territory.

Caste spilled beyond the 'native' spheres. In the 'modern' textile mills too, caste and the priorities of ritual separation of bodies (untouchability) translated into a hierarchised regimentation of mill-duties and the separation of practical departments: laborious spinning work reserved for the outcast Dalit castes – *vankars* (weavers) and *chamaars* (animal-hides workers) while weaving practices were housed in separate departments for 'upper' peasant castes – *patidars* and traditional Muslim weavers, in order to preserve the cultural rules of untouchability and ritual purity; nomadic castes – *vagharis*, similarly, worked in separate departments for framing. After work, these workers went home to separate *chaalis* (workers' quarters), where Dalit *chaalis* tended to be more derelict. This segregation of residential quarters by caste-professions and affinity to waste, was, however, not unique to Ahmedabad's industrial working class, but drew on older patterns of habitation. It was prevalent among pre-settled artisans and local residents of the walled city of Ahmedabad who settled down in caste and profession-based closed habitation quarters – locally termed *pols*, *chaals*, *vas* or *muhallas* since Sultan Ahmed Shah's era in the 15th century (Yagnik & Sheth,

2011). *Jativarnadhivas*, or habitation by caste⁴⁴ (see (Banerjee & Mehta, 2017) for a brief overview of socio-historical writings on ‘Ahmedabad’s notoriously segregated urban landscape’ (p. 183)), was also practised in the rural Gujarati hinterland in the north of Ahmedabad where many of the workers migrated from, potentially bringing spatial idioms of separation along with them (Pocock, 1972; Prammar, 1987; Desai & Desai, 2011).

In some cases, as in the traditional *pols* and *muhallas* of old Ahmedabad, or in peripheral villages like Wadaj (on the once-sparsely populated western bank), issues of waste would receive collective consideration especially within the community governance bodies. Composed typically of resident male elders and influential residents, these *panchayats* would be informal conferences constituted at a micro-level of the closed and sociologically homogeneous caste-neighbourhood, predating the modern municipal bodies. They would perform a hegemonic (gendered male and dominated by the caste order) ‘boundary work’, in what may arguably ‘maintain the self-identity of dominant groups and ideologies’ (Moore, Kosek, & Pandian, 2003, p. 28). Local arrangements would be made by these *pol* or village *panchayat* councils to designate an ‘outside’ space, notably for waste dumping and burning. For the densely populated old city of Ahmedabad (the walled city and its surroundings), ‘outside’ could be the sufficiently distal fringes like the Sabarmati riverside, or unoccupied, unclaimed

⁴⁴ Indeed, segregated community living is not without historical precedence in the region. Clustered living in terms of overlapping social (caste) and professional (craft) identity seems to have been a norm. Described by the term *jativarnadhivas*, which literally translates from the Vedic Sanskrit language into ‘habitation by caste’ (*jati*, or position within the social hierarchy – ‘*varna*’), segregated living is known to have been practised in the ancient Gujarati city of Patan, capital of the once mighty Chalukya empire (10th-13th century AD). Following the decline in royal patronage in the city, craftsmen from across north Gujarat and beyond are believed to have migrated into the flourishing city of Ahmedabad, less than 200 km down south. Indeed, the old walled city of Ahmedabad is still – to this very day – a conglomeration of caste and profession-based closed quarters – locally termed *pols*, *chaals*, *vas* or (Muslim) *muhallas*. Their continuity may arguably be traced back to the 15th century foundation of the city by the sultan Ahmed Shah, according to some historical records like the *Amdavadno Itihas*, by Maganlal Vakhatchand.

(or weakly claimed) spaces within the city limits like fields or vacant plots of land. For peripheral rural spaces (of the time), like the Wadaj village on the western bank, the nearby 'wasteland' of Ramapir no tekro, the unoccupied portions of the marshes that 'untouchable' Dalits had made arable and built their dwellings on, served as safe space where waste could stay 'in place'. These sites were subsequently used as open garbage dumps, without necessarily consulting the Dalit inhabitants or securing their consent. The closeness of marginalized Dalit settlements to waste ubiquities would not concern the caste-residents of the main village (Pocock, 1972). Typically, caste-based hierarchies would, therefore, (re)produce patchwork 'geographies of inclusion and exclusion, purity and pollution', garbage occurrence and order, in their surroundings (Ghertner, 2012, p. 1162) (see (Sharma, 2012), among others, for more recent political critiques of place-making and ongoing Dalit exclusion from bourgeois environmentalism).

Thus, we can already see some of the uneven spatial patterning of garbage in a sociologically stratified region. It was therefore not the elite habitation spaces, but fringe Dalit settlements (Dalits were not allowed to inhabit the 'main village') and their vicinity, which tended to be strewn with garbage all over. Garbage ubiquity was thus not *common* even within so-called 'native' population, but mediated by the spatial idioms of caste. Most caste-quarters maintained their own everyday infrastructures of garbage removal which led to uneven spatio-material redistribution, and in practice, reproduced local differences.

Experiences of garbage ubiquity were also mediated by uneven exposure to and caste and gender-based allocations of work, say, of collecting, carrying, disposing waste. The hierarchies of pure and impure also extend onto animals enrolled in the routinised efforts of garbage removal – the revered cattle fed on

agricultural waste or domestic food leftovers left out for them before urban households and markets (together with dogs, cats, crows, donkeys, etc.), while the abominable pigs were reared for consuming faeces and other waste. In this scheme of 'collaborative practices' between hierarchised people (Simone, 2013) and animals (Baviskar, 2011; Gutgutia, 2020), the local caste societies made sure that the handling of some of these wastes or those inedible by animals were performed by the Dalits (outcast from the social order – the *varnashram*, and designated to serve the latter under ritual sanction, or unwritten socio-cultural rules). Waste-work would be further differentiated by waste materiality (e.g., cattle carcass clearing for Dalit sub-castes like *chamaars*, sewage and nightsoil clearing for *bhangis* and *valmikis*, etc.). Depending on the materials or the hazards involved, the task could be gendered too. For example, sweeping common areas like streets were allocated to females, whereas men performed those tasks that required heavy lifting. Dalit men and women would, consequently, be identified with the materials (or animals) they handled or the spaces they inhabited, and thus, stigmatised as ritually polluting, disruptive to the very spatio-social and material orders they helped maintain (Guru, 2011; Gidwani, 2015). Deemed 'untouchable' – 'invisible' even – waste removal work by these stigmatised people would mostly be performed in the darkness of the night (Shinoda, 2002). As such, the possibility of running into an upper caste person, i.e., the cross-caste co-embodying of space was avoided.

The gendered and caste-based practices and networks of waste labour were routinely inducted within the urban municipal nexuses of maintaining colonial orders in Ahmedabad (Tam, 2013). Despite the insistence on mechanised infrastructure, lower caste and outcast bodies would be hired in underpaid jobs to repair and clean these systems, and occasionally carry out the menial tasks of

removing garbage from the elite European and non-European quarters, and disposing them manually or in carts (Doron & Jeffrey, 2018, p. 33). Again, these works were mostly performed in the early hours of dawn or in the darkness of the night. Nationalists like Gandhi organised surveys, performed advocacy and technological research to improve the working conditions of manual scavengers, for example, through the Harijan Sevak Sangh (Agarwal, 1934; Patel, 1970). Gandhi also compared the sweepers to mothers, narratively highlighting their vital care-work for the 'Hindu society' (Gandhi, 1954).

After Independence (1947), caste discrimination, 'untouchability' were prohibited under law, and a series of affirmative state actions were undertaken (Shinoda, 2002). These led to limited changes in socio-economic hegemonies (Jaffrelot, 2003; Yagnik & Sheth, 2011). Yet, the 'enduring ideologies of caste still loom large when it comes to occupations associated with handling of waste of any kind' (see (Doron & Jeffrey, 2018, p. 32) also (Gill, 2009; Gidwani, 2010; Singh, 2014; Teltumbde, 2018)). Manual scavenging continues by caste, for example, despite being illegalised. From apparently caste-neutral uniformed janitor and cleaner jobs allocated predominantly to Dalits, to precarious labour (sub) contracts in SWM, caste-dominated patterns of difference and differentiation have persisted in compounded forms from the colonial era through to post-colonial neoliberal market regimes (Mosse, 2018). We turn more properly to some of these in Chapter 5 where we elaborate on the planning and constitution of the 'new' state-mediated SWM regime. It suffices to highlight, for now, that the various regimes of garbage governance, whether laid out on a grander scale or constituted more locally, overlapped with, drew from, and re-produced traditional lower caste gendered labour and patterns of socio-spatial divide.

Post-Colony and Plastics:

The hybrid resourcing of lower caste labour into the public and private modes of local governance of garbage continued into post-colonial India. In effect, while Provincial governments changed hands and fresh laws were enacted to provide for the establishment of constituent municipalities after India's independence, post-colonial municipal policies and practices around garbage inherited many of their colonial legacies. 'At the stroke of the midnight hour', as the world slept and India awoke to 'life and freedom'⁴⁵, many of the pre-existing infrastructures of local governance – physical to bureaucratic, labour networks to legal categories – were inherited. In particular, local governments continued to be notoriously cash-strapped and technically disadvantaged to be able to arbitrate or act in wider interest (Doron & Jeffrey, 2018). As the ruling Congress party prioritised rural livelihood development and community empowerment, urban governance remained a policy afterthought. In fact, 'public policy in India favoured containment and restriction of metropolitan growth and specifically discouraged new investments' during the first two decades of independence, as urban population grew at less than 1% until 1961 and under 2% until 1971 (Sivaramakrishnan, 2013, p. 87). Furthermore, the political governance model adopted by the Congress party (its ranks dominated by western-educated upper-caste elites) was to rule through a coalition of dominant interests across different domains and scales, which 'included sections of the middle class, landlords, rich peasants and professional groups who were interested in preserving their position within Indian society' (Chaplin, 2011, p. 60) (see also (Chatterjee, 1997)).

⁴⁵ From the Tryst with Destiny speech delivered by Jawaharlal Nehru on 14 August 1947, on the eve of India's Independence. Nehru became Free India's first Prime Minister. The iconic speech may be fully accessed here: https://www.cam.ac.uk/tryst_with_destiny

This meant that scarce municipal resources continued to be unevenly distributed and post-colonial governance continued to prioritise safeguarding the interests of the tax-paying elites, many of whom hailed from the colonial middle classes and maintained their prior hegemony. Sections of the socio-economically impoverished population remained marginalised with inequitable representation in civic and political life, while many of them continued to devote labour to the work of waste removal, as before.

In the inadequate presence of the municipality in the matters of garbage management, therefore, pre-existing arrangements of caste-based socio-technical practices in garbage removal persisted, and maintained habitable 'civic' orders, albeit unevenly, across different urban quarters. In Ahmedabad, the AMC was set up in 1949 under the Bombay Provincial Municipal Corporations Act and the Municipal Commissioner was given complete charge for drafting byelaws and implementing waste policy. Yet, on the ground, households and housing clusters (including new modern housing complexes) continued to depend on gendered 'lower' caste labour arrangements for the handling and disposal of different kinds of waste materials. The fringes of the city, vacant plots of land, former 'wastelands' and fringes of Dalit settlements (like Ramapir no tekro), roadsides, lakes and the expansive and long Sabarmati riverbank continued as open and haphazard dumpsites. Eventually, waste dumping points (*dhalao*s) were designated at the neighbourhood level, and large yellow bins were provided by the municipality for local households and neighbourhoods to be able to dump daily waste. These would be picked up occasionally by trucks contracted by the civic authorities and dumped in the city's peripheries (AMC, 2017). It was only in 1982, that the AMC designated peri-urban space in Pirana – a stretch of land of

approximately 1 sq. km – to openly dump ‘unsegregated and often hazardous waste ... without any scientific method of treating garbage’ (Dutta, 2017).

However, not every discard was disposed of at the city’s margins, or dumped and burnt, or consumed by roaming animals. Some materials co-elaborated different histories. Materials like metals (say, containers of ghee and oil, or discarded household utensils) or glass (say, broken utensils, containers of pulses and pickles) – recalcitrant to ‘natural’ processes of degradation, persisted in the environment (and perturbed urban inhabitants) for longer periods (Doron & Jeffrey, 2018). Some of these ‘solid wastes’ (by the early 1990s, the term had caught on to local bureaucracy, as mentioned above) – metals and glass, alongside discarded cloth and jute fibre, (news)papers, cardboards, wood, etc., co-produced a parallel field of socio-material possibilities for the urban poor.

This revealed another crucial aspect of the unfolding garbage story, where material recyclability or reusability offered a limited chance to the urban poor to reclaim economic activity and a place in the city (Gill, 2009). Some of these recovered objects offered immediate use value (say, reclaimed wood, as many of my respondents – former waste-pickers – shared, were used as cooking fuel, tarpaulin sheets salvaged as waterproofing material for urban ‘slum’ settlements, metallic containers and tin vessels re-used as domestic utensils). Again, the occurrence and scale of these variably durable and potentially redeemable materials gave rise to a number of specialized urban professions and markets of material gathering, segregation, accumulation, exchange, transport and processing. These networks (self) enrolled significant numbers of the urban poor and caste-marginalised populations, migrant and seasonal labour (Breman, 2016). An elaborate, yet uneven, network of people, techniques, hierarchies, and

technologies thus routinely reclaimed, screened, sorted, broke down, melted and recast these materials into usable forms for remanufacture (Gabrys, 2011). Once-rejected materials were thus variously mediated, mutated into forms amenable again to sociomaterial calculations and processes of object-making and value-generation (examples of urban practices and networks of material salvage are abundant and stretch across the world – see (Gregson, Crang, Ahamed, Akhter, & Ferdous, 2010; Reno, 2016; Hawkins, et al., 2015; Millar, 2018; Nguyen, 2018; Butt, 2020; Laser, 2020), for example, for a range of material-specific accounts of recovery, process, revaluation and requalification, also (Doron & Jeffrey, 2018) for material-specific accounts of recycling in urban India ranging from hair, gold, paper, glass, cloths, electronic devices to plastics).

Ahmedabad, like other cities across South Asia and the world, has had a long-standing network of material reclamation and renewal, composed of actors like *pastiwalas*, *kabaadiwalas*, *peethawalas*, and *kachre binnewalis* (Dey, 2020). Together, they would compose a complex legacy of socio-material revival and survival, offering the urban poor low-capital opportunities to eke out a dignified living, aspire to own and manage recycling businesses, and become legitimized economic and political participants themselves (see (Beall, 2006; Gutberlet, 2008; Gidwani, 2010; Faulk, 2012; Millar, 2014; Samson, 2015; Rosaldo, 2016) for various instances of waste-work based socio-economic and political mobilisation), if not allow themselves opportunities to re-mediate the traditional rules of deprivation and marginalisation by caste (Gill, 2009). Given the steady accumulation of material discards in and around the city, these entrepreneurial networks of material gathering and salvage, together with the more coerced and abject work of waste removal for upper caste residences and clusters, diverted large quantities of garbage off the streets, roadsides, household front-doors, and

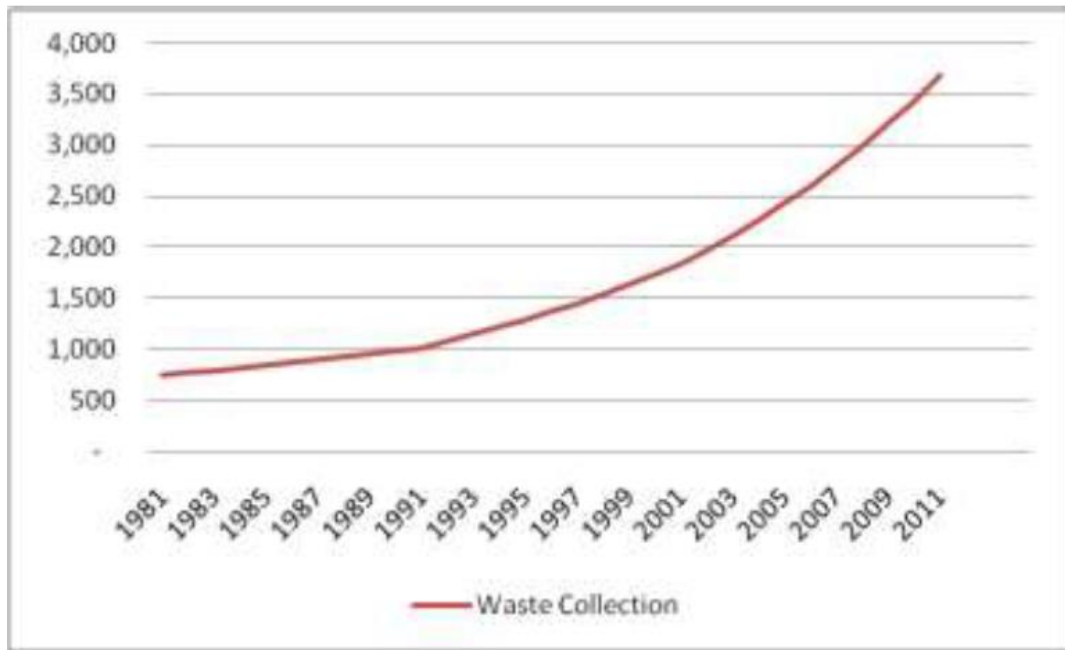
open dumps. In other words, they routinely reduced 'garbage strewn all over' the city. Despite their critical role in maintaining socio-economic and spatial orders (thus reducing municipal burden), these historically marginalised actor-networks received little support or recognition from the state and wider civil society (Gidwani, 2015).

From the mid-1970s, as Indian industry picked up and urbanisation grew at unprecedented rates, the scale and material composition of urban solid waste changed precipitously, including in Ahmedabad. The growing complexity of garbage materiality would disrupt carefully maintained (albeit problematic) spatio-material orders in the city (say, garbage-free residential clusters, *pols*, *muhallas*, and elite middle-class neighbourhoods at the cost of garbage dumping and proliferation at the urban fringes or in close proximity to slums and Dalit houses), and bother, if not re-mediate, the boundary-making practices encountered above.

From the late 1970s, the erstwhile regime of state licensing and strict regulation of large domestic industry, nationally, started easing, giving way to private-sector enterprises (Mukherji, 2009). The batch-production of retail consumer goods, actively discouraged by centralised policies thus far, were promoted from this period, and further strengthened throughout the 1980s, when the indigenous petrochemical manufacturing industry also finally received state promotion (Gill, 2009). From 1991, the national economy was decidedly opened up to foreign capital. Alongside deregulation, massive privatisation was promoted across sectors, including retail consumption. Economic liberalisation reflected in higher GDP, expanding service sectors, and massive urbanisation across India⁴⁶,

⁴⁶ Though definitions of urbanity and counting methods challenge and problematise statistics (Kundu, 2010), India's urban population, approximately 62 million according to the 1951 census, stood at 109 million in 1971, but then increased drastically to 286 million by 2001, and to 377 million by 2011.

resulting in the expansion of an urban middle-class, defined by varying degrees of disposable income, 'desire for consumer goods and the resulting garbage they produced' (Doron & Jeffrey, 2018, p. 13)⁴⁷.



Source: (AMC, 2012)

Fig. 11: Estimates for average daily solid waste generation (in MT) in Ahmedabad by year, from 1981 to 2011. Courtesy: AMC [Open Data License – GOI]

Plastics, the material preferred for design, synthesis and batch-production in the Western industrial world (Bensaude Vincent, 2013), started to become available in abundance, especially from mid-1980s, as India's growing petrochemical industry and refineries pumped tonnes and tonnes of raw material and feedstock

⁴⁷ We laid out some of the colonial roots of the Indian urban middle-classes above. Authors debate and contest definitions of class identity, features, contents, and discontents, etc., as pertaining to the so-called 'Indian middle-class', especially as they emerged, post-Independence, into the post-colonial and neoliberal futures. For more detailed, situated accounts, as well as contestations, critiques and doubts about the homogeneity of this population category, see (Deshpande, 2003), esp. (Sridharan, 2004; Srivastava, 2014) for after 1980s.

into the manufacturing markets. Similar to other economies, like the post-War America (Meikle, 1995) or West Germany (Westermann, 2013), plastics in India, despite its late development, caught on and were integral in the elaboration, (territorial, commercial) expansion and stabilisation of markets and the emergence of industrial consumption cultures (Muniesa, et al., 2007; Hawkins, 2012; Hawkins, et al., 2015). As Dey elaborates, plastic's industrial mutability – its plasticity – enabled the design and proliferation of consumer products suited for different markets niches, responsive to specific needs and affordances of India's diverse population demographics, while also imitating pre-existing materials and their qualities but further improvising to suit market demands (e.g., paper, leaf-based packaging giving way to plastic bags) (Dey, 2021). See Doron and Jeffrey (2014; 2018), also Pathak and Nichter (2019), for more instances of strategic material 'substitution' like neem-twigs (for brushing teeth), steel buckets, metal or glass tumblers and utensil, detergent and oil containers, medicinal vials, etc. all being replaced by specialized plastic make and packaging (Doron & Jeffrey, 2018; Pathak & Nichter, 2019), and (Hawkins, et al., 2015) for polyethylene terephthalate (PET) replacing glass in packaging drinks and bottled water, increasingly consumed in the hot (Ahmedabadi) weather. Indeed, as retail consumption expanded and consolidated among the middle-classes, bottom-of-the-pyramid retail (Prahalad & Hart, 1998) – enabled by synthetic packaging and scaling down to 'sachetization' (Cross & Street, 2009) – prevailed too, especially with the urban poor aspiring to middle-class standards. Grocery-shops were flooded with plastic (packaged) retail goods – from the Lay's crisps to the international cola brands, Pepsi and Coca Cola, to healthcare and grooming products. Bigger portion sizes (say, suited for those who may be able to afford them) co-existed in the market (albeit unevenly) with small single-portions in

aluminated polythene packaging, say, for shampoo, tobacco, snack, etc. for longer shelf lives more finely suited to the commercial demands and consumption rhythms of lower income neighbourhood retail shops. Consumers were initiated into mobile on-the-go consumption cultures (Hawkins, et al., 2015), and were lured by the prospects of less cumbersome and more efficient, socially responsive experiences of shopping and goods carrying (Dey, 2021). Plastic bags, for example, typically offered free of charge (despite the new governmental rules on plastic waste management enacted in 2011), enabled more frequent (and potentially higher quantity) purchasing and convenient transporting of goods – thus, helping to increase consumption; while also enabling decanting and selling by portion in low-income neighbourhoods – thus, increasing the spread of consumption (Dey, 2021). By the 1990s, plastic carrier bags – once a collector’s item in elite and internationally mobile households in the 1970s (Doron & Jeffrey, 2018) – had become ubiquitous (Pathak & Nichter, 2019).

According to a 2011 report by the British Plastics Federation, the growth rate of the Indian plastics industry, in the first decade of the new millennium, was ‘one of the highest in the world, with plastics consumption growing at 16% per annum (compared to 10% p.a. in China and around 2.5% p.a. in the UK)’ (BPF, 2011). The State of Gujarat, home to the biggest petrochemical refineries (including the Reliance Industries) was identified as India’s leading plastics manufacturing hub. Plastindia – India’s apex body of plastic industry, reported during their latest triennale international conference, held (notably) in Ahmedabad, that India’s major thermoplastic manufacturers would collectively produce 15.7 million metric tonne (MMT) of plastics in 2019-20 – a 1.7 MMT capacity increase from 2016-17, their president describing it a ‘very fast growing sector’ (Plastindia, 2018). The Central Pollution Control Board’s (CPCB) 2013 overview of plastic waste

management (2013) identified increasing plastics use not just in retail packaging and consumption, but also ‘unprecedented’ plastics use in/as ‘clothing, ... household and industrial products, and building materials’, transport and infrastructure (p. Ch. 1).

However, as plastics became abundant as (part of) ‘products’, they also started proliferating urban waste streams. This is reflected in a stunning estimate from a widely consulted World Bank sourcebook for urban planners and policymakers (Zhu, Asnani, Zurbrugg, Anapolsky, & Mani, 2008), where the percentage of plastics in MSW streams across India increased from 0.60% in 1996 to 9.22% in 2005. By 2018-2019, as per the recent annual report on plastic waste management by the CPCB, about 3.3 MMT of plastic waste were being generated annually across India (CPCB, 2019). However, this appears to be a conservative estimate if compared to industrial estimates of yearly plastic production and use. Indeed, the phenomenon of plastic waste is more critically contextualised if we consider the disposability of plastic packaging as integral to the emergence of mobile and convenient consumer products and consumption cultures (plastic’s plastic mutability thus also enacting disposability for products of mass consumption, which, as Hawkins highlights – are ‘made to be wasted’) (Hawkins, 2013). As a ‘use-and-throw’ material culture gained ground from the late 1990s (Pathak & Nichter, 2019), and as more plastic products were produced, circulated, used, and disposed, garbage was assuming an unprecedented prominence of scale (Gidwani & Corwin, 2017). Its materiality was becoming more plastic and complex, posing new techno-political challenges for diverse populations and constituencies but also for municipal authorities.

In plastics' uneven yet massive proliferation and related wider socio-economic restructuring, we tap into another complex patterning of material ubiquities in urban space. Indeed, (plastic-dominated) solid wastes are not easily tamed (Hawkins, 2006; Doron & Jeffrey, 2014; Altman, 2018). Garbage, once predominantly removed to the 'secure' invisibility of peripheralised sites – often in the dark of the night by marginalised Dalit hands and bodies, started to accumulate and became more prominent in central commercial and residential neighbourhoods, thoroughfares, recreational spaces and sites of middle-class consumption within the city. A great variety of discarded plastics (though also paper, metal, rubber, etc. in smaller quantities by proportion relative to plastics) piled on in vast quantities at these sites each day, comparable to localised rates of consumption and disposal. Limited municipal capacity and insufficient techniques for garbage removal and treatment meant these obdurate materials accrued rapidly, degraded slowly, and accumulated steadily. When burnt, these wastes would emit smoke – engulfing disadvantaged fringe habitations but also the affluent elite quarters (Doron & Jeffrey, 2018; Sharma, 2021); when dumped, they generated leachates seeping into wider fresh water sources; and if consumed by unsuspecting animals, they would cause premature deaths. Localised gendered, caste and animal labour-based arrangements fell short in capacity for garbage removal, challenged by complex materialities, scale, and increased (densities of) urban settlement. The 'wastelands' (like the flanks of Ramapur no tekro), fringe spaces, Sabarmati riverside and the Pirana landfill were not the only 'open dustbins' in the city anymore. Socio-corporeal and spatio-material orders were threatened across multiple sites. Garbage ubiquities – with the advent of persistent plastics, was not limited to marginalised sites and Dalit experiences alone. As plastics accumulated in the environment, choking sewage,

rivers, and other natural drainage and ecological assemblages, flooding and plagues became frequent. Plastics burning generated noxious fumes, leachates released potentially harmful additives and effluents, which permeated to the bodies of citizens, not restricted simply to Dalits (Pathak, 2020). This triggered 'public' anxieties, which started to be increasingly shared, articulated on public platforms, media and the court, and as the opening discussion demonstrated, and eventually turned into acute judicial activism which laid down rights, claims and fundamental demands from the state. As plastic waste emerged as 'pollutants' (see (Pathak & Nichter, 2019; Pathak, 2020) but also (Henderson & Green, 2020; Schönbauer & Müller, 2021) for the articulation, contestation and stabilisation of (micro)plastics as 'risky objects' for publics), links were being drawn, 'publicly', to environmental and sanitary rights, and to urban aesthetic desires, urging the state to act.

After a brief journey through India's urban histories, we have now looped back to the starting anecdote of this chapter on public mobilisation around garbage. We reckon how plastic made waste experiences more widely shared, generating uneven public responses, contestations, and claims. However, this still does not mean that exposure and experience of plastic waste is uniformly distributed. The 'informal' *peetha*-based recycling networks responded and re-organised to draw value from plastic waste, in turn, reducing, some of the widespread accumulation. Following foragers, *pastiwalas*, *peethawalas*, and other actors who variously localise plastic waste from across the city, we come to grips with some of the uneven patterns of plastic occurrence in the city. We also take stock of the practical difficulties in accessing and extricating these plastic discards, experiences which further complicate one's reading of plastic's ubiquity.

Indeed, much granularity in patterns of material difference, and spatio-temporal distribution of plastic is encountered when one walks, finds, bends down, touches, sifts through, listens to – sensorially and practically interacting with these materials regularly over time. I got a sense of some of these patterns by working with the recycling communities of Ahmedabad and along my personal and professional (ethnographic) trajectories through the city at different times of the day, and night. Indeed, despite their incredible variety in physico-chemical composition and form, etc., certain plastic objects (characterized by their polymer types and combinations, feedstock quality, object sizes and forms, admixture with other kinds of waste materials) are more likely to be found occurring at specific sites and neighbourhoods in the city during specific times of the day, or the year.

As examples, one could cite the higher likelihood of occurrence of discarded PET and glass bottles (soda and alcohol), snack packaging, cigarette butts, etc. along the newly concretized Sabarmati Riverfront, a site of conspicuous middle-class assembly and consumption as compared to residential neighbouring, thus, revealing patterns of plastic material occurrence linked to commerce, urban routines, spatial use, social cultures, etc. Some of these objects and leftovers would accumulate through the night, as men (the uneven gendering of space was explained above) sat drinking, chatting. Smaller-sized composite packaging of lower-grade polymers (for cheaper products, products with long shelf-life, single-use sizes) were likely to occur in low-income residential neighbourhoods. Aluminised polythene shampoo sachets, small biscuits wrappers, transparent polypropylene (PP) snack packaging, small polythene bags, and so on. In the more affluent neighbourhood bins (*dhalaos*), one was likely to find better polymer-grades and larger-sized packaging (say, bigger 500 ml shampoo bottles instead

of small single-use sachets, or larger HDPE containers of oil instead of smaller pouches).

Plastic objects might also be found mixed with dust, sand, rainwater, food materials, oil, etc. depending on specific forms of use or mediation with non-human elements (say, based on the materiality of objects these products contained or interacted with, on weather conditions, or on intervention by street animals). The occurrence of specific plastic products (and waste) peaked at different times of the day like PET bottles or low density polyethylene (LDPE) pouches of cold water or soda around midday, such daily patterns peaked further in summer than over the milder winter months.

Spatially, of course, these discards were more likely to be found around food and beverage trucks, wholesale marketplaces and retail shops (where larger cartons and empty paper containers were also abundant), open spaces for leisure like parks and the Riverside, and of course, near public dustbins, large yellow municipality bins, open dumps by the roadside, empty neighbourhood plots and strategic street corners, where garbage from the locality accumulated. Understandably, these specific localisation patterns are incredibly complex, emergent and transient yet sometimes durable, overlapping with, mediated by (but also mediating of) a range of inter-leaking socio-economic patterns, urban infrastructures, rhythms, cultural activities, economies, constraints, and climatic conditions. Seasoned foragers, like Kantaben and Veenaben (from our introduction), identify these patterns and likelihoods, despite relational productions of plastic ubiquities across space, time, practices, and contingent agencies being evidently messy and mutable.

While plastic waste complicates the sociomaterialities of urban life and ecology, the routine work performed by Ahmedabad's *peetha*-based networks of material recovery and recycling emerges as ever more important. In the final section, we elaborate on certain key technical practices and practitioners who gather some of these plastics and make them recyclable. As the complex granular urban spatio-plastic ubiquities are negotiated and mediated, a range of markets, entrepreneurial and livelihood opportunities are also constituted. Indeed, the massive abundance of plastics in the city opened up new possibilities for the pre-existing gendered caste-based practical networks, which effectively re-organised, expanded operation and capacity around plastics, especially from the 1990s, and leveraged on the new economic opportunities that plastic ubiquities generated.

Enacting Plastic Recyclability: Key Practices and Networks

We roughly categorise the processes of enacting plastic recyclability through two terms. 'Localisation' will refer to the multi-modal, multi-sited and multi-scale processes of material acquisition, sequestration, segregation, cleaning (removal of contaminants being seen as a form of re-localising matter across categories of (non) value), exchange, aggregation, preservation, and transport. Localisation, thus, entails a broad conceptual view of sorting out matter in space. It alludes to the uneven distribution of plastics across spaces and times of the city, their acquisition, and ensuing processes of mediated streamlining by finer, and finer, material categories into more-or-less homogeneous stable consignments. In other words, there is a territorialisation of tasks to secure plastics and fix them into funnelled down, sorted units, and circulate these along particular channels. The other term, 'recycling' will refer to the batch-wise technical processing where

these (re)localised consignments arrive as usable feedstock to be reduced down to remanufacturable elements⁴⁸.

In effect, plastics are not readily recycled. The complex assemblage of practices, (embodied) techniques and sociomaterial, spatio-temporal organisations across scale which we capture by our discussion of localisation essentially prepare plastics for 'recycling'. That is, they make plastics amenable for the available techniques of the 'recyclers'. As such, the site of 'recycling' (or at the 'recycler') is denied primacy as the only site where recycling takes place. We choose instead to visibilise the distributedness of the process and its pragmatic enactment across sites. In so doing, we highlight the vital work performed by the *kachre binnewalis* (waste-pickers), *peethawalas* (aggregators), *peetha*-workers (including material sorters, cleaners, etc.) which are integral and inseparable to the recycling process. The separation of localisation and recycling, which is clearly untenable in practice, is a narrative tack made nevertheless for this thesis. This is because the new MSWM regulation issued by the Government of India (which we elaborate in Chapter 5) interprets the work of 'recycling' and 'collection' narrowly as mutually exclusive, self-sufficient sites/practices. The mediations, relations, and inter-dependencies in-between are barely accorded recognition. A proper appreciation of each set of practices, and their indispensable inter-linkages is, therefore, necessary to set the stage for critical elaboration later on.

⁴⁸ At times, recyclers not only produce feedstock but turn manufacturers of new products themselves (say, recycled polythene carrier bags). This gives them better control over price and enables them to earn higher profit, catering to parallel markets which often run in the urban economic underbellies. Instances like these outlie *infra*-economies (Gidwani, 2015) because they do not simply supply raw materials for mainstream 'capitalist production'. Indeed, recycler-cum-producers are not mere supplicants to; but instead, compete and undercut the markets of dominant corporate actors (say, mainstream polythene carrier bag brands) by producing cheaper, or lower grade, substitutes and counterfeit products.

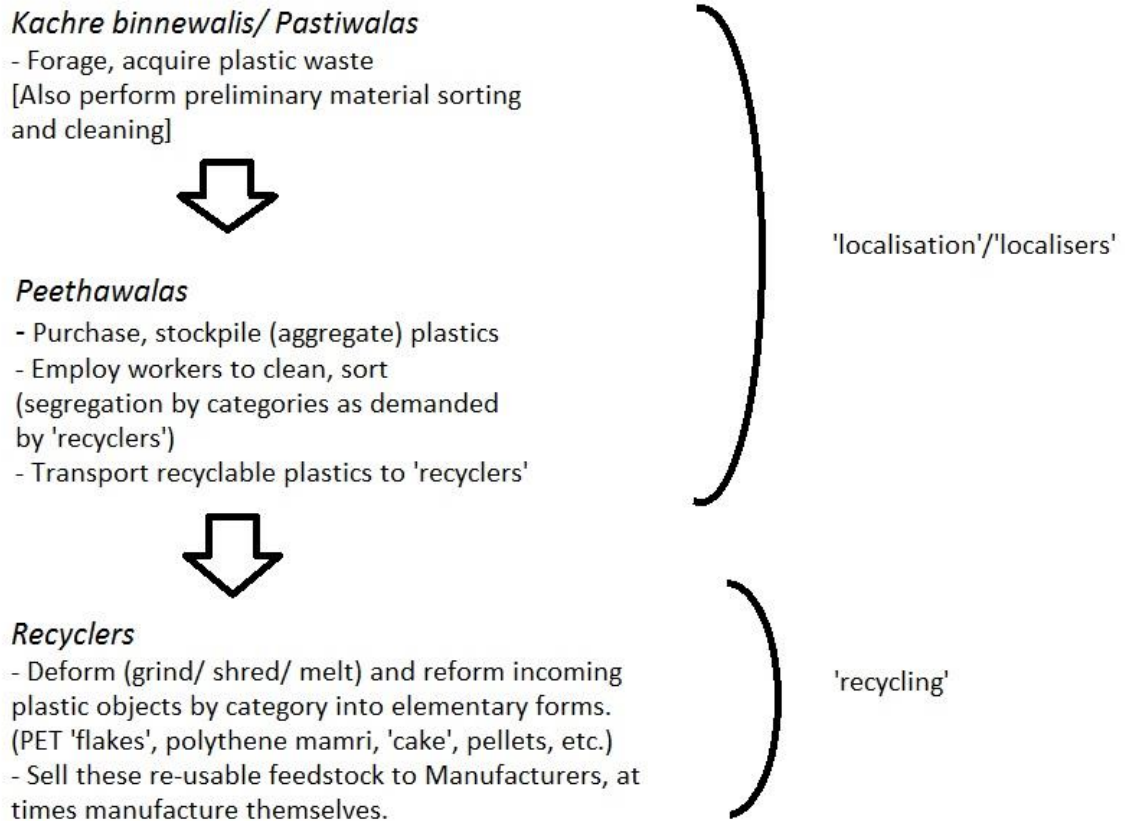


Fig. 12: A simplified material flow diagram identifying some of the overlapping key mediations (and their distribution) performed on plastic waste which enact its recyclability and constitute the recycling process. Courtesy: Author

Plastic mutabilities also generate conditions for limited social and economic change. We situate the ensuing discussion at Ramapir no tekro. A once-peripheral marshland – described in colonial land audits as a ‘wasteland’ (CWMG, 1925-1926, pp. 456-457) – on the western bank of the Sabarmati, Tekro accumulated thrown away garbage but also socially discarded Dalits and those who emigrated from the old city through the latter half of the 20th century following the massive closure of textile mills and political violence⁴⁹. As a motley melting

⁴⁹ The mill-based textile economy of Ahmedabad faced a downturn from the 1960s. Seven mills collapsed between 1960-70, rendering up to 17,000 workers jobless (Yagnik & Sheth, 2011). Professional precariousness is said to be linked with communal tension along the lines of caste and religious identity,

pot of diverse sociomaterialities, Ramapir no tekro emerged as a major hub in the foraging, mediation and trade enterprises which make plastics recyclable. Here, habitations were patterned less clearly along the lines of caste (since most settlers were Dalits anyway) and perhaps more cogently along friendly affinities, similar experiences of violence, former provenance (say, former co-workers at the city mills and friendly neighbours who decided to flee the city together) and above all, the spatial, logistical, commercial and practical solidarities and competitions related to recycling work. This marked significant changes to the more traditional *jativarnadhivas* patterns we described above.

Home to enterprising Dalits, Tekro now occupies central place within Ahmedabad, yet resists the expanding geography of land re-development (Jaffrelot, 2016). Despite the essential civic and environmental role of its many *peethas* (more than 20 as of 2019⁵⁰), resident-workers and *kachre binnewalis*

as violence pervaded the proximal residential quarters of the mill-worker families. In an incisive analysis of contemporary political violence in Ahmedabad (including a major riot in 1969), sociologist Ghanshyam Shah presents a precarious picture of contemporary lower/middle class life in the old city (Shah, 1974). Besides threats to physical harm, the period was also characterized by economic volatility, acute price rise and non-availability of essential food items. Many of my present-day interlocutors recalled regular riots and curfews disrupting life in the old city, and echoed a sense of looming insecurity. The large-scale handloom-based textile economy in Ahmedabad collapsed rather dramatically from the 1980s, with 52 more mill closures registered until 1996, and more than 1,00,000 workers made redundant (Howell & Kambhampati, 1999; Breman, 2004). As production and consumer trends in the latter half of the 20th century shifted from course yarn towards finer yarn, the drastic labour downsizing started from the labour-intensive spinning departments in the mills, which predominantly employed the Dalits. Indeed, according to a survey conducted by Breman and Patel, *chamaars* and *vankars* together constituted up to about 35% of the mill work-force – most of them made redundant (Breman, 2004).

The contemporary economic crises were compounded by local political crises, which also disfavoured the Dalits. Indeed, anti-Dalit sentiments were heightened in the 1980s with elite social groups protesting, nation-wide, against the constitution of the Mandal Commission (1979) and its subsequent recommendations for increased reservation (positive discrimination in public services, jobs and state education) for the ‘backward’ classes of the population. Ahmedabad was a prominent hub of violent mobilisation around the anti-reservation protests, which marked ‘lower caste’ and ‘backward class’ bodies as targets of middle class ‘public’ rage (Patel, 1999; Shani, 2005). The distant marshes of Ramapir no tekro on the rapidly urbanising western bank of the river was already a known Dalit settlement, a ‘wasteland’, considered ‘safe’ and became a natural resort for many of these endangered Dalit families who fled in clusters overnight.

⁵⁰ The annual environment audit of one of these many *peethas* identifies them as having facilitated in the emission reduction of 2354.06 tons of CO₂ in 2019-2020.

(more than 500 as of 2019), the century-old Dalit settlement is predominantly considered illegal⁵¹. Set in stark contrast to the wider straight roads, multi-storeyed housing and commercial establishments which marks its neighbouring urban quarters, the dense, intractable habitation spaces of Tekro is often considered one of Ahmedabad's largest 'slums' (Marnane, 2019), an immoral occupancy of 'freeloaders' impeding the city's real-estate growth story (as a local IT-sector entrepreneur confided in private), which needed a 'facelift', if not eviction (Rana, 2010). In effect, while neighbouring quarters are overwhelmingly dotted by commercial buildings, shopping malls, multiplexes, ordered middle-class residential complexes (and garbage-free streets), high and opaque tin sheets are erected to block Tekro from public view, especially when national and international dignitaries visit the Sabarmati Ashram of Gandhi, the Father of the Nation – situated right across the Ashram Road from Tekro. The following section therefore presents a counter-view of the place. As we lay out the practices and nexuses of material localisation and segregation for recycling, in the process, we uncover a story of sociomaterial mutability: struggle and change. Indeed, over time, especially from the mid-1990s, as the trade in plastic waste and recycling-based industries surged, residents of Tekro started to become rich and politically influential – albeit unevenly. Plastic's recyclability thus offers illustration of how local *peetha* networks generated a socio-economic and cultural community of

⁵¹ As of 2019, Ramapir no tekro is included within the urban wards of Wadaj (AMC, 2020); and the former 'wasteland' is public property especially after a series of land reforms between 1976-1979 (Yagnik & Sheth, 2011), the AMC arbitrating (il)legality of its occupation and use. A 496-page official document updated in July 2020 by the AMC mentions 'Ramapir no tekro' / 'Ramapir Tekra' six times, and announces the regularisation of two formerly 'unauthorized' private properties under the Gujarat Regularisation of Unauthorised Development Act (GRUDA), 2011. Traditional ownership of land in the marshes is thus officially presumed to be 'unauthorized' by default, unwritten land ownership and informal property exchanges considered invalid, unless individual residents applied for satisfaction of property rights and were granted regularisation from the state bureaucracy and civic authorities.

Dalits, and empowered their claims to place in a rapidly developing 21st century metropolis.

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Fig. 13: Uneven urban ‘order’. Ramapir no tekro – untamed, inside the harp-shaped territory made by the three bordering roads and a neo-urban collage of ordered housing all around. Inside the harp, dense human habitation and some remaining marshland (the intermittent stretches of green, seen on the right) co-exist. The Ashram Road, the main thoroughfare of Ahmedabad ‘West’, bifurcates at the southernmost tip of Tekra – continuing south-north, and diagonally north-east following the river. The latter extension separates Tekra from Gandhi’s Ashram. The Ring-Road (west-east) constitutes Tekra’s northern limit, along the former waste-dump, near the T-shaped road junction. The reader may be able to see the physical infrastructures (in white) of a new waste transfer station set up in the place. 2019. Courtesy: Google Maps

‘Recyclers’:

If plastic recycling involves securing the materials’ basic polymer structures to produce new formal configurations, then the low heat requirement allows for most plastic recycling processes to be conducted in small spaces, and with minimal

requirement of electricity (Doron & Jeffrey, 2018). The remains of dilapidated textile mills in Ahmedabad offered the perfect opportunity for massive expansion in small-scale plastic recycling. Indeed, as the large-scale handloom mill industry collapsed, mill compounds and machinery were auctioned off to small-scale aggregators, assemblers, and producers who set up small factories, workshops and warehouses throughout the 1990s and early 2000s to recycle particular resins of plastic⁵². Across former textile hubs in Rakhiyal, Naroda, Chandola, etc., large former mill compounds turned into lively assemblages of several smaller, heterogeneous enterprises – sometimes nestled in a chamber as small as a standard-sized Western bedroom with a high ceiling, partitioned vertically to form two floors (potentially separate functional departments). Many of these remodelled chambers (or larger spaces) became plastic recycling ‘factories’ – or, processing units, perched in the middle of other workshops and small industrial units. The 2018-19 CPCB report (CPCB, 2019) estimates at most 1,002 plastic recyclers in Gujarat. In actuality, the number could be higher.

Each recycler would liaise with niche clients (manufacturers) and suppliers (*peethas*), specialise in a particular polymer type or diversify strategically according to affordances, to consolidate their position within respective recycling markets. Plastic would be brought into these establishments cleaned, segregated, graded, and prepared, though larger factories may have in-house

⁵² Consistent with Takashi Shinoda’s data ((2000) see also (Breman, 2004)) on caste and small-medium business proprietorship in (urban) Gujarat during this period, most of these new proprietors belonged to the traditional trader and landed farmer castes, like *patidar*, *baniya* and *jatt*, with some lateral entries leading to limited occupational diversification among the Brahmins and Dalits. My empirical research revealed, however, that differences prevail even within these caste groups, which are in no way homogeneous. For example, *jatts* (landed farmer caste) migrated from Uttar Pradesh (thus deemed as *baaharwale*, or outsiders, despite multi-generational settlement in Ahmedabad) are often looked down upon. They take to working with ‘dirty’ materials, like waste plastics, while Gujarati *jatts* would mostly avoid these professions, taking up ‘cleaner’ businesses like power loom textiles, machine parts, etc. Ownership of recycling businesses by Dalits is even rarer, though not entirely unheard of. At Ramapir no tekro, these patterns reverse, as we shall see.

finer material sorting and disassembly units for cost-saving. Prepared materials are mechanically and/or thermodynamically re-formed in batches as appropriate: resistant PET and PVC object-forms are hacked and chipped down, film-based polythene and polypropylene products are ground down or melted with heat, catalysts, dyes and additives.

A range of standardised elementary forms – (high density polythene – HDPE) ‘cakes’, (PET) ‘flakes’, (polythene) *mamri* (or, shreds), pellets, and so on – are thus produced. These are, obviously, not entirely ‘formless’ (Gabrys, 2011, p. 138) as form seems to matter within specific contexts of practical constraint. For example, PET bottles could simply be hacked down to flakes (in a ‘grinder’), centrifugally cleaned, dried and dispatched to the manufacturers of (recycled) synthetic fibres. Preparing flakes involves less technical complexity (mechanical, no heat) and is thus affordable to most recyclers. However, certain recyclers could also opt for the more intricate – but higher return – processes of preparing PET pellets for induction into more elite product value chains (say, recycled PET, or rPET bottles). But producing PET pellets obviously demands more complex processing, technical expertise, and practical affordances. Similarly, some polythene recyclers cut off processing decidedly at the cruder ‘cake’ stage (sufficient for manufacturing combs or buckets) while some venture ahead to more complex, and multi-stage process chains to prepare finer and more distinctly graded pellets (used in making carrier bags and packaging films). Thus, different functional, yet standardised, re-formed raw material categories are batch-produced according to local need, ambition, affordances, priorities, and requisite standards of remanufacture. They cater to specific markets, have particular demands and supplies, and fetch different prices (per kilogram).

As economic actors, recyclers invent and imitate best practices for profit maximisation and cost reduction. Most of the recyclers I interviewed designed and assembled their own functional machinery from smaller mechanical components purchased at textile mill auctions, instead of buying expensive ready-made imported machines. One recycler – Anandbhai (name changed) – maintained international mechanical design catalogues in his warehouse office, which he pulled out for me, explaining how he interpreted and emulated the most suitable product design with local materials and means.

A massive privatisation of electricity supply and industrial grid inclusion in Gujarat through the 1990s and early 2000s favoured (thermo)plastic recycling, which needs controlled heating in order to re-orient carbon-hydrogen polymeric bonds but not incinerate them. Indeed, with electricity, processual heat inputs could be effectively regulated. Recyclers minimise energy usage further in order to cut costs and the chain of processes reflect these techno-financial calculations. One flake-maker used their high horsepower ‘grinder’ sparingly, and for a minimum number of hours. The machine was switched on only after the required daily volumes of raw materials had been fully prepared. Material processing at the stage of ‘recycling’ involves less manual labour (as the laborious preparatory work would already have been performed by ‘localisers’), and work is typically handled by one or two *ustads* – specialist workers. ‘Recycling’ could thus be carried out effectively and profitably at small-scale ‘cottage-style’ establishments without substantial energy or spatial demands (Gill, 2009; Doron & Jeffrey, 2018). Given the various historically-mediated spatial and labour constraints of most recyclers in Ahmedabad, the preparatory stages of plastic localisation assume complementarity and critical importance.



Fig. 14: A polythene pellet-making unit in Rakhiyal with daily capacity of about 500 kg. Melted polythene ‘threads’ are extruded through sieves (of variable diameter) passed under cold water to solidify before these solidified threads are chopped off by a time-calibrated mechanical axe to prepare pellets. Courtesy: Author

Effective localisation is essential to the valuation of recycled plastic feedstock. Indeed, recyclers sell their products directly to (re)manufacturers or to mediating brokers. Gujarat being a plastic manufacturing hub (CPCB, 2013; Plastindia, 2018; CPCB, 2019), most of the material is sold locally (therefore low

transportation costs) and thus, higher exchange prices are secured. The product sale price is linked predominantly to the quality of the feedstock on offer⁵³, which refers to the degree of material contamination present in the batch. As one polythene recycler – we shall call him Aqibbhai – explained to me, ‘one gram of contamination and the entire batch will be spoilt’. Contamination may be in the form of polymer types (say, different hydrocarbon chain structures admixed) but also assume the disruptive potentials of oil (fatty acids), dust and sand (silica), colorants, etc., which are said to bring down the functionalities of the recycled plastic, its usability and therefore, price. However, Aqibbhai’s explanation was more performative than literal. As I observed more closely, it became apparent that for a batch to be ‘spoilt’ did not mean that it was decimated to zero value, instead alluded rather to a marginal reduction in its value. In any case, recyclers were always keen on maximising financial returns and thus preferred to reduce ‘spoilt-ness’ to a minimum. Indeed, it is mainly through the degrees of ‘spoilt-ness’ that the final exchange-price was agreed between the recycler and the manufacturers’ agents (see Fig. 15). Thus, mere sorting by polymer types, colours and dye-types, additives, etc. is not sufficient for a maximal generation of

⁵³ Though there is a wider set of relations which also define the price of recycled plastic feedstock. On the demand side, the price of crude oil is an important determining factor, as many recyclers explained to me. With low oil prices, so-called ‘virgin’ plastic feedstock becomes available at cheaper rates, thus, offering product manufacturers direct financial incentives to prefer virgin stocks over recycled stock. Prices tend to be less volatile on the supply side, since growing plastic consumption and induction into the recycling trade networks ensure recyclers have a more or less steady flow of raw materials to work with. Recyclers mentioned certain minor factors affecting supply and cost prices, such as, seasonal consumption patterns (discarded PET bottles are more abundantly available in summer than in winter due to increased ‘cold drink’ and water consumption outdoors), socio-cultural festivals (festivals like Diwali, Dhanteras, Ganpati, etc. drive up retail consumption, leading to increased availability of packaging discards and waste materials in the city), etc. However, they maintained that these variations remained cyclical and were typically restricted to ‘Rs. 5 or 6 max only’ per kg (as one polythene recycler, Wasimbhai, shared via WhatsApp). Governmental tax regimes, especially the differential taxation rates for recycled and virgin plastic pellet sales under the recently introduced Goods and Services Tax or GST, also drive up costs for the recyclers, disadvantaging their products financially against virgin feedstock which have been accorded a significantly lower tax slab (5%, as of 2018). The most significant challenge to plastic recycling appeared to come, however, from the new national waste governance regime in India which favours totalized incineration of urban plastic waste, and poses an existential threat to the supply of plastic waste into the recycling value chains. We discuss this in detail later.

profit. Materials must be made 'clean', in Aqibbhai's words, through the removal of dust specks, oil and mud, manually and then, with chemicals and machines (centrifugal rotators, acidic and alkaline 'baths', temporary drying under the sun, etc.). However, these processes of cleaning and category-wise segregation are costly, and they demand space and labour, which explains why recyclers prefer buying feedstock that is already cleaned and reliably segregated in advance. Hence, the crucial dependence on localisers. We now turn to the Tekro-based networks of localisation.



Fig. 15: Two low-density polythene (LDPE) pellet samples are presented. The one on the left – of lighter and 'cleaner' tone – is graded as 'high' quality, the sample on the right – slightly darker and with more particulate admixture – is 'medium' quality. They are priced at Rs.75/kg and Rs.65/kg respectively as of January 2021. The recyclers can 'see and tell' their differences. On rare occasions, they would bite a pellet and know its quality and price. Courtesy: Author

Practices, Relations, and Pragmatics of Plastic Localisation:

Localisation stands for a range of heterogeneous multi-modal processes which prepare plastics for 'recycling'. Localisation is performed by many actors/practitioners, whose sites and scales of practice differ, and in their inter-linking, interdependence, and material exchange (or transfer) relations, an uneven sociomaterial hierarchy is also enacted. These often draw on but also mediate pre-existing socio-economic hegemonies (see (Gill, 2009), also (Mitchell, 2009; Nguyen, 2018)). At base, the common point across all these practitioners is the aspiration to gather, assemble plastic materials – whether through direct purchase from households, or by foraging in the city – and to sell; but also, to perform supplementary value-addition tasks like cleaning, segregation and storage (within respective limited capacities) in order to maximise sale prices. Thus, these are all economic agents performing material localisation and mediated valuation under differential socio-economic, technical conditions/affordances. Together with 'recyclers', these localisers elaborate the actual pragmatics of containment and qualification, drawing our attention to the complex processes and networked exchanges which constitute and condition the plastics recycling 'economy' ((Caliskan & Callon, 2009), see (Hawkins, et al., 2015) for an illustrative discussion on the 'economization' of PET bottle waste in Vietnam).

Pastiwalas and Peethawalas:

Pastiwalas are Ahmedabad's traditional buyers and brokers of old newspapers and paper-based discards for recycling (*pasti* in local Gujarati translates to paper, cardboard and such materials made from pastes). With changes in the consumption patterns and the emergence of new materials in the city, *pastiwalas*

expanded their operations to include plastics of different polymer-types, and integrated themselves to cater to different material-specific recycling networks. Akin to *kabaadiwalas* – as similar material scrap trading professions are known across cities in the northern half of India – *pastiwalas* have long been ‘cornerstones’ of urban material salvage and renewal networks (Chaturvedi & Gidwani, 2011). In the urban lingo of Ahmedabad, however, the term *pastiwala* is used interchangeably with *peethawala*, signalling similarity, but also crucial differences in terms of the respective modes of material acquisition, mediation, affordances, and scale of operation.

Peethawalas would typically operate from fixed urban locations, called *peethas*, where (recyclable) materials would be exchanged from a street-facing shopfront at per item or per kilogram rates, as agreed. Urban households, carefully storing packaging materials and old newspapers over time, would carry these to the local *peethawala* for sale against careful weighing on a scale-pan and obtain some cash in return. As such, the *peethas* are crucial sites of economic activity and material localisation – where unwanted or excess materials are exchanged by primary consumers themselves. *Peethas* are also essential parts of Ahmedabad’s socio-cultural and spatial fabric, ‘a (longtime) feature of Indian life’ within an urban ecology largely marked by thriftiness, re-use and resource conservation – an ‘old-style frugality’ (Doron & Jeffrey, 2018, pp. 98-100) under decades of slow economic growth and a cultural history which accorded high moral capital to self-restraint⁵⁴. Every Ahmedabadi household or small business would have a go-to *peethawala*, usually, the one nearby. Within each household

⁵⁴ Mahatma Gandhi, the mass political ideologue during the freedom movement and independent India’s ‘Father of the Nation’ himself actively popularised a moral culture of thriftiness, self-regulation and self-sufficiency: ‘The world has enough for everyone’s need, but not enough for everyone’s greed’, he would say.

(depending on class and affordances), the gendered practices of cleaning, drying, storing, carrying and sale of domestic discards against cash would have their situated micro-economies of labour and reputation (Dey & Michael, 2021). *Pastiwalas*, on the other hand, are mobile scrap-buyers, riding tricycles and carts with sufficient interim storage space, performing another mode of material localisation by transiting between points of material acquisition and sale. Itinerant *pastiwalas*, ferrying through city neighbourhoods, would also have a loyal clientele of households and business establishments with regularised arrangements for material procurement against cash. Their value addition is in making and maintaining networks of familiarity and in moving dependably between them. *Pastiwalas* sell their procurement to the highest bidding *peethawala* – who possess storage capacity, but could also be employed to act under obligation to (say, against cash credit or vehicular loan) *peethawalas*, thus, performing more intermediary roles themselves within the networks of material localisation.

Though it would seem that *pastiwalas* have limited access to space and restricted capacities of value addition (say, by material sorting), they may perform segregation at the site of material acquisition itself. Thus, households (especially women) would carefully store objects by recycling categories (paper, glass, metals, different types of plastics – not just by polymer type but also by degrees of contamination (recall ‘spoiltness’), etc.) and exchange these with the *pastiwala* at category-specific rates. Thus, we can appreciate the immanent and cross-cutting nature of information transmission (from ‘recycler’ to the *pastiwala*, to individual households) and the allocation of labour across different sites, relations and scales of material circulation and mediation in the distributed process of recycling. Indeed, as the *pastiwala* makes up for his lack of space and sorting

labour by quoting lucrative rates of exchange, it incentivises households to perform preliminary sorting and cleaning themselves, thus, pragmatically outsourcing some of the material segregation and preparatory labour to other sites and to other pairs of hands. In these pragmatic and non-linear relationalities of material mediation, we find elaboration of what Michael and Rosengarten (2012), Hawkins (2013) and others, have called a 'topology': an immanent coming together of heterogeneous relations responding to the needs and affordances of specific contexts.

Peethawalas occupy a critical mediatory position within the topologies of plastic localisation. Greater storage space enables *peethawalas* to stockpile more volumes – localising materials temporally and spatially, better positioning them to weather unfavourable economic and commercial circumstances, and to exercise influence over prices locally (Gidwani, 2015). In general, space is a capital resource, as *peethas* – as storage space, aid material aggregation and scale-building, a value addition by itself within the chain of material exchanges and value appreciation leading up to final exchange with the recyclers, who prefer buying materials in bulk. *Peethawalas* with appropriate storage capacities could sell recyclable raw materials directly to the final buyer, thus, drawing optimally high margins of profit (i.e., what remains after the deduction of purchasing and operational costs from the final sale price). However, space alone is insufficient in procuring value from plastics. Space must be secured. Indeed, *peethawalas* are obliged to lay concrete flooring, exercise vermin control and seal doors, windows and openings within their premises to prevent mice from proliferating and reducing the recyclable plastic overnight into unusable powder! Human supervision and localised rules of ethical conduct, alongside walls, sacks, wires,

anti-theft deterrents, CCTV cameras, and such techno-moral means are also crucial in the enactments of plastic localisation, and value.

A spacious *peetha*, especially one with water and grid connectivity, facilitates critical value addition through systematic sorting and cleaning of procured materials, enabling them to quote higher sale prices to the recycler, and earn greater profit. For example, a *peethawala* at Ramapir no tekro with the facility of comprehensive sorting, procured 'mixed' polythenes for Rs. 4 per kg (in winter, 2018). They had employed manual labour who would sort, clean, dry and prepare graded (say, according to material contamination), polymer-specific 'bales' (compact cubes of pliable plastics stuffed together and held in place by tightly fastened metallic wires): a range of laborious, technical, organised processes of transforming bulky mess into segregated, cleaned localised units, which could securely be dispatched to the recycler for onward processing. The *peethawala* was subsequently able to sell constituents from the above consignment as ready-to-process stock at substantially higher prices per kg: Rs. 5 for recycled polythenes, Rs. 7 for non-whites, Rs. 12 for whites, and as high as Rs. 24 for translucent high density polythene films, with slightly 'spoilt' consignments of each of these categories sold at Rs. 2 less per kilo. Thus, alongside space, the labour of sorting (separation and re-moval of plastic objects by recycling categories), cleaning (re-moving contaminants from objects), carrying and transportation is also essential to localisation (including finer sorting and re-movals). An intricate set of *peetha*-based practices thus order heterogeneous material objects – 'sorting things out' from dust, oil to plastics of 'other' recyclable categories, colours, resin-types – proving critical in transforming heterogeneous and materially diverse plastics as suitable for recycling.

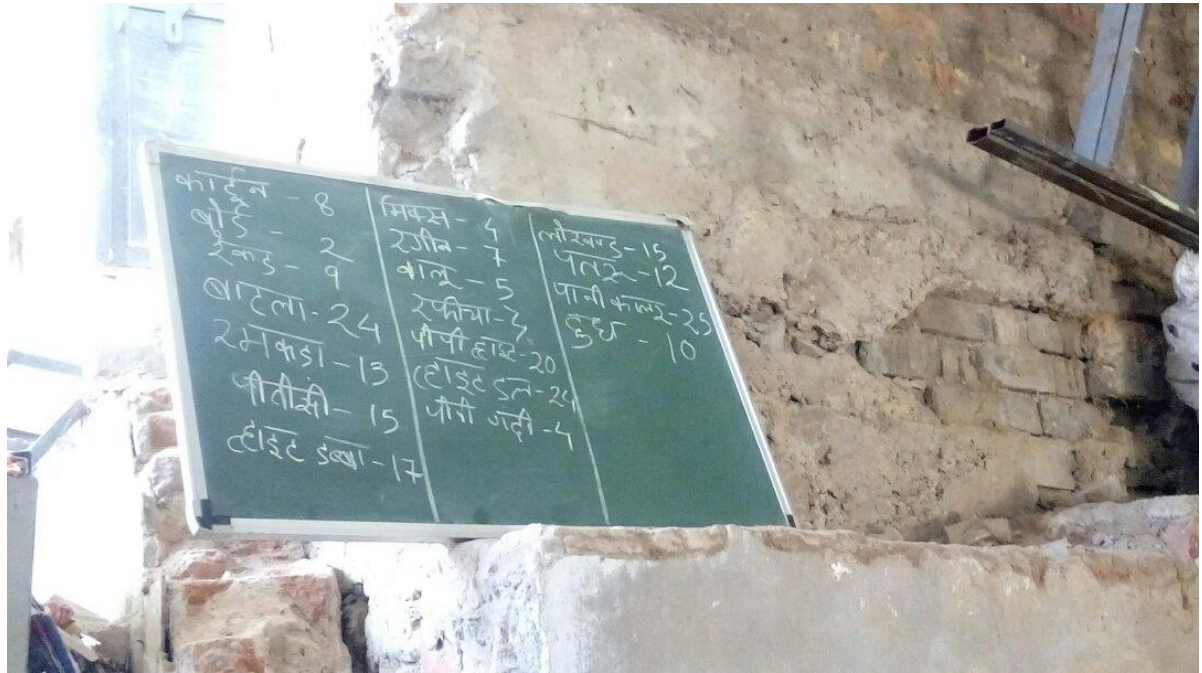


Fig. 16: Rate-chart for purchases (mid-2018) at a *peetha* in Tekro. 13 out of the 18 items stand for different recyclable categories of plastics that the *peetha* dealt in.
Courtesy: Author

In a stratified society, where ownership and use of land is often stringently regulated by rules of birth, *peethas* of Ramapur no tekro mark a significant break in tradition. Indeed, in the old city, the land (storage-space)-dependent *peetha* proprietorship lay almost exclusively with 'upper' caste individuals and families with ancestral history of land ownership and commerce. My interlocutors – foragers but also local residents – recalled Kaalu Seth, an influential *peethawala* based in the old mill neighbourhood of Mirzapur until the 1990s, who belonged to the land-owning *jatt* caste from the northern agrarian state of Uttar Pradesh, while many *peetha*-owners were *thakurs* (fighter-land-owners), *kunbis* (farmer land-owners), *patidars* (landlords), and *baniyas* (trader castes) from Gujarat. Dalits almost-never owned but mostly found employment at *peethas* (say, as labour) or performed itinerant acquisition under their obligation (say, as *pastiwalas* or small-scale *panni dealers*). These hierarchical patterns of proprietorship, power and

employment within the networks of material localisation echo similar observations by Butt in Lahore (2020) or Gill in Delhi (2009), where *kabaadi (peetha)* ownership and market control are carefully guarded by caste communities, thus, (re)producing socio-economic hierarchies and legacies. At Tekro, however, *peethas* are owned and managed by Dalit *chamaars*, employing local *chamaar* workers and purchasing recyclables from a community of local *chamaar* women (*kachre binnewalis* or foragers, who we introduce shortly). Indeed, many of the *chamaar* former mill-workers, who emigrated from the volatile old city to the safety of the fringe wasteland and filled up the marshes of Ramapir no tekro to set up settlements for their kith and kin, were far-sighted waste entrepreneurs. By dint of early control over land and land-use, these early (male) settlers, like Bhimabhai and Jamirbhai, had marked out territory for setting up *peethas*. As such, some of the oldest *peethas* of Tekro are not only among the most spacious – with high capacity for storage and scale-building, but they also managed to attain the heights of prosperity from the recycling trade over time.

Peethas play crucial organisational and supportive roles in the emergence of local socio-economic community. Indeed, *peethawalas* of Tekro have their loyal entourage of dependents: kith and kin, but also proteges for whom they provided support and shelter during times of difficulty and dispossession. The *peetha*-owners' social and economic interests tend to be guarded by the community, which, in turn, is secured by ongoing negotiation and services including credits and sponsorships, rented housing, social protection, political representation, etc. by *peethawalas*. The immediate social networks and communities around *peethas* are also material-specific in some sense. Indeed, local hierarchies, communal stabilities, ethics of cooperation and competition, alliances and conflicts are dependent less on reified structures (like caste), but more directly on

the rise and fall in price and fortune of recyclable materials (thus the *peethawala's* power and influence) within the recycling networks and other spheres beyond.

These distinct sociomaterial patterns of spatio-practical organisation partially shaped physical and political landscapes too. *Peethawalas* took initiative to develop communal roads and infrastructure to constitute distinct (often plastic-specific) *pols* and *chaalis* at Ramapir no tekro. These infrastructures articulated identity and difference but also connected *peethas* and *peetha*-based residential clusters to the main road, thus ensuring vehicular access for plastic transport and wider connectivity to these otherwise insular locations within the marshes. The *pols* and *chaalis* of the once-peripheralised 'wasteland' are named after worshipped Dalit deities (e.g., Chamunda *vas*, Vyasdev *no pol*), evoking historical mythical legacies toward shaping community consciousness. Some clusters take on names modelled after modern political champions of Dalit emancipation (e.g., Ambedkar colony, after Dr. Bhimrao Ramji Ambedkar, who was also independent India's first Law minister, and the Chairman of the Drafting Committee of India's Constitution). Many of the influential *peetha*-owners assumed political affiliation with the leading political parties in Gujarat like the Congress or the Bharatiya Janata Party (BJP), mobilizing vote-banks within their community-clusters, thus, influencing local electoral politics in significant ways. Financial and political power proves valuable in negotiating land claims, defending Tekro's place and legacy in face of powerful urban transformations of the 21st century.

From the 1990s, plastics became the preferred material for salvage and trade due to its high demand for recycling (say, in the elaboration of a vast economic underbelly of cheap, low-grade consumer goods, and recycled packaging material), and the high profits it guaranteed (Gill, 2009). 'In plastic, we are

becoming landlords, so we much prefer it', said one of Kaveri Gill's respondents, a Dalit *kabaadi*-trader in Delhi (Gill, 2009, p. 161), a sentiment overwhelmingly echoed by my *peethawala* interlocutors. The increased scale and material variety of plastics generated a new set of laborious demands and *peetha*-based jobs (Doron & Jeffrey, 2018). *Peetha*-work culture, once associated with 'masculine' muscle-based labour, changed over time as the heavy and hazardous glass, iron and steel were replaced by greater allocations of *peetha*-space and operation towards lighter plastics. Women began to be preferred to men for the nimble fingerwork of plastic sorting, cleaning and drying, while smaller, narrower feet and light body-weight were deemed better suited for trampling upon mounds of plastic films for the preparation of compacted bales. For the women of Tekro, these developments opened up new socio-economic possibilities. However, as *peetha*-based practices and space became differently gendered, no man wanted to work there anymore, even if job security in other sectors was increasingly rare (Breman, 2004; Jaffrelot, 2016). Given the lucrativeness and sheer potentials for scaling up plastic localisation and trade, more *peethas* came up. With an unprecedented surge in in-house *peetha*-employment and stable (even rising) incomes, Tekro's women assumed primary roles and responsibilities not just in private life but also in community, while men performed typically underpaid casualised jobs elsewhere, or sat around, unemployed.



Fig. 17: Inside the peetha at Ramapir no tekro (in 2018), where I worked. Workers are mostly female. Two workers, on the left, are seen inside the iron compactors, standing atop mounds of plastic films, compressing by trampling upon them. Two workers, on the right, help each other in moving a sack full of PET bottles. Courtesy: Author

Kachre binnewalis:

By far the most numerous among actors within the recycling networks of Ahmedabad, *kachre binnewalis* are predominantly female⁵⁵, and Dalit. As Dalits, they are mostly excluded from *peetha*-ownership, while as females, they tend to be culturally dissuaded from riding material-collection vehicles in the public sphere⁵⁶. Furthermore, working on low financial capital, they are often unable to

⁵⁵ Practitioners rarely include male children and adult males, all invariably from the 'lower' castes. Though the Gujarati language offers the (binary) possibility of gendered qualification, the predominant feminisation of this particular mode of localisation is manifest in the term *kachre binnewalis* being popular (*wali* being a feminine associational suffix, *wala* in *kachra binnewala*, being the seldom used masculine analogue).

⁵⁶ The use of technology within the material localisation is highly gendered (we discuss this again in Chapters 6 & 7). Dalit females, even seasoned waste foragers, considered it improper to ride carts and tricycles in public. When asked why, one of my respondents, Jassiben, waved her hands and laughed at the very idea, while Deenaben simply facepalmed and later, shook her head to suggest that this was not done. The performativity of their denial notwithstanding, over the course of time, however, we shall see (especially in Chapters 6) that these stabilised gendered patterns of technologising practice are variously muted and mutated, as new modes of human-technology associations are drawn, both individually and collectively.

purchase recyclables directly from households and shops (unlike male *pastiwalas*). Save rare and irregular instances of altruistic ‘free’ material donation from certain households and shops, *kachre binnewalis* typically resort to walking, foraging for saleable recyclable materials left over, discarded by the public in accessible urban spaces. They would pick up materials by the hand mostly from large yellow community bins at street-corners or by the roadside, smaller bins outside shops, or at places of leisure, bins left outside households, and garbage accumulating during the day across the urban commons – streets, fields, vacant plots of land, the Sabarmati riverside, etc. If, by acquiring recyclable objects directly from users who no longer needed them, *pastiwalas* sequestered discards before they accumulated in the urban environment, *kachre binnewalis* wrested what was already cast away in the public domain, potentially accumulating as pollutants (recall ‘garbage strewn all over the city’). As such, they mediated garbage ubiquitousities – potentially disturbing to the public, and reduced their spatial, environmental (and municipal) burdens. They would sequester these materials in sacks (typically of plastic, though earlier, heavier jute gunny bags were used), and carry to eventually sell them at *peethas* in exchange of cash. The hazards and labour of urban mobility, technical skills (say, in identifying recyclables) and physical efforts of plastic sequestration and transit turned into income. As discarded materials accumulate on the urban landscape all through the day and late into the night, the early hours of dawn are opportune moments for undertaking labour-efficient outings with the maximal potential for material gleaning.

Various unofficial estimates by social workers, waste-sector practitioners, and bureaucrats put their total number between 50,000-80,000 (during my 2018-2019

fieldwork period) in Ahmedabad city alone⁵⁷ with at least 500 of them residing in and working from Tekro. While street-facing *peethas* could afford a more accessible shopfront for local residences and businesses to visit and sell scrap, the more spatially insular *peethas* depended primarily on the steady, regular material recovery and supply by *kachre binnewalis*.

To be sure, *kachre binnewalis* are economic actors, freelance entrepreneurs. Unlike the *chiffonnier*, or the rag-picker, often romanticised in 19th century European literature (say, with Berthaud, or Baudelaire), *kachre binnewalis* – like Kantaben above, would not pick up objects without discretion and difference to perform a public good (Bielecki, 2009). They are opportunistic foragers instead, motivated to maximise income with limited means (often as the sole breadwinner). Their spatial mobility, patterns and rhythms, are guided by the priorities of valuable sequestration. They are also acutely aware of their own practical affordances and logistical limitations (say, the weight of materials they could carry). In this opportunism (but also pragmatism – we expand on this shortly below) of the foraging movement, they are perhaps more akin to Tsing's mushroom-pickers, carving out life and livelihood with left-overs (Tsing, 2015).

The reduced vehicular passage as well as the natural visibility of dawn constitute suitable conditions for material discovery; guided by the knowledge of material occurrence in space – whether actual (seen from a distance) or expected (from known patterns or prior knowledge of garbage accumulation in and around certain

⁵⁷ By comparison, official estimates for the number of registered plastic recyclers barely exceed 1,000 in the entire state of Gujarat, as per a 2018 report by the Central Pollution Control Board (CPCB, 2019). A 2011 report by the British Plastic Federation estimated the total number of registered plastic recyclers in the entire country at 26,000, with over 75% small-scale businesses (BPF, 2011). Another report in 2008 by the Central Institute of Petrochemicals Engineering and Technology (CIPET) put the number at 3,500 in the 'organised' sector and 4,000 in the 'unorganised' sector, based on a survey of 60 Indian cities (CIPET, 2008). There are no official estimates on the number of itinerant brokers, but their number would not exceed that of waste-foragers on foot.

sites – like yellow *dhalao* bins, outside restaurants, hotels, and commercial areas – or through whisper networks and tips), *kachre binnewalis* would criss-cross their way through the city, not necessarily following municipally prescribed urban circulation patterns for pedestrians (say, along pavements, or through walking plazas with restricted vehicular passage). In their pedestrian subversion of territorialised regulation of urban mobility, *kachre binnewalis* may even remind the reader of the ‘flaneur’, the unattached opportunistic stroller of the city, who may be keenly observant of what is going on, aware of the differential patterns of habitation, consumption, sociomaterial particularities of urban space. Indeed, there are parallels, say, with de Certeau’s authorial notion of the flaneur who lifts themselves ‘out of the city’s grasp’ and is able to visualise space and carve up spatial trajectories more autonomously (de Certeau, 1984, p. 92). Indeed, the term *kachre binnewali*, used for self-designation among my interlocutors and former practitioners, evokes a sense of pleasure in the (foraging) movement within public spheres and the wilful nature of selective material (*kachra*) acquisition – freedom of choice what (not) to pick – associated with the key verb *binna*. Indeed, sometimes, my interlocutors also called themselves *kachre chunnewalis* – the verb *chunna* translates to choosing, but also to electing (politically).

However, the affordances of tactical, autonomous walk as discussed by de Certeau, are unevenly masculine and reflective of a certain socio-economic privilege (Amin & Thrift, 2002; Michael, 2006). Furthermore, the particular socio-spatial contexts and conditions on the *kachre binnewali*’s mobility are steeped in and compounded by the legacies of caste (also gendered caste), which, as we have seen, mediate and enact space by drawing particular ‘lines of control’ – visible and invisible (Phadke, et al., 2011). This not only pertained to segregated

patterns of habitation, endogamy, or enacted uneven geographies of waste disposal and accumulation, but also obliged the works of waste removal to be carried by particular ritual routines. Indeed, waste removal by Dalit (female) workers from elite, middle-class and upper caste households, neighbourhoods, and residence clusters were conducted in the early hours of dawn or in the darkness of night to avoid run-ins with powerful upper caste bodies. Despite times having changed and untouchability being abolished from India's constitution, idioms of exclusion and exception have persisted in different forms. Almost every *kachre binnewalis*, who I know, spoke to, or accompanied during foraging, spoke of gendered and casteist slurs by passers-by, sometimes by local residents, or complained of unfair policing and detention (on false charges of 'stealing', and loitering). Indeed, the subject of police intervention comes up again and again in the testimonies of foragers and waste gatherers elsewhere in India too (Chaturvedi & Gidwani, 2011; Bhaskar & Chikarmane, 2012; Shankar & Sahni, 2018). As such, the limited time windows for foraging – say, through the night, or at dawn – are strategic too, chosen by *kachre binnewalis* in order to reduce unpleasant encounters and detentions (which have high social and economic cost in terms of lost gendered time). Here again, we locate autonomy of movement and enterprise, albeit in limited spatio-temporalities which are mediated by compound legacies of socio-economic control.

Besides the various restrictions and mediation on practice, *kachre binnewalis* – relying heavily on their feet, hands and bodies for foraging, are only able to exercise limited mobility, cover limited urban territories for material recovery, and have significant limits on their material carrying and storage capacities. This restricts how much weight in recyclable materials they could collect and carry within limited time, and thus, also impacting their daily incomes. Furthermore,

recovery from the dumps or the roadside mean greater chances of the reclaimed materials being mixed with dust, water and fatty acids – ‘contaminants’ which significantly ‘spoil’, reducing the recyclability (as we have seen) and exchange price of these materials. This means that *kachre binnewalis* must exercise rigorous inspection before picking up materials. They must calculate that the object – with its weight, material quality, cleanability, and finally, potential exchange price – are well worth investing their time, effort, and strength in. Indeed, materials sold without adequate cleaning and sorting fetch low prices, but also earn a bad reputation from the *peethawala*, possibly affecting their judgement and valuation during future transactions⁵⁸. *Kachre binnewalis* must negotiate physical limitations, fatigue, but also potential dangers of exposure (say, from manually handling garbage), attacks (say, from stray dogs vying for control over the streets and food-rich street dumps at night). Of course, these are not least mediated by the pressures of domestic work and other gendered responsibilities.

Variegated challenges generate inventive responses from *kachre binnewalis*. They would re-organise mobility, (embodied) techniques, modes and affordances of practice. The prevalence of plastics does remarkably reduce some of the challenges of manual localisation (e.g., plastic’s lightness, water-repellence makes them easier to carry while paper-based discards (*pasti*) get soggy and heavy with exposure to (rain)water; again, plastic’s exposure to dust and sand

⁵⁸ This was, indeed, the case at the *peetha* where I worked: certain *kachre binnewalis* would be systematically quoted lower (than actual) weights or rates, because the *peetha* manager believed their consignments contained greater proportions of *kachra* (she meant admixed materials and waste). Though such allegations could not be readily verified on the spot, the manager justified her decision by citing examples from a few earlier transactions. Not all, but a few. Such arbitrary valuations of their time, labour, and collected materials, obliged *kachre binnewalis* to try to maximize collection weights (to balance out *kachra* driving down their sale price), and practice rigorous material screening and cleaning before they sold their consignment at the *peetha*.

may be relatively simpler to wash under running water than paper; unlike glass or sharp metals, plastics are less prone to causing physical injury). Mindful of the uneven patterns of plastic ubiquity in the city, *kachre binnewalis* would aim for more affluent residential or commercial neighbourhoods and localised sites (like the Riverfront, parks and attractions, large community bins), but also strategic times (weekends, festive seasons) for maximal, efficient, profitable collection of recyclables. In order to maximise collection, they would involve female kin – extra pairs of hands to pick up and carry, sort through stuff, but also to walk alongside, dividing up time and labour across different quarters to maximize their territorial coverage⁵⁹. Indeed, collectivisation mitigates certain dangers and difficulties involved in manual (gendered) foraging. Foraging in a group makes it easier to access streets with aggressive stray dogs⁶⁰. Even the police would not bother too much, if outnumbered. Collectivisation enables aggregation of substantial volumes of materials individually, making it worthwhile to sit down together by the roads, empty sacks to sort through the collected materials, perform basic cleaning under roadside water-taps, finally sequestering segregated material categories into particular sacks, sell and share the income. Thus, as multiple related tasks are shared and performed time and labour-efficiently, safely, and maximal value gets procured *by the family*. In the process, certain ‘public’ infrastructures (roads, municipal bins, tap-water) are also co-opted.

⁵⁹ Kantaben, one of my mentors, shared her tactics for maximising foraging area and better coordination. On occasions when she and her daughter Hetal went foraging together, they would divide up time and neighbouring streets between themselves, each navigating separate streets and areas, picking up recyclables from there, and reconvening approximately every 30 minutes at pre-decided places to exchange information, materials, re-strategise, and recalibrate practice. Streets with difficult dogs, drunk men, etc. would be avoided, or faced together.

⁶⁰ However, some seasoned practitioners also shared that they did not fear stray dogs anymore. ‘Once they know you mean no harm or competition to them, they become familiar to your ‘smell’ and stop bothering’, Duliben told me, advising me – as a novice forager – to avoid any confrontation or eye contact with the dogs and to go about my business ‘at normal pace’, as if unperturbed by their presence. The strategy worked.

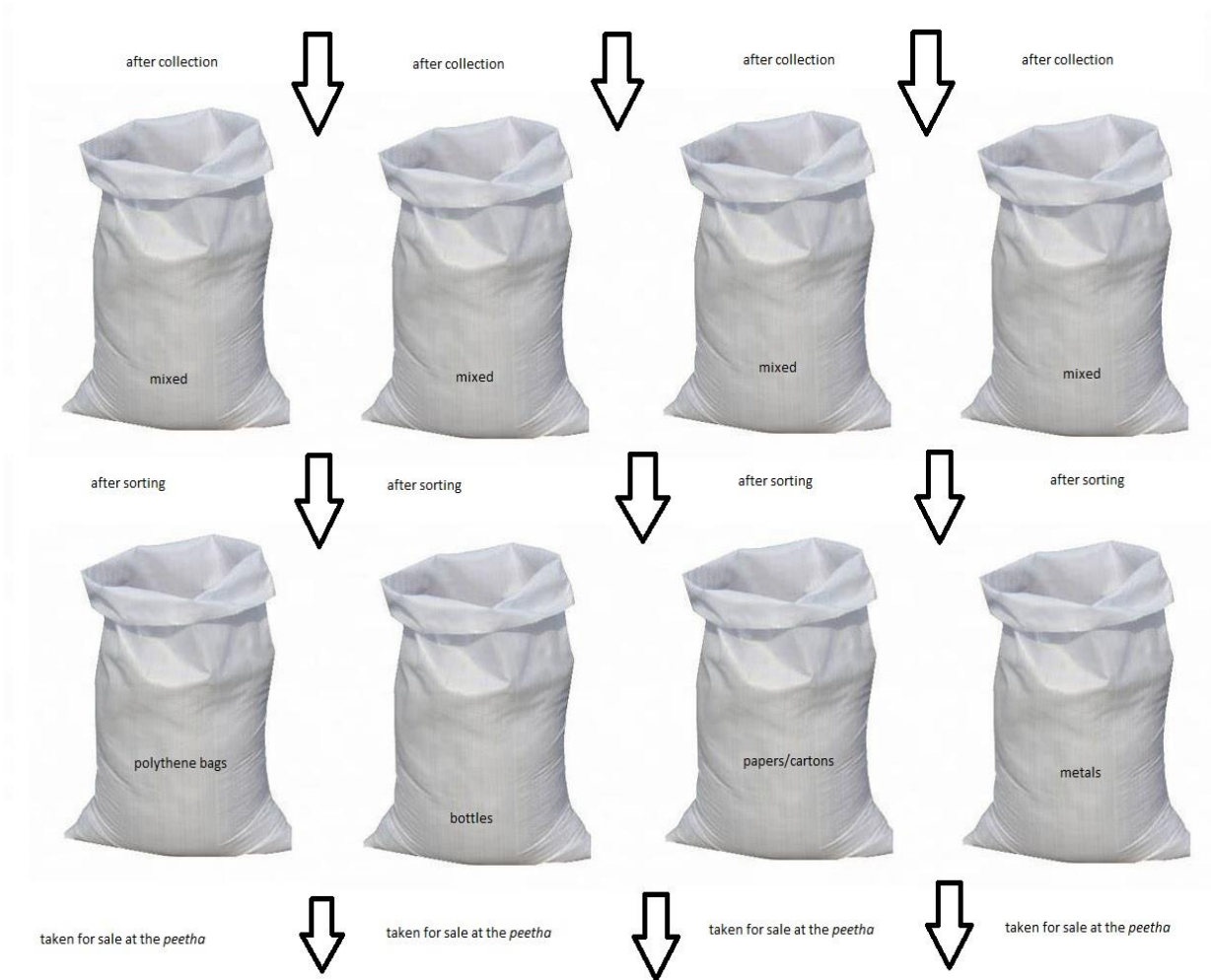


Fig. 18: A simplified representation how 4 kachre binnewalis foraging together might maximize income collectively. They would equitably divide labour for collection, segregation, containment and transportation tasks between themselves, and earn greater exchange price by selling segregated (instead of mixed) categories of materials to the peethas. Courtesy: Author

Such inter/intra-generational gendered co-operation also enables transmission of strategies and tactics, helping one get familiarised with the sociomaterialities of urban territory (say, from mother to daughter, or from mother in-law to daughter in-law), and the production, sharing and stabilisation of stories, values and legacies, besides work. In effect, such gendered division, or sharing, of labour also enable women to manage domestic duties more equitably (and efficiently) between them. An ethics of co-operation among *kachre binnewalis* – however

fragile – manifests across (gendered) networks beyond the immediate family, perhaps aided by caste or gendered solidarity. There are whisper networks among *kachre binnewalis* through which information (say, material prices) circulate, tips are shared, conflicts and complaints are posed and resolved. This enables price discovery, comparison and aids in making more profitable sale decisions. Since there are competitions, understandably, to access the resource-rich sites (and times) in the city – like affluent neighbourhoods and middle-class consumption sites during weekends – *kachre binnewalis* make tacit arrangements with each other to divide time of collection and territory (say, by alternate days) in order to avoid running into each other. This avoids petty conflicts. In effect, spreading out over time and territory through co-operation, ensures that there is something available for everyone. *Kachre binnewalis* would ‘never steal each other’s collects’, one of my mentors, Deenaben proclaimed. It was evident that such no-theft ethics enable maximisation of collects. Indeed, an individual could initiate their sortie with more than one empty sack; fill only one sack at a time, pose it by the roadside once full, and carry on with the other sacks until all became full. The labour of having to carry around too many heavy sacks was thus avoided, and maximum effort reserved for the one final trudge to the *peetha* with all the filled sacks. Although there have been cases of theft or extortion by the mafia elsewhere (say, in Delhi (Chaturvedi & Gidwani, 2011)), I did not encounter such occasions first-hand. Through makeshift trust-networks, *kachre binnewalis* allude to a collective process of knowledge-making, (selective) sharing of information, and socio-professional value production which goes beyond (the ethics of) kinship, revealing an emergent community based on enterprise. These networks are also mediated (strengthened, at times weakened)

by the intervention of NGOs, more instances of such wider civic alliances are discussed later through Chapters 6 and 7.

Conclusion:

We described some of the complex processes (and their overlapping and compound layering through history) by which garbage becomes dissipated, but also territorialised – removed, or ordered – in different ways. This of course enacts a representation *before* the new state reforms in MSWM were implemented with rigour. These include overlapping colonial and para-colonial modes of garbage governance, eventually their continuity and change into the post-colonial modes of ordering urban territory. However, I also showed how the materiality of plastics – increasingly abundant in the cities from the mid-1980s – complicates some of these older patterns, routines and labour arrangements which secured socio-economically mediated spatial orders. In the process, plastics reproduced older patterns of garbage ubiquity (say, in the urban fringes and along impoverished ‘lower caste’ human habitations and ghettos) but also generated new persistent ubiquities which ‘irritated’, and triggered anxious mobilisation on the part of an elite ‘public’ constituency, demanding the state to intervene. In the process, I disaggregate the dominant claims of ‘common sight’ of ‘garbage strewn all over’ and unravel their uneven sociomaterial, spatio-temporal concentrations, contestations, material contents, opportunities, and discontents.

In the next chapter, we follow the state’s response in the form of an elaborate techno-practical, cultural, and bureaucratic ‘infrastructuring’ to localise garbage, especially plastic waste, differently. It suffices for now, to solicit the reader to ponder upon some of the overlapping, inter-linked plastic mutabilities described

in this chapter as a way of starting to put together a conceptual inquiry into plastic's sociomaterial ubiquity.

Indeed, if the supposedly infinite mutability of plastics into a range of consumer products generates a certain commercial ubiquity, or ubiquity of facility, use/re-use – however uneven, then this vision is disturbed. Notably, by the apparent immutability of discarded plastics persisting. This is partly narrativised as a matter of concern, marked by problematic accumulation, anxiety, and mobilisation on the part of an elite 'public' constituency. Again, these problematic ubiquities are also generative differently, notably as marginalised communities self-organise to access, 'localise' and 'recycle', enacting particular forms of recyclability and drawing various sociomaterial objects, and values therefrom. As networks of work, exchange, enterprise, ethics, and communities emerge along these particular forms of plastic mutation, limited changes to socio-economic marginality are occasioned. However, the ongoing processes of material, social change (and stagnations) continue. As we shall see in the next chapter, the embodied practices, and inventive networks of plastic recycling are further subjected to powerful forces through state reform. Do these institute complete, or permanent mutings, we shall ask. How are mediations effectuated – through what processes and infrastructures – under the new policy environment? Or are they subverted through situated improvisation? How do the reforms re-territorialise some of the above plastic processes? The ensuing chapters offer situated elaboration on more and further ongoing messy plastic mut(e)abilities.

Chapter 5: Enacting Incinerability: Of Infrastructures and Mutings

We described in the previous chapter the complex lineages of local governance and practices which produced an uneven material ubiquity of garbage in Indian cities, specifically in Ahmedabad. While colonial rule introduced municipal governance to protect the health and political economic interests of the ruling elite, such civic governance – designed to be run on local revenues, was marked by protests, tax evasion and budgetary constraints. This produced fragmented and piecemeal patterns of municipal attention and ‘public’ priority for services, where vast swathes of the ‘native’ population were left in the shadows, unserved. However, we highlight how municipal governance of garbage drew substantially on and overlapped with parallel indigenous regimes of caste-based territorial habitation, control and waste-work (relegated to a subaltern population by obligatory ritual notions of caste and gender). Garbage governance thus complicated and reinforced many of the pre-existing socio-economic and spatio-material patterns which unevenly disadvantaged the already marginalised. Post-independence, many of these fractious, fragmented orders of garbage removal and practices of their uneven localisation in space continued, but were complicated by the abundance, material complexity, durability and persistence of synthetic materials like plastics propagated by the post-1980 industrial market economy. As plastic waste accumulated in and threatened the sanitary and aesthetic orders even in the elite neighbourhoods, anxious ‘publics’ called for state intervention in the matter. However, in the weak presence, even absence, of the state, in the matters of garbage removal, thus far, large numbers of the enterprising urban poor – especially Dalits, as in Ramapir no tekro – self-organised in practical networks to forage and mediate these more durable and intractable new materials, especially plastics, creating conditions for their limited mutability through locally adapted techniques of recycling. While these

decentralised enterprises reduced garbage ubiquities and municipal burden, importantly, they also created new conditions for progress, profit, and self-affirmation of the urban poor. This chapter describes the state's response to the garbage crisis, its ensuing plans, policies and programs in the form of an elaborate municipal solid waste management (MSWM) infrastructure. At the same time, it also discusses how pre-existing networks of practitioners and entrepreneurs localising recyclable matters stood to be disrupted, marginalised, or co-opted under unfavourable contracts of municipal work.

Plastic Incinerability: Towards Reforms

Solid waste Management, post-2000, became subject to centralised state planning. The Municipal Waste (Management and Handling) Rules 2000, enacted by the Ministry of Environment and Forests in response to the widespread 'public' protests and judicial activism of the 1990s, was India's first federally-enacted guideline in the matters of solid waste management⁶¹. It held the urban local bodies (ULB), including municipal corporations for 'major cities' with population exceeding 1 million, responsible for 'infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes' (MoEF, 2000). ULBs were to report to State Urban

⁶¹ The term 'solid waste', though current in waste bureaucracy from the early 1990s (see Chapter 4), is not defined in terms of specific material composition but in terms of material state and source, instead. The MSWMH Rules, 2000 identifies municipal solid waste as residential and commercial waste 'generated in a municipal or notified areas in either solid or semi-solid form'. The subsequent revision in centralised state guidelines in the form of the Solid Waste Management Rules, 2016 (MoEFCC, 2016), does not define material composition either, though indirectly includes plastics. It expands the number of sources (to include 'institutional waste', 'catering and market waste', 'street sweepings', 'silt removed from surface drains', 'horticulture waste', 'agriculture and dairy waste', etc.), but carves up the category of solid waste to define 'dry waste' as 'waste other than bio-degradable waste', including 'recyclable waste' and 'combustible waste' (the latter is defined as waste with 'minimum calorific value exceeding 1500 kcal/kg'). In any case, the SWM Rules 2016, as we shall see below, is accompanied by supplementary material-specific solid waste management rules; these include, notably, the Plastic Waste Management Rules 2016 (MoEFCC, 2016) to address the specific challenges and opportunities afforded by this specific category of (solid waste) materials.

Development Ministries, which would ensure financial support and monitoring of duties. Central and State Pollution Control Boards (CPCB, SPCB) were charged with the responsibility of drafting legally-binding requirements, specifications, health and environmental standards for waste disposal and processing, and to ensure their implementation across scale. Residents and business owners within municipal jurisdiction were termed 'generators of waste' with duties to comply by ULB rules. Mindful of 'public' demands, the central guidelines urged ULBs to ensure that solid waste was not 'visible to public' (MoEF, 2000, p. 8). It also issued a waste hierarchy, a preferred order of technical processing to be followed by ULBs. The latter prioritised recycling and re-use, and encouraged waste segregation into 'recyclable' and 'bio-degradable' categories by the generators of waste.

However, as public responsibilities and duties were being shared and fixed, active deliberations went on in the courts and governmental planning circles regarding the technical and financial feasibility of solid waste management by the ULBs. Mindful in particular of the high financial demands of MSWM (in effect, municipalities already spent the lion's share of their budget on waste management (Doron & Jeffrey, 2018)) and chronic municipal budgetary constraints, policy models were being discussed and debated by prioritising the demands for 'efficiency gain'. Theories, reports, and strategies (toolkits, guidelines) on how waste management services could be provided for cheaper circulated privileged circuits of knowledge production and transfer spanning various governmental agencies, planning committees, courts, but also UN agencies, international development institutions (World Bank, Asian Development Bank, etc.) and independent scholars and subject 'experts' (Luthra, 2020). Co-incident with wider economic tendencies for liberalisation,

overwhelming support gathered ground from as early as the early-1990s for privatisation as a way of rendering waste management efficient (Schindler, et al., 2012; Gidwani & Corwin, 2017). A rigorous policy analysis by Luthra shows how empirical evidence from American economist E. S. Savas substantiating the theory of efficiency gains from privatisation in the US waste collection markets in the 1970s and 80s were produced and problematically propagated as self-evident testimony to justify cross-scale privatisation of MSWM across India (see (Luthra, 2019; 2020)). However, unlike other domains of the erstwhile nationalised economy, privatisation in waste management would involve the suppression of the rights of the urban poor over garbage, thus, potentially jeopardising their livelihood claims, enterprises and legacies.

The Supreme Court of India-appointed Asim Barman Committee (1999), charged with the diagnosis of the MSWM situation across 300 large Indian cities, recommended 'private sector' participation as a way of easing municipal burdens. The Committee's recommendation for privatisation was, however, a nuanced one with due recognition of the 'important role of rag pickers in reducing the waste and the cost to the local body in transportation of such waste' (Asim Barman Committee, 1999, p. 59)⁶². Furthermore, it offered detailed guidelines for the empowerment and upgrading of the work-conditions of rag pickers and the 'informal sector' through civil society participation.

⁶² Note the specific use of the term 'rag picker' in these policy discussions and deliberation, but also in state guidelines – often inter-changeably with the term 'waste-picker' (MoEFCC, 2016, p. 55). Unlike the romantic French connotations of almost altruistic public service of picking up and salvaging modernity's detritus, the more pragmatic profit-minded nature of these enterprises – as captured and elaborated through our discussion of the plastic recycling networks in Chapter 4 – are recognised in these state documents. The terms 'recyclers' are mentioned in the SWM Rules 2016, for example, and their direct and indirect relations of exchange with waste-pickers also acknowledged. Rag pickers, or waste-pickers, in these contexts, are thus, akin to *kachre binnewalis*, the self-descriptive Gujarati term used by my interlocutors in Ahmedabad.

However, ensuing policy interpretations of the recommendations and their implementations remained partisan and problematic. They privileged a particular section of the private sector, which involved private corporates, and the claims and credentials of the private enterprises of the urban poor were largely ignored. Throughout the 2000s, several municipalities engaging with rag pickers through civil society severed their contracts in favour of corporates which quoted lower rates, and promised services additional to waste collection (including transport, waste processing, facility maintenance, etc.) ((Kothari, 2013; Parmar & Trivedi, 2013), also detailed below and in Chapter 6). While rag picker contracts were considered cost-inefficient and cumbersome, 'unable or unwilling to align with market-driven approaches' (Oates, Sudmant, Gouldson, & Gillard, 2018, p. 9), in their place, 'public-private partnerships' (PPP) with corporate-style actors were preferred, with the expectation that these agencies could even pay the state revenues on their profitable operation. This reflects a wider 'neoliberal turn' in waste management in the Global South post-1990s, where public policy and practice were framed around the belief that profit-driven private firms could deliver more cost-efficient services and accountability (Lee, 1997; Eggerth, 2005; Spronk, 2010). However, the differentiation within the 'private' here seems to involve exclusive idioms of expertise, particular modes of demonstrating competence, and willingness to adapt techno-financially (Gidwani & Corwin, 2017; Luthra, 2020). As such, while certain private actors are 'facilitated' (rather than accommodated by the state (Shankar & Sahni, 2018)), other private practitioners, networks, competences, skills, and abilities are undermined.

Indeed, besides the concerns of cost, urban municipalities were also pre-occupied by the efficiencies of time and scale, which reflected broader state and market interests. As we elaborate below in the case of the Ahmedabad Municipal

Corporation (AMC) – already India’s 5th largest municipality by the late 2000s, technical and practical solutions were sought, which could mediate the complexity and rising quantity of solid waste generated per day⁶³, in view of all the technical, logistical, civic, juridical, and political challenges and demands, but also financial and economic opportunities they presented. As part of a recently neoliberalised globalised economy with mounting international debts on the state, economic growth and rising demand across Indian cities constituted larger state priority and market interests. Waste must be removed and disposed/processed at the large scale and rapid rhythm in which they were generated. The search was on for techniques that would promise ‘the quickest road to success’ (Gidwani & Corwin, 2017, p. 50; Luthra, 2017; Shankar & Sahni, 2018).

Furthermore, deliberations were on to consider if and how MSWM could be linked to wider a ‘set of spaces and moments within wider circulations of value’ (Kirsch, 2013, p. 437), integrated with processes of economic growth and profit accumulation. In effect, the national policy direction towards privatisation in solid waste management did not merely involve a planned re-allocation of rights to waste, resources and work organisation from one particular set of professional actors-networks to another. At the heart of this transformation, therefore, were considerations how waste – in all its differential and unruly materialities – could be turned from an object of mere technocratic intervention (say, something to simply dispose, or to get rid of) into a value proposition, one that would enable

⁶³ In 2018, when I accompanied representatives of a local non-profit, visiting the commissioner of the AMC with an authorisation proposal for their plastic recycling facility, the Commissioner’s early remarks were striking: ‘But how much plastic will you treat?’, he asked the young CEO, ‘10...100 MT per day max?’ ‘Sir, we can try 10 MT’, spoke the crestfallen CEO, whose existing facility could only facilitate in the recycling of 1 MT plastic per day. ‘C’mon! We need big-scale solutions’ was the municipal commissioner’s jibe. ‘There’s already a 10 MT capacity recycling plant, we gave them a shed and facilities recently... but the scale is insufficient.’ The commissioner was referring to Ahmedabad’s only ‘authorised’ plastic recycling plant at the time – ‘Let’s Recycle!’ by NEPRA.

calculation and promise the production and accumulation of value (Kirsch, 2013; Hawkins, et al., 2015).

In this regard, as Gidwani and others have elaborated, the possibility of value generation from waste – which the urban poor had already been practising for decades – was starting to be considered, tried and tested, as new sites of intervention for corporate capital (Gidwani & Corwin, 2017). Here, waste was starting to be seen not as external to, but potentially, as something that could be internalised into the economy (Gidwani & Reddy, 2011; Gidwani, 2015). However, given the inherent socio-cultural stigma, caste and gendered connotations and ideals of socio-economic and moral value (or its lack thereof) historically attached to waste, how could waste be turned into a suitable and techno-culturally legitimate domain for wider middle-class, upper caste white-collar participation (Gidwani & Corwin, 2017; Kornberg, 2019)? What forms of physical, socio-cultural, and economic relationalities with waste were acceptable? How were pre-existing waste-mediation networks and traditional practitioners/experts to be regulated or related to – potentially co-opted for labour, made amenable for taxation and accountability, or strategically sidelined in competition?

In contrast to the more materially-specific, time and labour-intensive, decentralised techniques of recycling – considered the domain of work of the lower caste poor (Gidwani & Corwin, 2017)⁶⁴, new techno-economic frontiers of

⁶⁴ Although Gidwani and Corwin show us how a middle-class start-up culture and corporate interventions into the commerce and profitable operation of plastic recycling are also emergent. Notably, these new companies project a cultural re-narrativisation of expertise and professional re-organisation of technique, that excludes (even if not practically) and undermines the traditional legacies and claims of expertise of the *kabadiwala*. Articulations of ‘modern’, hassle-free service and ‘proper scientific’ techniques proliferate these discourses (see also (Jeffrey, 2015; Doron & Jeffrey, 2018; Luthra, 2018)). A media article, appearing in an upmarket business magazine with upper/middle-class readership, introducing one such start up, started with a bold claim that the ‘traditional kabadiwala’ was

value generation from waste and technocultural narratives of practice were sought. In this regard, high-capacity Waste-to-Energy (WTE) networks of waste circulation emerged as the silver bullet solution to the various complex problems posed by waste, with opportunities for scalar and financial growth (de Bercegol & Gowda, 2019). In addition, WTE also emerged as an articulation of ‘modern’ and ‘scientific’ technique. Indeed, despite the privileging of recycling within the waste hierarchy recommended by the MSWMH Rules, 2000, WTE-based technologies were initiated in most major cities, Ahmedabad being among the first to adopt large-scale WTE projects, with public-private-participation contracts drawn as early as in 2007 (AMC, 2017). By 2017, at least 4 WTE contracts had been signed – planning to incinerate up to 70% of its daily solid waste generated in weight. Similar projects were started in Pune (Shankar & Sahni, 2018) and Delhi (Demaria & Schindler, 2016). By 2015, the Indian government had already sanctioned 48 incineration projects across 12 states (Kornberg, 2019), with overwhelming support gathering in planning circles, bordering on ‘obsession’ (Shah, 2011). The Central Planning Commission, in a 2014 report, recommended WTE as a pre-condition to India dealing its waste ‘scientifically’ in order to make ‘modern life possible’ for its citizens (Planning Commission, 2014).

disappearing. Later, the founder justified his start-up by stating that in Delhi, things like ‘plastic and steel weren’t recycled’ before. Another start-up, as Gidwani and Corwin quote, claimed to offer value propositions to households willing to sell waste ‘better than selling to your local kabadiwala’. They had a website, offered an app with ready rate estimates, and door-to-door services when solicited (though, much like the *pastiwalas* of Ahmedabad who offered mobile material acquisition). Another English media-article, promoting an e-waste start-up, began with a triggering image of computers being openly burnt. It framed the intervention of the start-up as a necessary ‘missing link between consumers and recyclers’ that was free for the perils of informal mediators. Notably, save exceptions, this growing market of recycling start-ups premises itself as an alternative to traditional practitioners, though many of them co-opt or collaborate with the same old networks for onward mediation and actual value recovery. In any case, their numbers are small. In Ahmedabad, for example, there were three such door-to-door waste collection start-ups as of 2018, where-as, *peethawalas*, *pastiwalas*, and *kachre binnewalis*, clearly outnumbered them.

Though WTE may involve various technological processes, incineration-based techniques were held in high esteem in the central planning circles (Luthra, 2017; Kornberg, 2019)⁶⁵. There were reasons why. The growing quantity and complexity of urban solid waste were cited by planners, lawmakers and bureaucrats to premise and justify the policy push for incineration (de Bercegol & Gowda, 2019). Advanced 3rd generation incinerators claim to reduce up to 90% of MSW volumes (Doron & Jeffrey, 2018), some even up to 95% (Tchobanoglous, Thiesen, & Vigil, 1993). With urban and peri-urban real estate being a prized commodity for development, much of the demands and ensuing contentious struggles to acquire municipal land for landfilling would be reduced if disposable solid waste volumes were drastically reduced in the first place. Furthermore, proponents claimed that incineration – in its technical mediation of waste matter right down to the level of chemical bonds – would not require fine categorisation and labour-intensive segregation of materials as in recycling (Luthra, 2017); thus, it was quicker. The promises of energy generation from waste were framed as a potential way to address rising energy demands. Thus, as a long-term and multi-valent, though costly (Bhatnagar, 2015), investment in ‘sustainable’ urban futures, incinerators were hailed as the techno-fix with potentials ‘to provide a single solution to a wicked problem’ (Doron & Jeffrey, 2018, p. 148).

Additionally, linking back to the earlier point about scientific modernity, according to Kornberg, incinerators articulated for bureaucrats and planners a cultural aspiration toward ‘international ... standards of development and modernisation’ (Kornberg, 2019, p. 5). These aspirations were afforded essentially by localised

⁶⁵ Among the many ways to generate energy by incineration, the model most commonly followed in India is through the combustion of waste (and rarely, through conversion into refuse derived fuel – RDF) leading to the ‘recovery of heat to produce steam that in turn produces power through steam turbines’ (MoNRE, 2021).

cultural articulations; the attractive idiom of ‘burning’ drew cultural associations with fire as a significant purifying agent that could remove the stigma from waste and offer filthy Indian cities a cleansed facelift to ‘world class’ status ((Kornberg, 2019) also (Bhatnagar, 2015). In effect, one of the earliest WTE projects initiated in India, in Ahmedabad, was reported to have adopted ‘EU Technology’ following EU emission norms, which, in all likelihood, alluded to Mitsubishi-Martin incinerators used at over 400 waste processing plants across Europe, but also in South-East Asia (Doron & Jeffrey, 2018, p. 147). Finally, ‘removal of stigma’ also articulated a ritual justification for non-Dalit participation in the everyday work of waste. This was albeit with the expectation that heavy mechanisation of waste collection, transport and processing through WTE (we elaborate on mechanisation below) would separate, distantiate, and sensorially sterilise waste from its corporate mediators; translating unruly materials into standardised docile units of weight and energy, amenable for white-collar handling via spreadsheets and corporate drawing board calculations of value (Kornberg, 2019; Balayannis, 2020).

However, the technical and financial calculations of efficiency gain from incineration were deceptively premised and grounded on false expectations, critiques argued. The mere scale of urban solid waste did not guarantee the cost-efficiency of operations and the expected rates of energy output from WTE technologies, as these plants ‘require(d) a continuous supply of waste inputs of sufficient quantity and quality—high calorific value and low moisture content—to be viable’ (Luthra, 2017; Shankar & Sahni, 2018). The physico-chemical characteristics – the materiality – of ‘Indian waste’ was cited as the primary reason why publicly-funded and costly WTE projects were bound to fail. India’s

solid waste profile surveys estimated low calorific content and high moisture as compared to estimates drawn from countries where WTE is adopted as a norm.

According to a widely-cited Centre for Science and Environment (CSE) report, titled, *To Burn or Not to Burn: Feasibility of Waste-to-Energy Plants in India*, the calorific value of garbage in India ranges between 1411-2150 kilocalorie/kilogram (kcal/kg), compared to 1900-3800 kcal/kg in Sweden, Norway, Germany and the USA (Sambyal & Agarwal, 2018). Luthra (2017) performs an aggregated analysis of surveys and (non-)governmental reports characterising calorific content of solid waste in New Delhi from 1986 to 2006. In his analysis, the solid waste profiles returned consistently low calorific value (LCV) and high moisture content which outlay even the government's own incineration standards: 'almost everyone is in agreement that Indian waste is suitable for composting and not for incineration' (Luthra, 2017, p. 55). This brought into question the enormous faith and public finances placed upon waste incineration technologies and raised various safety and plant-viability concerns, notably as mixed, moist waste materials are known to disrupt equipment (Doron & Jeffrey, 2018; Shankar & Sahni, 2018). Instances of potentially toxic emissions from some of the early incinerators were cited, signalling the shaky grounds of public desirability and acceptability for the technology (Demaria & Schindler, 2016). Finally, if large quantities of waste were diverted for burning, the moral and economic questions surrounding the potential loss of livelihood and dispossession of the urban poor, dependent on these materials, also received critical consideration and articulation (among others, see (Agarwal, Singhmar, Kulshrestha, & Mittal, 2005; Gidwani, 2010; Chaturvedi & Gidwani, 2011; Kothari, 2013; Demaria & Schindler, 2016; Luthra, 2017; Dey, 2020) alongside critiques drawn from other world regions (Samson, 2015; Dias, 2016)).

Plastic's incinerability – its stable carbon-carbon covalent chemical bonds potentially broken down, combusted, to release high energy outputs (mostly as convertible heat) – emerged here as a critical point of persuasion and contention, mediating these public debates. Plastics – differences in resin-types but also the various catalysts and combustion techniques considered – are known to embody high calorific value up to the order of 10,000 kcal/kg (Zevenhoven, Karlsson, Hupa, & Frankenhaeuser, 1997). A recent study, conducted on plastic retrieved from household waste in India, converted high-density polythene (HDPE), low-density polythene (LDPE) and polypropylene (PP) into liquid fuel (refuse-derived fuel – RDF) using dolomite, and obtained a resulting calorific value also up to 10,994 kcal/kg (Sonawane, Shindikar, & Khaladkar, 2017). The growing abundance of plastics within MSW streams of India – as discussed above – was being considered as a potential solution to the problem of efficiency from WTE. Indeed, we have shown that the percentage of plastic waste in municipal waste streams rose dramatically from 0.60% in 1996 to 9.22% in 2005 (Zhu, et al., 2008). The Ahmedabad-based PlastIndia, India's apex plastic industry association, estimated a steady annual growth rate in polymer consumption at above 10% across all the national 5-year plans from 2005. In 2013, the annual CPCB Survey estimated the consumption of 12 MMT of plastic in India from packaging, clothing, household equipment, to transport and civic and industrial infrastructure (CPCB, 2013). The planned annual production of polymers amounted to 15.7 MMT in 2019-20, a further increase of 1.7 MMT from 2016-17 (Plastindia, 2018).

Of course, not all plastic ended up (regularly) into daily waste stream, but an estimate by the Federation of Indian Chambers of Commerce & Industry (FICCI) figures 43% of this fresh annual production used in 'packaging and single-use plastic', potentially ending up as domestic and commercial solid waste

(Venkatesh & Kukreti, 2018). That is, hypothetically at least, about 7 MMT of plastic waste per year, and the number is growing (Plastindia, 2018). If, despite the practical, logistical difficulties and variations in methodology, the average quantity of solid waste generated annually in India is estimated at 47 MMT (Doron & Jeffrey, 2018, p. 67), then the growing percentage of plastic waste by weight in urban waste streams – even if mixed and unsegregated by more finer resin-type (with different calorific values), could be expected to enhance the calorific values and incinerability of ‘Indian waste’ (i.e., it could be made to generate high calorific value – HCV), as it does elsewhere (Tsiamis & Castaldi, 2016). The potential promises of plastics for WTE were well-recognised within neoliberal planning circles (Luthra, 2017).

However, as pragmatic theorists of material process (we discussed Barry (2005), De Landa (2011), Hawkins (2012; 2013), Michael (2013), among others, in Chapter 2) remind us, and the *peetha*-based recycling networks of Ahmedabad have elaborated further in Chapter 4, the material qualities of plastic are not fixed, but conditionally emergent. That is, in this case, despite high bond energies entailed within lattice structures, these properties may not ‘express’ themselves in the desired ways. In other words, plastics have to be *made* incinerable. This might involve – to present a rather simplified view of the present supply side of the process – disentangling plastic waste from heterogeneous sites, practices and routines from across the city, ensuring separation from food waste, urban foliage, street-sweepings and other moisture-intense waste (which might reduce energy output and the viability of the incinerator), building a stock of segregated plastic waste and then, circulating them along secure, non-porous channels of mediation and aggregation into the incinerator plant, where they may await onward technological mediation.

Due considerations and exchanges were on among planners, policymakers, administrators across departments and (international) (non-)governmental agencies, and with 'experts' recruited by them. These led to a number of position papers, guidelines and recommendations. Among key recommendations were, to initiate waste segregation 'at source', i.e., with the 'generators of waste' – households, Residential Welfare Associations (RWAs), individual businesses and commercial clusters (say, plastics and other HCV materials separated from moisture-heavy LCV materials) and direct waste collection from source (Planning Commission, 2014). While direct sourcing was expected to stop waste accumulation and mixing in the commons, this was supplemented by advice to ensure 'end-to-end' integration and streamlining of the entire process of waste transit from source to the processing facilities (MoF, 2009). Better control of waste transit was recommended (Forsyth, 2005). One World Bank guideline for policymakers advised carefully managing 'scavenging and other recycling activities' so as to reduce leakage, and to maintain the 'composition and combustibility of waste arriving at an incineration plant' (Rand, Haukoil, & Marxen, 2000, p. 5-6).

In effect, as plastics emerged as the materials of interest, their potential recyclability (elaborated in Chapter 4) also made them a bone of contention, and the mediatory role of India's waste-pickers and recyclers tended to be cited as an expropriation, a reason for the low efficiency of WTE operations. According to one expert report, up to 90% of combustible household waste was 'extracted' at the doorstep by waste collectors for recycling (Nandy, et al., 2015), a similar observation echoed earlier by a Central Planning Commission Report (Planning Commission, 1995). 'Around 500,000 rag pickers' across the country extract recyclables, leaving behind waste of 'very low content quality', shared a waste

management firm operator, assigning the blame of WTE's low efficiency rates, and low rates 'success', to foragers and recyclers (Furniturewala, 2012, p. 21).

These observations served to frame waste-pickers and the recycling networks as competitors to the WTE-based solution, inhibitors to its success, rather than valued partners and allies in the public efforts at plastic waste mitigation (Luthra, 2017). Ones, who needed to be 'carefully managed', mediated, or co-opted – and whose municipal rights over waste re-claimed and re-assigned (Chaturvedi & Gidwani, 2011; Shankar & Sahni, 2018). Indeed, in order to guarantee waste quantities and characteristics desired for the viability of private waste collection and processing operations, the Central Ministry of Finance, in 2009, recommended 'long-term' allocation of the 'rights to waste' to private municipal contractors (MoF, 2009). Waste-pickers (thus dis-possessed) were to be offered municipal employment under recommendation from the Asim Barman Committee. Finally, heavy mechanisation to reduce human mediation but also to increase collection, storage and end-to-end transit capacity, and techniques of surveillance, were to be pursued with profit-driven private contracts (Gidwani, 2015). As cost, time and scale-efficient incineration lay at the heart of the neoliberal plan to order MSWM provision, a steady (if not increasing) supply of 'dry' plastics was deemed necessary. As such, the above technopolitical and practical recommendations suggest ways to maximise the collection of incinerable feedstock, offer municipality agents conditions for better control over moisture and admixtures (by segregation), but also, necessarily to re-wrest the de-facto rights over plastic waste which foragers and aggregators like *kachre binnewalis* and *pasti/peethawalas* were enjoying in the weak presence of the state in the domain. The accumulation of incinerable plastics by the dis-possession and re-localisation of recyclable plastics may be considered to

constitute the guiding the neoliberal pragmatic of plastic process here. One that we may call the 'pragmatic of plastic incinerability'.

Ahmedabad: Early Experiments in Incinerability

Post 2000, when most of these MSWM policy deliberations and planning were underway in the Central and State governmental circles, Ahmedabad emerged as one of the early-mover cities. Urban waste management reforms were already initiated in urban centres of Gujarat following the 1994 Surat plague (Doron & Jeffrey, 2018). But especially after Narendra Modi took over as the Chief Minister of the state in 2001, this was notably expanded and elaborated in Ahmedabad city – Gujarat's state capital-region, in the way of initiating large-scale and costly WTE contracts, participating in planning and experimenting with neoliberal reforms and technical programs as a way of integrating WTE and enacting the above pragmatic of incinerability at a more crude, local scale of practice.

Modi's tenure (2001 – 2014) oversaw Ahmedabad's urban territory expanding drastically from 190 sq. km by area to 450 sq. km by 2010 (Mahadevia, et al., 2018), becoming, according to Forbes, one of the world's 10 fastest growing cities (Kotkin, 2010). More than 19 neighbouring ULBs and 30 village local bodies were incorporated under the jurisdiction of the expanding AMC during 2005-2010: leading to rise in constituent population (from 4.9 million in 2001 to 6.4 million in 2011) and a near-doubling of property tax collection, rising from Rs. 498 crores (2010) to Rs. 897 crores (2017) (Patel, 2020). Urban population density rose to 11, 948/ sq. km; the highest among any city in India (Sankar Cheela, Ranjan, Goel, John, & Dubey, In Press). The average daily MSW generated from the jurisdiction of the AMC was estimated at 3,800 MT in 2011, rising from 750 MT in 1981 (UMC, 2012). With rise in available municipal capital, greater prominence

of daily MSW on weight scale – including in plastics and spatial density of (‘waste generating’) populations, technologisation at a large-scale and profitable private operations in waste management – from collection to processing looked feasible.

In 2007, the first WTE contract was commissioned, followed by another in 2009, yet another in 2012, and one in 2016, with plans to cumulatively incinerate up to 2,700 MT (out of 3,800 MT) of solid waste per day (AMC, 2015). WTE contracts obliged beneficiary private corporates to design, build, finance, own and operate (DBFOO) techno-scientific facilities on public land leased by the AMC at nominal cost (as low as Re. 1, or £0.0098/ annum) for long periods (25-30 years). Depending on contract specifics, while some companies would have to pay the AMC an annual royalty, most contracts included various concessions, and made provisions for regular payment by the AMC to the company as ‘weight-dependent’ service fees per MT of MSW processed. There were additional arrangements for the state electricity regulator (GERC) to offer an energy-purchase guarantee or to potentially award higher tariffs to these WTE units (AMC, 2017). These contracts reflected the ‘market-driven’ orientation in MSWM where the WTE operator was driven by profit, which could be maximised (drawing from public subsidies and tariffs) if the contracted operators increased their capacity of deliverables both by metric tonne (MT) – by imbibing and burning more solid waste; and by megawatt (MW) – producing more energy. A potentially beneficial outsourcing of multiple responsibilities for the AMC.

However, WTE plants alone do not make plastics incinerable. As early as in the late 2000s, planning workshops were on in the State, including in Ahmedabad in collaboration with the United Nations Commission on Regional Development (UNCRD), to adopt strategies for integrated end-to-end (or ‘cradle-to-cradle’)

management of material circulation, including with producer interventions, accountability and financing sought in the domain of MSWM (UNCRD & AMC, 2012). A large number of local experts and research articles, conducting city-surveys on MSWM throughout the early 2000s, overwhelmingly recommended the use of technical devices and equipment like covered and separate bin storage at source, fully covered⁶⁶ and axel-based tipping/ non-tipping trucks, garbage compactors, containerised handcarts, Radio Frequency Identification (RFID) tags, etc. Strategies like minimisation of intermediate sites for transfer and aggregated storage, Global Positioning System (GPS) monitoring, etc. alongside privatisation and regularisation of services for efficient waste management, were recommended especially in the domains of waste collection, transit, and street-sweeping (see (Atre & Shah, 2007; Purohit, Bothale, & Gandhi, 2016; Goswami & Divi, 2019) among others). Contemplations were on, as early as in 2007, to remove the large yellow bins, which accumulated mixed waste at the neighbourhood level, and to provide door-to-door waste collection in order to minimise waste mixing. In particular, municipally-provided bins (to waste generators) was considered as a strategic device not only to segregate but also to re-assert, reclaim municipal right over waste (recall the BMC Act 1949 which accorded the AMC ownership of solid waste within 'public' waste receptacles⁶⁷). The city was divided into six 'zones' (later a 7th was added after 2017). Street-sweeping was expanded, with the municipality assuming greater charge and

⁶⁶ The recommended covering of bins, and waste transport vehicles and equipment not only ensures non-porosity – i.e., materials not leaking out or coming in, but also, provided the covering is opaque, ensure the sequestered waste material is invisible from public sight. With opaque material sheets like in metals, non-porosity and invisibility could both be together ensured, thus the earlier municipal obligation – as a matter of sanitary, aesthetic care – of keeping waste from '(in)visible to public, nor exposed to open environment preventing their scattering' (MoEF, 2000, p. 8), may be integrated and carried forward in matters of financial care.

⁶⁷ See the Bombay Provincial Municipal Corporations Act, 1949, pp. 5.

control over contracts. Door-to-door waste collection was initiated from the early 2010s, at least in the central zone of the city (UNCRD & AMC, 2012). For waste localisation, initially, a more inclusive and collaborative approach was adopted in privatising these practices. In 2007, the AMC had as many as 900 contracts with NGOs (the largest being SEWA⁶⁸), RWAs, as well as caste-based *mandalis*, or associations of traditionally employed workers to collect garbage, sweep streets and common areas, etc. According to the general arrangement, as Atre and Shah describe, the AMC would pay these micro-enterprises Rs. 10 per month per household, served by these workers, of which the worker was entitled Rs. 9. With each worker allocated up to 150 households for door-to-door collection, they expected to earn a minimum assured income, supplemented by earnings procured by selling the recyclable components of the waste, collected by them, to the *peethas* (Atre & Shah, 2007).

However, by the mid-2010s, many of these numerous contracts, especially with NGOs for door-to-door waste collection were severed (Parmar & Trivedi, 2013; Oates, et al., 2018). They were instead allotted, zone-wise, to fewer large private companies (typically one company per zone), again reflecting the organisational scaling up and neoliberal inflexion in Ahmedabad's MSWM policy. Barring contractual exceptions, the AMC provided waste collection equipment and facilities (like single zonal refuse transfer (aggregation) stations – RTS, RFID and GPS based surveillance systems, covered collection trucks, hook-loaders, compacters, etc. To cover for fuel necessary to run mechanised collection vehicles, the AMC would pay the contracted private agent per 'complete'

⁶⁸ Self-Employed Women's Association, founded by Elaben Bhatt in 1972, is a trade union and non-profit organisation based in Ahmedabad that advocates worker's rights and financial security for women from low-income households and employed in the informal sector (Bhatt, 1989; 2006). With over 2 million registered members, it is the world's largest organisation of informal workers, according to the UNDP Human Development Report, 2015 (Jahan, 2015).

collection trip (in the condition that the truck's storage capacity needed to be reached at the end of trip) and for the 'operation' and 'maintenance' (O&M) of its facilities (AMC, 2017). The company would be responsible for labour and workplace protection, practically independent to hire, fire, labour and define wages. The door-to-door waste collection agents could thus maximise their income by increasing the number of collection trips, and by offering low-paid and 'informal' work contracts to its workers. As such, in this selective privatisation to favour scale and profitability of operation, the rights, autonomies and credentials of actual handlers of waste were undermined.

Most street-sweeping contracts were however retained (though with tricycles/handcarts with separate containers for waste segregation and long-handle brooms provided by the AMC). According to a 2012 city-report commissioned by the AMC, at least 24% of the city's collected solid waste were localised by these street-sweepers (UMC, 2012). Public passages within the municipal jurisdiction were divided into 'beats', units of 'street length allotted to each street-sweeper to be swept every day ..., dependent on the width of the street, average waste generated by that street, nature of activities on the street, traffic volume, etc.' (UMC, 2012, p. 83). As such, there are more than 10, 400 beats under the AMC, covering 1484 km of linear road length, managed by more than 13, 000 street-sweepers working under the AMC (AMC, 2017). These employments were via arrangements and rules of employment mediated by private labour agents (Chaturvedi & Gidwani, 2011), RWAs (UMC, 2012; Dey & Michael, 2021), *mandalis*, and sometimes by NGOs (UMC, 2012). Supposed to work in shifts, street-sweepers were expected to transport their combustible collects to 'secondary points of collection' – usually yellow community bins, or to

waste collection trucks at pre-decided routines – so that these materials could eventually make their way to the WTE for energy generation.

India's New Solid Waste Management 'System': Design of an Infrastructure

What we uncover from these developments in policy and actual program is a re-ordering of different sociomaterial practices and practical relations across sites, subjectivities, and scales, making these relate and link to WTE facilities in different ways. With the proliferation of different standards, equipment, devices, techniques, rules, practical relations and obligations (including contracts of different measures), but also strategic sociomaterial screenings and exclusions, we find the cross-scale practical orchestration and minute calibrations of garbage mediation, plastic segregation and circulation that might make plastics incinerable. They enact a particular pragmatics of incinerability, aspiring to put together an efficient, profitable, measurable, accountable and predictable nexus of practices. While we described the groundworks for policy design, but also the situated smaller-scale implementations of some of these pragmatics in Ahmedabad – so-far until 2014, these reforms would soon be enacted on a much grander scale, federally, as Narendra Modi, elected India's Prime Minister in 2014 – with an absolute majority for his party, moved on to take charge of Central leadership. The pragmatic of incinerability would soon become part of a centralised 'system' of legislation and technocultural ordering of practices, from where they would re-mediate, re-entrench, expand and intensify some of the above tendencies on the ground.

In all this pragmatic re-ordering, this re-territorialisation of extensive sociomaterial relations across scale, we highlight how conditions are prepared for the dis-

possession and reclamation of (recyclable, also incinerable) plastics from the recycling networks (Chapter 4) and their de-stabilisation in a variety of ways. This includes devices and practical arrangements that reduce the waste-picker's access to plastic waste, mediate their habitual patterns of practice, but alongside such modes of deprivation – if not exclusion, leave open the possibility for integration: employment in the MSWM 'system' as authorised practitioners, albeit as 'informal' workers under less favourable conditions. At the same time, we shall note how the new waste rules would exclude mediation agencies, like *peethawalas*, and create difficult conditions for their integration into the new 'system', say, in terms of bureaucratic obligations, technocultural demands, etc., thus with potentially deleterious effects on the recycling networks – also competing for plastics. MSWM – thus, built on the strategic integration (say, of labour) and silencing (say, of the rights, resources and practical possibilities) of pre-existing waste-entrepreneurs, would thus emerge as a 'boundary-making project', where, after Das and Poole, differential standards of (non-)valorisation and (non-)facilitation become a 'necessary entailment of the state, much as the exception is a necessary component of the rule' (Das & Poole, 2004, p. 4).

In terms of the sheer scale of plastics, people, and other things, that stand to be mediated – circulated, screened out, held in place, these new national territorialisations, qualified by the state as the solid waste management 'system' (MoEFCC, 2016), are generatively conceived as constituting an extensive project of 'infrastructure'. The concept of infrastructure has been variously theorised in social science literature (say, to denote particular relations of production in Marxist political economy), but we here approach the term more in terms of its materiality than its metaphors, as reflected in recent discussions within STS and anthropology, especially following the 'new materialist turn' (Appel, Anand, &

Gupta, 2015). In particular, some of the recent conceptual iterations of infrastructure (say, (Bear, 2007; Anand, 2017)), have effectively performed a sort of ‘systems’ thinking⁶⁹. According to Larkin, infrastructures denote built networks which facilitate flows of things and beings over space, provide speed, meaning, and direction to these circulations, and enable interaction and exchanges between multiple constituencies (Larkin, 2013). For Star and Bowker, attempting a more ‘common-sense’ imagination of the concept, infrastructure runs ‘underneath’, ‘it is that upon which something elsewhere rides, or works, a platform of sorts’ (Star & Bowker, 2006, p. 230).

In these regards, we cite how a bureaucratic framework enacted by new governmental rules (notably, the Solid Waste Management (SWM) Rules, 2016, together with material-specific ancillary rules for plastics – the Plastic Waste Management (PWM) Rules 2016) and a technocultural and practical framework generated under the ‘Clean India’ program re-enact responsibilities, re-calibrate expectations, reputations, and obligations to produce conditions for a national-scale re-ordering of relations and circulation of incinerable materials towards WTE. It must be remembered that this view of the infrastructure as a substrate that smoothly and quietly orients is rather normative. It does correspond empirically to the present SWM infrastructure at least in its stage of planning. Later, we shall have occasion to draw on other situated theorisations of infrastructures, where these systems appear much more fragile, porous, irregular, and emergent – perhaps even noisy and ‘lively’ (Amin, 2014). But more about that later. For now, we shall highlight another aspect of infrastructures that

⁶⁹ In these regards, critical considerations have drawn heavily on older forms of theorisation of enrolment, association, coordination, and control (drawing not least on Actor – Network Theory, and its later and cognate parallel iterations – see (Michael, 2017) and Chapter 2.

concerns othering and deleting. How infrastructure 'valorizes some point of view (or mode of practice) and silences another' (Bowker & Star, 2000, p. 5) will be put to generative use to conceptualise the systemic 'mutings' inherent in the above mode of enacting planned plastic mutability.

In 2016, within two years of Mr. Modi's political leadership at the Centre, the planned reforms were enacted in the domain of solid waste management. The MSWHR Rules 2000 were replaced by the Solid Waste Management Rules, 2016, together with material-specific ancillary rules for plastic, e-waste, and construction & demolition waste – materials which posed specific challenges to but also opportunities in MSWM. The new Rules incorporated or created opportunities for most of the pragmatic guidelines and technical recommendations, with elaborate juridical, legal and techno-practical frameworks for their implementation under centralised control. Under the new leadership, WTEs were offered massive promotion for cross-country expansion. Here, we find expression of the modularity, the gradually incremental, territorially expansive, but also intensifying, nature of an infrastructure (Star & Ruhleder, 1996; Anand, 2015). In 2017, according to the NITI Aayog, the new central planning committee under Mr. Modi, works were underway for starting WTE plants in 100 Indian cities by 2019 (Kornberg, 2019). The energy output capacity from these WTE plants amounted on paper to 330 megawatt (MW) in 2017-18, and in 2018-19, the target was increased to 511 MW under the 'Clean India' mission (Sambyal, Agarwal, & Shrivastav, 2019). As of 2021, the estimated potential for energy generation from urban solid waste across India rose to 1247 MW, an area of future commercial development. A centralised nodal agency, the Waste to Energy Corporation of India, was already proposed, as of 2019, to clear and facilitate PPP proposals in setting up WTE plants across India (CSE, 2019).

Infrastructures tend to be massive, distributed entities, if not grand and sublime (Nye, 1994). Thought especially as (part of) systems, they are not just composed of circulating things (say, plastics, energy, transport) and underlying machinery and circuits – like WTE plants, bins and trucks, electricity grids, roads, etc. but draw in, depend on, leak into and mediate a wide range of other networks and constituencies. These may include people (Simone, 2013), animals (Gutgutia, 2020), sites (Liboiron, 2021), materialities (Appel, 2018), cultural objects and affects (Michael, 2020), information (Bowker, Timmermans, & Star, 1996; Karasti & Blomberg, 2018), communities (Appadurai, 2001; Dey & Michael, 2021), and environments (Davies, 2019). Star and Ruhleder (1996) call this distributed feature of infrastructure its ‘reach or scope’. Indeed, as Appel (2012) illustrates, electricity grids are infrastructures dependent on other infrastructures, say, of oil extraction, or labour. Anand (2011) shows us how the fluid mechanics of water circulation are not just mediated by metallic pipelines but are also mediated by political pressures. Furthermore, according to Star (1999), infrastructure is also a relational concept, in the sense that multiple actors and communities/conventions of practice relate to it differently, they do different things to it, expect different things from it; in so doing, (de)stabilise it in different ways. Thus, in the case of the WTE-based infrastructure, residents (‘generators of waste’) putting out garbage is a relational engagement with the MSWM system, which is different from how an SPCB official, charged with the inspection of a proposed recycling facility, might relate to the same system. But these constituencies, communities and conventions of practice must be brought together, their duties specified, mutual relations, expectations, forms and natures of communication, directionalities defined (see ‘transparency’ – (Star & Ruhleder, 1996)).

Indeed, in keeping with the pragmatic demands of running efficient WTE operations, or the wider policy demands of WTE proliferation in MSWM across India, WTE operations must be brought in relation with a wide range of relevant (as considered and drafted by the lawmakers) constituencies. This might include residents and populations 'generating' waste, municipalities, waste collection and processing companies, operators, but also, importantly, the producers of plastic commodities – especially of disposable objects, etc. Devices like bins, trucks, JCB loaders, compactors, handcarts, etc. must be sutured into these defined relationships. Solicitations may be sought from the ministries governing energy, power, not least in order to integrate and economise energy produced from the WTE plants. Furthermore, the environmental standards of emission, permissible limits, etc. must be drafted, which demand deliberation from the Central and State Pollution Control Boards (CPCB, SPCB). Again, new members must be enrolled into the infrastructure, integrated into this 'system' of relations. For example, applications for WTE operation, or waste collection, must be sought from interested parties, their proposals examined against a set of preferences, and approved. State urban departments must also have to relate to, share concerns about and mediate projects.

The SWM and PWM Rules 2016 effectively bring together a range of these agencies onto an extensive relational framework, and set up duties and mutual expectations between them, linking these horizontally, and vertically across scales. In effect, in comparison to the MSWHM Rules, 2000, the new Rules expand the scope of legal relationships (expanded from an earlier smaller set of agents and actors like 'generators of waste', ULBs, CPCB, SPCB and State Urban Development Ministries, to include more Central and State Ministries like Energy, Power, Fertilizer – notably for compost from wet waste, but also on local

levels, air, water, quality monitoring departments, etc.). Drawing together these entities, the Rules define and enlist their duties and mutual obligations, and on occasion, expand on their existing number of duties. There are provisions for penalisation against non-compliance. The Rules come with a long set of Appendixes with standards which these agencies are obliged to use. Indeed, a range of standards: from categories of waste ('dry', 'combustible', 'bio-degradable', 'wet', etc.) application/renewal/registration forms (say, for waste processing plants, like WTE), templates (say, for inter-ministry reports, or reports from the ULB to the State Urban Development Ministry, or to the SPCB), timelines of communication and implementation (say, of duties, or to return the results of an application), durations of plant registration, renewal periods, etc., but also technical devices (from 'long brooms', bins, trucks, compactors, 'secondary storage facilities'), and measurement thresholds (say, for emissions), are defined and recommended for these actors to communicate, compare, measure, and exchange matter and information between and across each other, reliably and predictably, across the different scales and contexts of practice.

Furthermore, co-ordination is attempted with defined hierarchies (another feature of infrastructures (Star & Ruhleder, 1996)): directions of material and information flow, policy preferences, defined and graded centres of power, autonomy and relations of accountability, with centralisation across scale – right up to the Central Ministry of Environment as the nodal agency, co-ordinating with other departments, performing duties, making and passing across/down information, instructions, drawing in feedback from across and below. For example, while ULBs are charged with the primary duty for implementation of the Rules locally, and to provide for MSWM (thus, in continuity with the MSWHM Rules 2000, the 74th Amendment, but also pre-existing municipal laws), different ministries and

agencies across scale inter-link in various ways to support and monitor ULB activities and programs, perform checks and balances. In this, there is also scope for local improvisations, and clustering of relations/practices. Most notably, State Urban Development offices are responsible for the interpretation of SWM Rules, consult with different State-level governmental agents and Central monitoring bodies, and draft State-adapted policies and strategies. ULBs are to draft municipal bye-laws following the State policies, plan programs, give out contracts, etc. in order to fulfil over 37 Centrally-specified duties, and report back to the State ministries and the SPCB office to ensure compliance.

To elaborate on inter-agency exchanges – their hierarchised standardisation but also the scope for improvisation and incorporation of the above pragmatic policy preferences, we cite the new regime of ‘authorisation’ introduced by the Rules. Authorisation is for new members to be integrated into the system, notably, as state-legitimised handlers and processors of waste (WTE units, compost plants, recyclers, but also waste-collectors). Although the criteria, conditions, preferences and mechanism for these various kinds of integration are not evenly defined⁷⁰. ULBs are explicitly encouraged to adopt large-scale technologised solutions. In effect, the Rules clearly recommend ULBs authorisation ‘preferences’ for processing technologies like decentralised bio-methanation and composting, and large-scale waste-to-energy (see 5th duty – (MoEFCC, 2016, p. 59)). However, the process of authorising draws in multiple agencies across scale. The CPCB is due to formulate/revise national standards and criteria for the authorisation of waste processing/disposal facilities in consultation with Central-

⁷⁰ We return to the point of uneven preferences and unequal, inequitable standards of integration, when we discuss the integration of ‘recyclers’ and waste-pickers more elaborately in Chapter 6, also below on Mutings.

level agencies, but also consider feedback from below. SPCBs would implement these standards locally. SPCB officials would examine and review actual proposals at the State level, based on centrally-received standards, but also undertake site-inspections themselves, accept feedback from local offices like, area planning, traffic, ground water and air quality monitoring boards, etc. to assess local conditions, demands and feasibility. Entitled with veto power to grant, suspend or cancel applications, SPCBs are meant to ensure standardisation in the authorisation/ rejection/ renewal of waste processing contracts in the States. ULBs would issue contracts only to/from companies authorised by the respective SPCB. Thus, while there are templates and standard measures involved in the process of granting authorisation, there is scope for localised manoeuvring, improvisation and limited autonomy. In particular, improvisation is notable when it came to the authorisation of waste-workers. Although ULBs are advised to re-educate and incorporate 'informal waste-pickers' within the MSWM system, minimum standards, conditions and rights of employment remain remarkably unspecified, essentially leaving such (non-)authorisation to be practiced flexibly by the contracted private agent⁷¹. Here, we find another instance of organisational hierarchy – albeit a more flexible one (Desai, 2012), where the publicly-contracted private agent in turn becomes the

⁷¹ Following sustained advocacy by trade unions and organisations like SEWA in Ahmedabad, Kagad Kach Patra Kashtakari Panchayat (KKPKP) and SWACH in Pune, Chintan and All India Kabaadi Mazdoor Mahasangh in Delhi, among others, the SWM Rules 2016, for the first time in governmental enactment, acknowledge the vital roles played by waste pickers (like *kachre binnewalis*) and 'the recycling industry' (Gidwani & Corwin, 2017). The State Urban Development (SUD) offices, which draft State-level SWM policies, are specifically instructed to ensure 'state policies and strategies ... acknowledge the primary role played by the informal sector' (MoEFCC, 2016, p. 57). However, as the reader would note, the Rules pre-define these actors as 'informally engaged' (MoEFCC, 2016, p. 55), in what would constitute the first enactment of a 'formal'/ 'informality' discourse (Sassen, 1994; Roy, 2005) in Indian waste law. In effect, the Rules recommend the SUD offices to provide 'broad guidelines' for the *integration* of informal actors in 'the waste management system'. Integrated workers are merely re-named as 'authorised informal ... waste pickers, ... recyclers' but not formal workers, and not accorded the securities and accoutrements due to 'formal sector work' (Breman, 2004). It would seem that the values of the waste collectors' labour are duly recognised, but not necessarily their rights.

state-authorised indirect authorising agent for workers, afforded primarily by own rules of profitable operation and market demands. Nevertheless, ULBs are asked to ensure contractors provide worker safety, notably by offering a specified range of personal protective equipment, like ‘uniforms’, ‘hand gloves’, ‘fluorescent jacket’, and ‘masks’.

To elaborate upon some of the key duties across actors – especially as they reflect the pragmatics of incinerability, let us start with ‘waste generators’. The Rules expand the definition of ‘waste generators’ to include larger and collective residential and commercial entities like RWAs, commercial centres, markets, etc. Injunctions are placed against ‘littering’, open burning and disposal of waste. Furthermore, waste generators are obliged to segregate waste at source, locally treat ‘bio-degradable’, wet waste, especially for RWAs, large commercial establishments and business conglomerates (composting, bio-methanation techniques are suggested) (MoEFCC, 2016), and divert ‘dry’ waste, by preference, to authorised municipal waste collectors⁷². ‘Covered bins’ are introduced as key devices in the Rules for segregation and containment of the above waste categories at source.

While separate bins are expected to facilitate segregation, the different place-based techno-practices recommended for dry/wet wastes are expected to facilitate further separation of the combustible from the non-combustible and the

⁷² The Rules define ‘bio-degradable’ waste as ‘any organic material that can be degraded by micro-organisms into simpler stable compounds’ (MoEFCC, 2016, p. 52). ‘Dry’ waste is defined to include ‘recyclable and non recyclable waste, combustible waste’, especially excluding bio-degradable waste and ‘inert’ contaminants (p. 53). The category of bio-degradable waste and inerts combined, often clubbed together as ‘wet’ waste, includes materials with heavy admixture of water, dust and food waste. The categories of wet waste, including bio-degradables, and dry waste, find wider mention in the recommendations under the Clean India Mission, also initiated by Mr. Modi’s government in order to supplement and boost the reforms and regulations in solid waste governance. We revisit this below.

moist. With big commercial establishments, conglomerates, hotels, markets, shopping malls, and big housing societies, RWAs, recommended to locally treat segregate wet waste – ‘as far as possible’ (MoEFCC, 2016, p. 55) – this would mean moisture-intensive materials are designed by policy to be screened out by a large section of waste generators right at the source, leaving out only dry incinerables in separate containers to be collected by the municipal agency. The obligation for ULBs to promote and preferentially authorise localised bio-methanation and composting technologies, as mentioned above, must be interpreted in this pragmatic light. Waste generators are also recommended paying user fees for waste collection services.

Under its retained primary responsibility to plan and provide for MSWM, ULBs are assigned a larger list of 37 specified duties. These include organising door-to-door waste collection from all residential, non-residential, commercial and institutional premises; providing for and arranging regular sweeping of streets, promoting and facilitating the construction, operation and maintenance of decentralised community-level facilities for localised wet waste processing, and WTE for dry, combustible waste processing at a large scale, alongside their associated infrastructures, either on its own or ‘or with private sector participation or through any agency for optimum utilisation of various components of solid waste’ (MoEFCC, 2016, p. 59). Furthermore, in order to facilitate segregation, material and visual sequestration, containment, and transport of segregated waste, ULBs must provide covered bins, with recommended colour-coding for respective category of waste storage, ensure waste collection, segregation and storage of segregated wastes facilities are incorporated in building design and plan before granting approval for constructions, and furthermore, to set up ‘secondary storage facilities’ (like RTS), material recovery facilities (MRF) for the

intermediary aggregation and segregation of wastes in transit. Besides the provisions for covered equipment and infrastructure, the nationally-standard forms of reporting from a waste facility operator (including waste collectors, RTS, MRF) to the ULB includes a range of large devices, with the requirement that these be used: 'dumper placer', JCB loaders, compactors, covered trucks, etc., thus, also revealing the underlying logic of solid waste concealment (say, sensorial), materially-contained circulation and progressive scale-building towards WTE plants.

To hold producers accountable to and relate to the system, the PWM Rules 2016 (also expanding on the PWM Rules 2011), oblige producer identification on plastic packaging and other commodities, and introduce extended producer responsibility (EPR), say, to draw funding for developing MSWM infrastructure. Furthermore, to increase the 'reusability' (potentially for incineration, or for recycling), the PWM Rules 2016 set conditions for minimum film thickness for plastic carrier bags, considered as abundant in urban waste streams (Pathak & Nichter, 2019; Pathak, 2020).

Clean India: Techno-Cultural Embeddedness and Reputation

Infrastructures are always assembled on already installed sociomaterial bases, remind Star and Bowker; they are embedded, sunk into pre-existing legacies and routines, social cultures, technical practices, from which they derive strength, inertia, justification, but also weakness (Star & Bowker, 2006). The new reforms in MSWM, introduced with the Rules of 2016, are obviously more modular and incremental, as we have shown, part of existing deliberations and inertia in waste management policy philosophies and also already implemented locally, in piecemeal fashion (like in Ahmedabad). However, it is the 'Clean India' mission

(2014 – 2019), initiated two years prior to the official enactment of the new Rules and shepherded by Mr. Modi, which, I argue, lent socio-cultural meaning and historicity to the infrastructure of waste governance – from the techno-practical levels of the mundane to scales of the urban and the national. Clean India performs a discursive ‘mode of ordering’ (Law, 1994), as it were, where certain actions (like, waste segregation), routines, techniques (like WTE) and practical arrangements (like mechanised and privatised MSWM), etc. are accorded cultural and moral primacy. Furthermore, in Mr. Modi’s own words, the Mission is ‘not a scheme thought overnight, but (his) dream since ... RSS Pracharak (activist) days’ (from (Doron & Jeffrey, 2018, p. 269)), articulating some of the pre-existing ideologies, legacies and practices of securing socio-environmental hygiene which we encountered and discussed in the beginning of and throughout Chapter 4.



Fig. 19: An Information and Broadcast Ministry flyer, with the Clean India logo, modelled on Gandhi's iconic round glasses. Variants of the flyers also show Gandhi clipart with the figure of the Mahatma in action: walking, cleaning, sweeping streets. The motto, translates from Hindi to: 'One More Step towards Cleanliness'. Courtesy: Ministry of Information and Broadcast, Government of India [Open Data License - GOI]

Mr. Modi came to power on the back of a popular political mandate. The 'Clean India' mission, announced soon after the commencement of his term, and inaugurated on Gandhi's 145th birth anniversary on 2 October 2014, mobilises some of the personal cult of the Prime Minister, and fuses it with older nationalist legacies of clean nation-building (see Chapter 4) notably through the ubiquitous and strategic use of the iconography of MK Gandhi. The cultural nationalism of Clean India, together with its critiques (including of misappropriating Gandhi's legacy for political gain⁷³) and problematic enactments of restricted, partisan

⁷³ Authors argue how Modi's larger-than-life branding in national politics has drawn problematically on the image of the saintly Mahatma Gandhi. This is done not least by highlighting their common Gujarati

publics, reminiscent of 'bourgeois environmentalism' have been widely written about (see (Doron & Raja, 2015; Jeffrey, 2015; Doron, 2016; Luthra, 2018; Dey, 2020; Dey & Michael, 2021)). Nevertheless, the prominence of the Mission is undeniable, and it generated a significant reputational cult on popular and social media as citizens posed for photographs with brooms (pretending to be) cleaning one's streets and urban neighbourhoods.

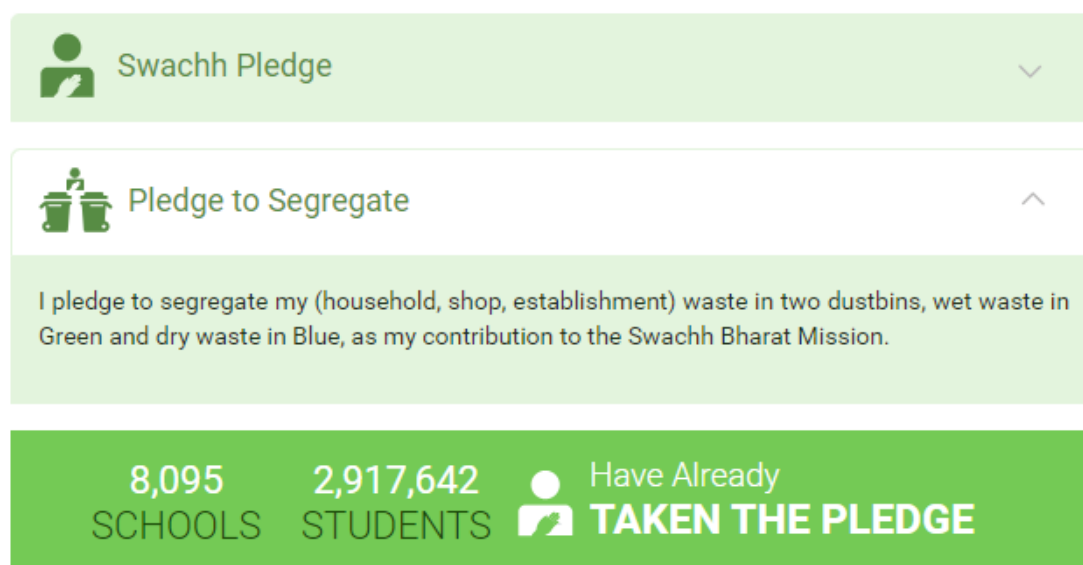
Besides all the spectacle, Clean India also attempts to draw some of these reputational networks towards mundane performances of waste segregation at home, or at one's business. In this less discussed yet practically significant aspect of 'Clean India', the 'pledge to segregate' asks citizens to sort dry and wet waste as part of their commitment towards 'clean' nation-building. As such, the pragmatics of plastic incinerability, articulated through the governmental infrastructures for ordering MSWM, are sutured, fused together with mundane performances of citizenship and belonging in a 'clean' nation. Bins again feature in this crucial enactment of clean nation-building. Furthermore, by setting a strategic 5-year timeframe to the Mission, to culminate on 2 October 2019, Gandhi's 150th birthday anniversary, mundane (as well as more dramatic) acts of waste mediation were linked to paying one's dues to the Father of the Nation. Gandhi's images proliferated social media badges, street hoardings, flyers; his

background and the legacy that both men launched their respective political careers from Ahmedabad (albeit almost half a century apart and along starkly diverging political ideologies). As such, Modi – who began calling himself India's *chowkidar* (gatekeeper) – is partly projected as India's new national guardian (Gaurav & Sheikh, 2019). Authors have critiqued the adoption of the Gandhian icon for 'Clean India'. This is particularly due to the de-radicalisation, and de-naturalisation of Gandhi's political identity and its convenient mobilisation for the seemingly apolitical 'Clean India' mission. Such an appropriation of Gandhi's legacy is strategic, particularly in the backdrop of the Indian right-wing (notably Modi's Bharatiya Janata Party) manoeuvring a politically advantageous moderate make-over for its history in popular imagination (Varshney, 2014; Palshikar, 2015; Sen, 2016). Such a critique of the 'Clean India' iconography is realised when one considers the killing of Gandhi in 1948 by a right-wing ideologue. The Rashtriya Swayamsevak Sangh (RSS), the right-wing's ideological and organisational parent, for which Modi was Pracharak from youth, had publicly celebrated the assassination.

iconic glasses looking on, watchful of every citizen, scrutinising every instance of non-segregation of waste, or of 'littering' (Doron & Jeffrey, 2018).

Take a Pledge

Prime Minister Shri Narendra Modi exhorted people to fulfill Mahatma Gandhi's vision of Clean India. The 'Swachh Bharat Abhiyan' is a massive mass movement that seeks to create a Clean India. Cleanliness was very close to Mahatma Gandhi's heart. A clean India is the best tribute we can pay to Bapu when we celebrate his 150th birth anniversary in 2019. Mahatma Gandhi devoted his life so that India attains 'Swarajya'. Now the time has come to devote ourselves towards 'Swachhata' (cleanliness) of our motherland.



Swachh Pledge

Pledge to Segregate

I pledge to segregate my (household, shop, establishment) waste in two dustbins, wet waste in Green and dry waste in Blue, as my contribution to the Swachh Bharat Mission.

8,095 SCHOOLS 2,917,642 STUDENTS Have Already **TAKEN THE PLEDGE**

*Fig. 20: The 'Pledge to Segregate' dry and wet waste at source.
Courtesy: www.swachhbharat.mygov.in/ [Open Data License – GOI]*

The Mission makes its policy preference for 'modern and scientific' technologisation and privatisation in waste processing networks rather explicitly known, as if drawing straight from the policy planning boards, earlier discussed. The website succinctly lays out the agenda, which includes (Jeffrey (2015) quotes):

- Introduce 'modern and scientific' municipal management of solid waste;
- Increase the capacities of urban local governments; and

- Encourage the ‘private sector’ to invest in waste management and public sanitation

As such, Clean India offers moral-cultural base and embeddedness, promoting ongoing inertia in national waste regulation policies to uniformise MSWM across India as a scalable and profitable private business proposition, in which WTE is framed and projected as one of the most central ‘modern and scientific’ modes of making ‘Clean India. The planned pan-Indian ordering of urban MSWM along these neoliberal techno-pragmatic lines is made even more prominent by the Swachh Survekshan Survey, which is a national ranking system introduced by the Mission, to be conducted annually, since 2016, where individual States and ULBs (along respective categories of population) compete for prominence of their MSWM models.

In what is projected as the ‘World’s Largest Cleanliness Survey’, involving 4237 ULBs in 2019 (MoHUA, 2019), ULBs are ranked ‘on the basis of cleanliness and sanitation’ (p. 8), along four broad parameters – ‘service efficiency and scale’, ‘direct observation surveys’, ‘citizen feedback’, and independent agency ‘certification’ (especially for open defecation) under equal weightage. We focus on the first three parameters, and upon looking into the nationally-standardised methods of classification and preference imbibed by the latest Survey in ‘service efficiency and scale’, a clear predominance in weightage points is observed for ‘processing & disposal’ (30%) and ‘collection & transportation’ (27%) (p. 11). The ‘direct observation’ accords high scores to the ‘visible’ aspects of cleanliness and urban ‘beautification’ (over 85% by weight – see Fig. 21) – alluding mainly to experiences of garbage ubiquity marked by undesirable occurrence of garbage, hoardings, etc. in residential, ‘slum’, commercial and ‘public’ areas. These are

made by private accreditation agency employees contracted to run the Survey. The 'citizen feedback' component includes testimonies offered by residents, where over 80% of respondents were contacted through telephone and web-based portals. By its methodological design to assess and order urban MSWM, then, the Surveys draw in feedback from but also project and amplify the specific kinds of civic demands and aspirations of the urban middle-class (predominantly those who would be accessible via phone calling, web-portals, or the Swachhta App for feedback).

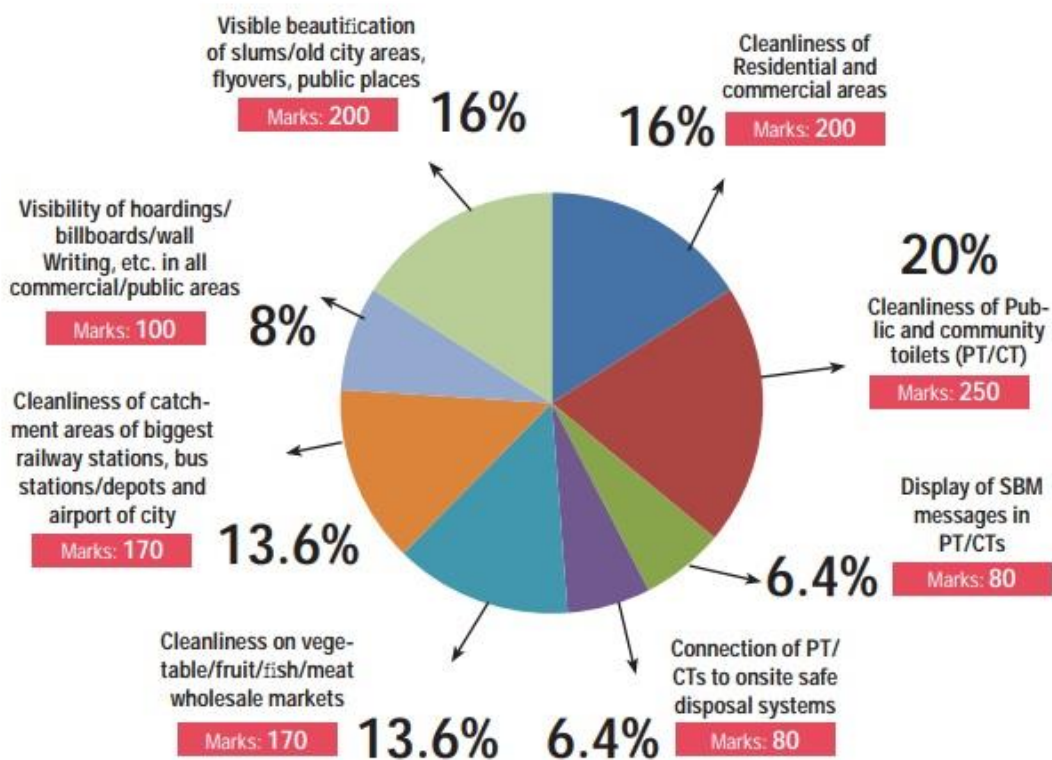


Fig. 21: The weighted 'direct observation parameters'.
 Screengrab from Swachh Survekshan Report 2019-20 (p. 13) [Open Data License – GOI]

Besides reflecting some of the older civic anxieties and (un-'common') demands of/from urban environments and their spatial, social and material orders, the Survey also, perhaps indirectly, promotes and produces compliance pressures

for the adoption of WTE-based, mechanised and privatised large-scale MSWM models. Indeed, grievances abound (Ganesan, 2017; Praveen, 2020). ULBs that have depended heavily on community-based solutions, small-scale decentralised actor-networks composed of cleaners, material gatherers, and recyclers, have complained that they are consistently marked down, thus, devalued in the 'cleanliness scale'. Calamities, like sewage blockage and urban floods, when narrativised as a failure of decentralised systems of waste management, create further pressure to adopt centralised, mechanised systems (Brittas & Ganesan, 2021). States and local governments have alleged that in their nationally-uniform standards of assessment and score-allocation to a complex diversity of operational contexts of waste management across the country, the Survekshans seem to unfairly favour mechanised centralisation of MSWM governance, and limited interpretations of 'modern and scientific' technologies in the form of WTE. These affordances of scale are promoted in subjective interpretations of 'service efficiency', and duly accorded high value, depriving those ULBs which would project different interpretations of efficiency. By its methods of classifying and ordering technocultural practice, policies, and experiences of garbage ubiquity in the cities, one could argue that the Survey enacts a certain techno-practical template, a model that might enjoy reputation within this new pan-India infrastructure. In any case, the Surveys further elaborate the above pragmatic, complementing the philosophy of the new reforms and creating inertia, potentially, for the accretion and expansion of its infrastructural reach. After all, ULBs and residents do not fancy their cities receiving low ranks by national comparison or be categorised as 'slow movers' in publicised reports (as a form of national shaming) thus, producing political pressures to toe a national technocratic ideal, whether or not practicable.

‘Clean’ Ahmedabad:

Bureaucratically, Raman writes about Tamil Nadu, the integration and ‘emphasis on social media, city rankings, and certifications has exacerbated the burden of documentation and the "tick-box" culture within (state) agencies’ (Raman, 2020, p. 2). Whether or not these infrastructures lead to actual patterning and a promotion of the pragmatics of plastic incinerability, and to what effects, will be explored in Chapters 6 & 7, where we delve into ethnographic cases where various mediations, frictions, cosmetic devices and shadow infrastructures are routinely constituted. However, for now, we focus on the civic and techno-practical efforts to ‘Clean’ Ahmedabad, especially as a form of modular increment to many of the policies and programs that were initiated during Modi’s Chief Ministership in the state. However, these more systematic developments are set together with and accompany more dramatic, if not cosmetic measures, to enact and project particular spatio-material ubiquities, which would serve to integrate the city’s existent MSWM practices and actualities within the ‘cleanliness’ scale, afforded by the new national infrastructure.

In effect, the Swachh Survekshan Report 2019-2020 termed Gujarat as the ‘Fastest Mover State’, nationally, in terms of SWM reforms, while Ahmedabad jumped up the ranks to take up the coveted top position: ‘India’s Cleanest Big City in above 10,00,000 population category’ (MoHUA, 2019, pp. 51-52). The survey reported 100% dry-wet waste segregation at source, and 100% coverage in terms of door-to-door collection in all 48 civic ‘wards’ of Ahmedabad, spread over its 7 administrative zones. Surveyors reported an impeccable ‘level of cleanliness’, ‘waste ... not left lying anywhere in the city’ (p. 51) and allocated 1248 marks out of 1250 in the ‘direct observation’ category. It would appear thus

– at least on paper – that Ahmedabad had been ‘cleaned’. The pressures of ‘cleaning’ Ahmedabad were understandably, enormous, symbolically at least. As the *karmabhoomi* (workplace) of Gandhi and Mr. Modi’s core political constituency (Yagnik & Sheth, 2011), the AMC was pro-active in proving the ‘Clean India’ success-story. Not least as a ‘proof of concept’ for other cities across the nation (and the world) to see, praise, and emulate. In mid-2018, one of Modi’s trusted bureaucrats, Vijay Nehra, was made the AMC Commissioner ahead of the Swachh Survekshan Survey, 2019, to offer the final push towards ‘cleanliness’ ahead of the ceremonial preparations for Gandhi’s 150th anniversary (2 October 2019), when the 5-year long ‘Clean India’ project would also conclude.

Mr. Nehra started his tenure with eye-catching measures and displays of civic re-ordering. Laying out his priorities shortly after assuming office in an interview to Ahmedabad’s premier local newspaper (Ahmedabad Mirror), the new commissioner stated clear goals for the ordering of urban sociomaterialities: ‘roads have to be good, garbage will have to be collected on time’, and shared plans to ‘introduce a source segregation waste collection system’ (Raval, 2018). Municipal efforts at ‘cleaning’ the city were visibilised to the public with some spectacular civic drives performed early in Mr. Nehra’s tenure, especially against ‘illegal parking’, street-hawking ‘encroachments’. Later on, ahead of the Swachh Survekshan direct observation visits, a Sabarmati River Clean-up was organised with citizens at a prominent central location on the newly refurbished Sabarmati Riverfront. The drive reportedly removed 5 MT of plastic waste from the riverbed (Patel, 2020)⁷⁴.

⁷⁴ Balayannis, discussing representations of cleaning hazardous waste in Tanzania (see (Balayannis, 2020)), writes how spectacular events of waste removal, which draw attention towards them, produce regimes of imperceptibility, sites and practices of waste occurrence/removal from where public attention is detracted. Citizen complaints (Gupta, 2021) and reports of garbage accumulation (Raval,

Turning now towards some of the more mundane but significant infrastructural increments in Ahmedabad to further the possibilities of efficient incineration, the AMC had, by 2017, initiated door-to-door waste collection in all 7 zones (a new zone was created post-2016), and consolidated street-sweeping regimes – albeit unevenly – across the city. While NGOs like SEWA and some RWAs and *mandalis* still retained street-sweeping contracts, new private companies had entered the market. Door-to-door waste collection contracts were issued zonally – usually one contract per zone.

To generate cost, scale and time-efficient collection and transit of solid waste cumulatively from across the levels of households, shops, neighbourhoods, wards, and zones, eventually towards the large-scale waste processing plants (typically located in the south-western city-fringes close to the Pirana landfill), 6 (and a 7th under construction in 2020) zonal aggregation centers – Refuse Transfer Stations (RTS) were set up. One facility (located in) and dedicated to each of Ahmedabad's 7 zones, the 7 RTS were premises with a more-or-less standardised design, each with a uniform daily waste handling capacity of 400 MT. Each RTS was again equipped with JCB-branded cranes, compactors, and a fleet of covered vehicles for different categories and routes of material transit, of differing yet standardised set of sizes/capacities: notably of 20 MT, 2 MT and 1 MT. The equipment would collectively remove, transfer, transport, re-form, and contain materials. The RTS infrastructure, equipment and devices are all commissioned by the AMC, and provided for operation and maintenance (O&M) to the waste collection contractor, who base their operation from the respective

2018; TOI, 2019) continued to proliferate newspaper columns – even increased in certain cases – during the period when Swachh Survekshan surveyors reported that waste was 'not left lying anywhere' in Ahmedabad. We elaborate on some of these infrastructural cosmetics, shadows, outflows, frustrations, and unplanned emergencies in the ensuing chapters.

RTS, where their workers, managers, and fleet are also stationed. Starting each morning, solid waste from door-to-door collection from across each zone is brought into the RTS with a combination of 1 and 2 MT trucks, passed on weight scales as they enter the premises after each collection-trip (see Fig. 22). Inside the RTS, which is designed for separate containment of dry and wet waste streams, trucks transfer their receptacles into respective compactor chambers, where the incoming materials are compressed for volume-reduction and fit into the 20 MT container chambers of the outgoing trucks. Thus, each outgoing truck would ideally contain homogeneous material categories – incinerables headed for WTE plants, non-incinerables destined for the landfill. Outgoing vehicles would also be weighed to make sure they reached the 20 MT mark for cost efficiency of transport, and it was the responsibility of site-managers to ensure that incoming and outgoing weights matched up at the end of each day of operation. CCTV cameras installed at the RTS would constitute evidence to compare the record of number of collection trips made by the fleet, based on which the collection company would get paid. On the other hand, the measurement of weights (in MT) constituted the basis of payment claims for the WTE agency, say, for each MT of solid waste processed. Unlike in mediation centers for recycling – like *peethas* (see Chapter 4), where material supply was further sorted into finer categories before aggregation, here, conserving incoming (ideally separate) dry-wet orders for efficient incineration and volume compression for efficient transit constituted the main pragmatic of profitability at the RTS.



Fig. 22: At the 400 MT-capacity RTS in Wadaj (West Zone), Ahmedabad. Two vehicles stand on weighing scales for digitised measurements conducted at the 'site-offices' on either side. On the left, stands an incoming door-to-door waste collection vehicle – one with the smallest capacity denomination (1 MT), with separate chambers for dry and wet waste. On the right is a larger outgoing vehicle of 20 MT capacity, expected to be filled exclusively with dry materials, headed for the WTE plant. The RTS acts as a key techno-logistical point of localisation and transfer of separate streams of materials toward different processing sites and networks. Courtesy: Author

Infrastructures are installed on pre-formed bases, folding in pre-existing and uneven legacies, while their incremental developments may also re-entrench some of the socio-economic and spatial orders and hierarchies they inhabit (see (Shankar & Sahni, 2017; Teltumbde, 2018; Dey, 2020; Luthra, 2020; Mandal, 2020; Sharma, 2020), among others for situated socio-economic critiques of the neoliberalised MSWM system in India). The 'West'-zone RTS, set up during 2017 by the AMC, where I conducted interviews and fieldwork, was built on the marshes of Ramapir no tekro at the site of the pre-existing 'unofficial' garbage dump. Physical embodiment of the 'modern' and 'scientific' MSWM infrastructure, this RTS localised, re-arranged and transferred nearly 400 MT of solid waste from across one of Ahmedabad's largest zones, all this merely a stone's throw away from one of Ahmedabad's densest Dalit settlements. No consent was sought from them prior to construction – my respondents at Tekro reported, perhaps because

these settlers were considered 'illegal' encroachments on public land, by default, following the post-Independence land reforms (see Chapter 4, footnote 51). The RTS itself employed Dalits. The contractor – a private company we shall call WTPL – chose not to hire local waste-workers, especially those residing at Tekro, potentially for fear of unionisation, and instead, employed a group of landless Dalit labourers (males) from distant Jhalod in western Gujarat, and offered them – along with families, resettlement spaces (shanties) within the RTS premises. Thus, a group of traceable, (socially, economically) dependent labourers had been enrolled, amenable to disciplined conduct, and made to push extra trips (recall the terms of waste collection contracts, where more trips equal more payment for the contractor). The site-manager, who I interviewed in 2018, performed a 'roll call' each morning at 7, when all 84 vehicle operators were expected to report. This was the time when daily briefings were made, previous backlogs explained, complaints and instructions communicated. Work would continue till late in the afternoon – even until evening, the trucks would make 'as many trips as possible', at times up to 6 per day.

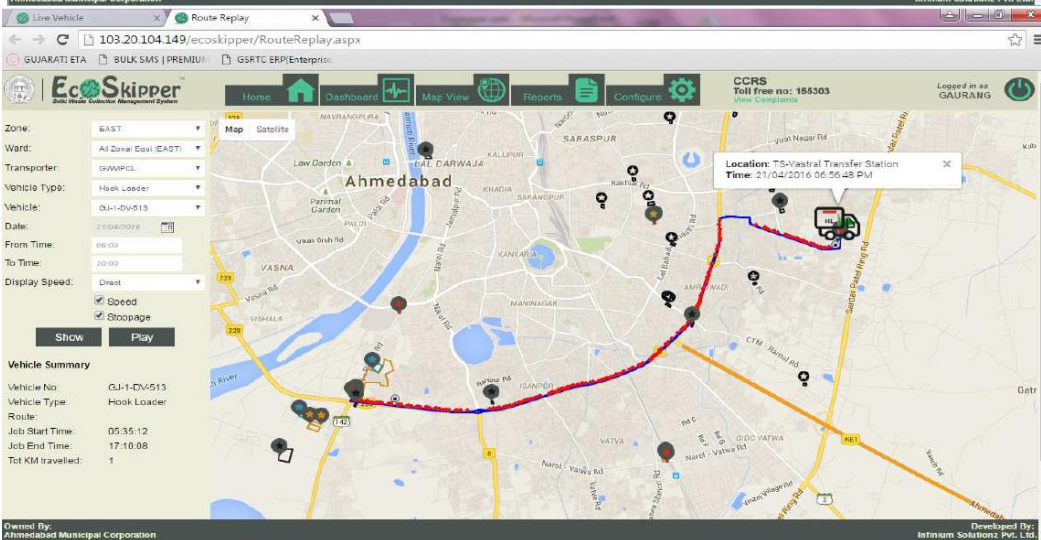
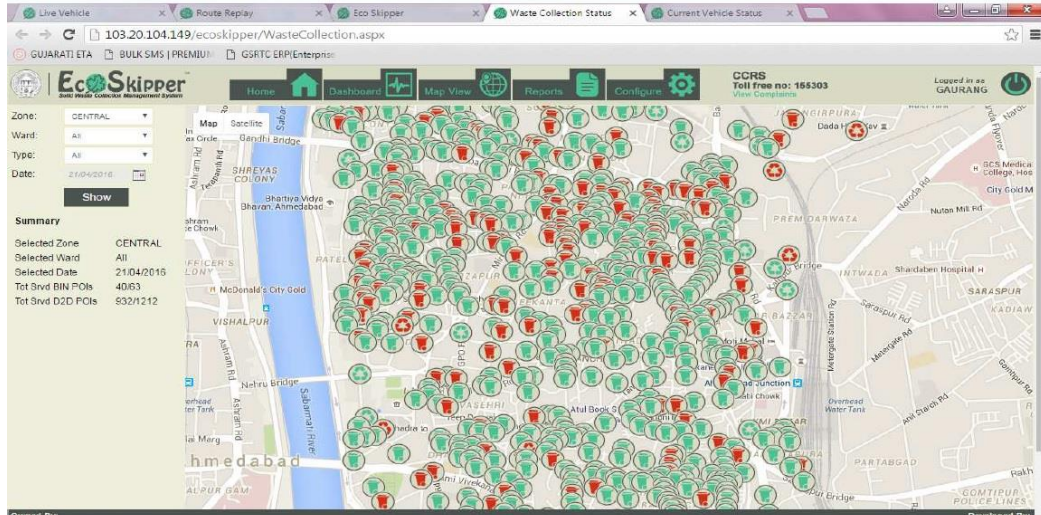
The experiences of actual waste handlers within the new infrastructure are not just rooted in the continuing legacies of deprivation based on caste but also on gender. Indeed, following the door-to-door waste collection vehicles and my observations at the West-zone RTS revealed how local social arrangements enabled a gendered entrenchment and co-option of unpaid female labour by the contractor. This was materialised through the truck-driver's wife who would accompany the husband (the only one on the payroll in these cases) to waste collection trips. Resident at the RTS premises anyway (at the mercy of the contractor), often the women tagged along, if sitting idle at home, offering a pair of extra hands to their overworked husbands as a gendered form of domestic

care, also perhaps out of obligation to the contractor. While the man drove the truck (note the gendered allocation of technologised work), the companion was expected to handle the bins, move materials within the vehicular receptacles to make space for fresh intake, maintain communication, etc. Thus, while the woman was physically proximate, and more directly exposed to waste materialities and hazards, the man remained relatively distant to these threats. The contractor did not have to fully employ another 'helper', thus capitalising on the woman's labour.

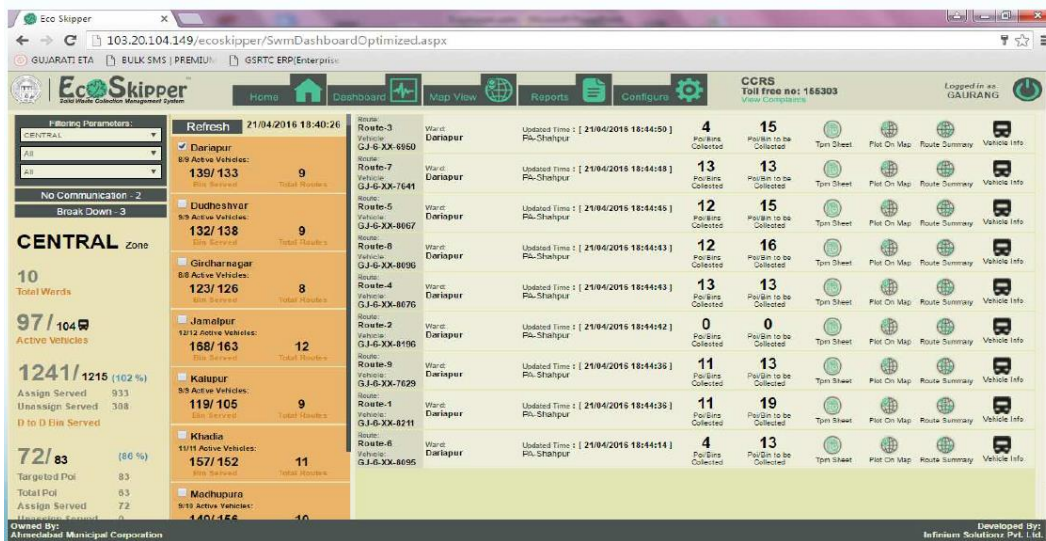
The work of street-sweeping too, was unevenly gendered, women predominantly being involved in these more manual forms of waste handling work. Employed, like RTS-workers, in casualised arrangements, often without a paper contract and on low pay and minimal benefits, street-sweeping was hard work – often alienating, involving long hours of solitary physical labour, potentially far from home with long and un(der)remunerated transit times. To ensure that streets (or 'beats') allocated to them appeared visibly 'clean', street-sweepers often ended up picking 'litter' without much discretion, even if sensorially repulsive and hazardous – for fear of being denied payment by their employers (UMC, 2012). Job benefits were uneven, dependent on the contractor's discretion. While some contractors provided sick payments, others did not, only a few offered emergency loans to their employees, and none provided standardised payment for extra hours of work or for transit to allocated sites of work ('beats'), my respondents reported. A survey, conducted with over 300 street-sweepers across 14 wards in Ahmedabad, revealed 'lack of motivation' in work, perceived 'lack of recognition', and 'bad conditions of the streets and (municipally-provided work) equipment' (Goswami & Divi, 2019) (for equipment, see below, also Chapter 7).

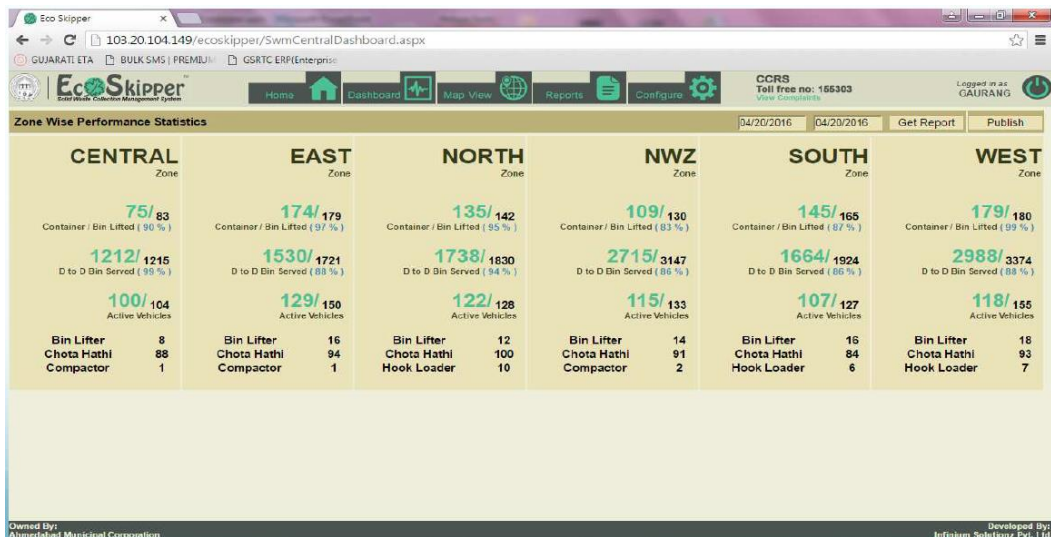
From 2017, the AMC started GPS tracking door-to-door waste collection. RFID tags were installed on collection vehicles, trolleys, large community bins – as per expert consultations, discussed above – to trace their movements and location. This was a complementary information and communication technology (ICT) infrastructure, designed for the AMC by a private software company, which enabled real-time device identification, map-tracking and aggregated archiving of routes, bin emptying status, etc. across the scales of the ward, the zone, and the city, co-elaborating a parallel hierarchy of governance, supervision, and accountability (see Figs. 23, 24, 25, 26).

Waste collection status on map



Zonal statistics





(Figs. 23, 24, 25, 26) Fig. 23: The status of a bin (emptied/not emptied) on map at a given date/time. Fig. 24: The current location of an identified vehicle along its pre-specified bin collection route. Fig. 25: vehicle-wise performance analyses at a given zone at a given date/time. Fig. 26: a city-wise visualisation of bin collection by zones. Screengrabs from Ahmedabad Municipal Corporation public presentation (2017) [Open Data License – GOI]

Each door-to-door waste collection truck (of 1 and 2 MT capacity) is equipped with two covered receptacles, separate and colour-coded for segregated dry and wet waste storage. The blue compartment is meant for the storage of incinerable dry waste destined for WTE, and the green designated for storing wet materials headed eventually for the landfill; these sections are internally separated by a metal divider. The two chambers are not equal in volume – the storage space for dry waste is bigger than that allocated for wet waste. In this unequal allocation of storage space for different waste categories, we find expression and co-alignment of the broader pragmatic of incineration, where wet waste is expected to be treated locally and dry waste collected by preference by the municipal system of solid waste collection. As such, waste collection vehicles are expected to bring in more incinerables than non-incinerables (Fig. 27). Street-sweepers, working under contracted agents, are similarly provided ‘handcarts’ and long-

brooms for material gathering and transit; carts are again provided with colour-coded baskets for segregated storage (Fig. 28).



Fig. 27: On the right is a typical door-to-door waste collection vehicle, colour-coded with separate dry-wet waste compartments. Courtesy: Author



Transfer of MSW from Street Sweeping into Compactor & Secondary Collection Bin



Source: (AMC, Door to Door Waste Collection System, 2011)

Fig. 28: (Above) A standardised municipality handcart for street-sweeping. (Below) Transfer of street-sweepings from the handcart into the dhalao, and to the authorised larger collection vehicles headed to the RTS/landfill. Courtesy: AMC [Open Data License – GOI]

What we uncover through this ubiquity of standardised devices and designs is the public-private enactment of the pragmatic we discussed, where priority is accorded to covered, non-porous (and preferably opaque) material containment, segregation and separate storage for dry-wet waste, and preferred orders of circulation, as part of efficient yet profitable waste collection and processing operations. Such an infrastructure must again be fused with the orders of practice by 'waste generators'. 'Source segregation is absolutely essential for successful solid waste management', the AMC commissioner said during a private meeting at the municipality headquarters in November 2018. Indeed, material localisation by segregation and separation of dry and wet streams at waste generation sites and their consistent patterning across other intermediary sites and scales seemed to be key to the pragmatics of incinerability. Recommended by the SWM Rules 2016 and by its own municipal byelaws to ensure separate wet waste treatment (preferably at source in RWAs, commercial establishments, and agglomerates), by 2009, the AMC had established 3 composting plants with a total daily capacity of 1000 MT (AMC, 2017) and in early 2020, set up 27

composters across the city for public use (TOI, 2020). In December 2018, the AMC initiated massive awareness drives, campaigns, and end-to-end messaging (TOI, 2018), educating citizens to segregate waste within their own premises. 'If the waste is not segregated by the society or individual houses', warned Mukesh Gadhvi, Dep. Commissioner (MSWM) AMC, 'the corporation will refuse to collect the same' (Kaushik, 2018). As a strategic device for localised storage, by its own byelaws drafted in 2015, the AMC recommended each waste generators to maintain separate blue and green bins for waste storage. The Municipality provided citizens with a standardised pair of bins – offered at subsidised rates, with the AMC's logo printed on them (Fig. 29). Besides segregated storage, waste contained within these receptacles – partly provided with public money – could be claimed as 'public' property, consistent with ongoing neoliberal efforts, nationally, by the municipality to reclaim the right to solid waste and re-allocate it to authorised private contractors.

સ્વચ્છ અમદાવાદ... સ્વચ્છ ગુજરાત... સ્વચ્છ ભારત...

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશન

સ્વચ્છ સર્વેક્ષણ-૨૦૧૮

કચરો આ રીતે બે બેગમાં છુટો પાડો

સુકો કચરો

- કાગળ (ન્યુન પેપર, નોટબુક વેગરે)
- કાર્ડબોર્ડ અને પુસ્તકો
- પેકેજિંગના કામમા વપરાતું મટીરીયલ્સ
- મિશ્રિત પદાર્થોથી બનાવવામાં આવતા પેકેટ (ટેટ્રા પેક વગેરે)
- પ્લાસ્ટિક

ભીનો કચરો

- બગડેલા શાકભાજી, રસોડામાં પડેલ નકામા શાક
- ફૂલ, ફળો તેમજ તમામ પ્રકારના બગડેલા જ્યુસ
- શાકભાજી અને ફળોના છોતરા
- ઘર કે બગીચામાં નિકળતો પાંદડાનો કચરો
- ખરાબ ટોચલેટ પેપર
- તમામ પ્રકારની ખરાબ ખાદ્ય સામગ્રી

આપના દ્વારા છુટો પાડવામાં આવેલ કચરો કોર્પોરેશનનાં ડોર ટુ ડોરનાં વાહનો આપના ઘરેથી સવારે સાત થી બપોરના એક વાગ્યા સુધીમાં જ લઈ જશે.

Fig. 29: Standardised bins for domestic waste segregation, provided by the AMC for door-to-door waste collection by its agents.
Flyer Courtesy: Ahmedabad Municipal Corporation (2017) [Open Data License – GOI]

Adding to these efforts to secure plastic waste – both from admixture with wet waste and from ‘extraction’ by waste-pickers, recyclers, (but also from ‘stray animals, dogs, crows, cows, and rodents’ as one local AMC official explained to me), further provisions were made. From 2018 – at a time when I started living in the city myself, individual households and shops were advised to keep bins indoors during the night. Residents were expected to bring their bins out only during pre-specified passage times for authorised door-to-door waste collection.

Gated societies (RWAs), commercial establishments and market associations were asked to enclose their large outdoor bins within locked cages, or face penalties of at least Rs. 500. Finally, in a last-ditch effort to 'clean' public spaces ahead of the Swachh Survekshan survey, in late 2018, the AMC removed all 803 yellow community bins (*dhalao*) from their habitual locations – neighbourhood roads and street-corners – within a matter of days. Pressures to project 'clean residential and commercial areas' (see Fig. 21) sans starkly visible and smelly garbage-saturated bins were cited (Raval, 2018). However, one could also read the removal of large yellow neighbourhood *dhalao* bins as pragmatic, notably to weed out alternative sites, practices, and disciplines of (unsegregated) garbage disposal (which, notably, also served as a point of plastic localisation and strategic 'extraction' for waste-pickers – see Chapter 4). In the absence of the habitual neighbourhood *dhalaos*, residents would be solely dependent on municipal service, where-in the one-time window for transfer of waste to authorised collectors, together with disciplined segregation (no acceptance without segregation) would seem to be the only option available. As such, more quantities of dry waste, with less chances for admixture, could be expected to reach the incineration plants.

“This image has been removed by the author of this thesis/dissertation for copyright reasons”.

Fig. 30: Representational image of a large community bin (dhalao), with waste-pickers foraging for recyclable materials in the mounds. Courtesy: Tribune India

Mutings:

The *dhalao* bins were necessary stoppages in our foraging itineraries each morning, until their removal. *Kachre binnewalis*, who I accompanied during their foraging, recounted how these big yellow bins had constituted the sociomaterial landscape of Ahmedabad. They held together its uneven patterns of material ubiquity, localisation, and flow, for many decades. For residents, *dhalaos* offered the possibility of deferred, flexible disposal of waste, where neighbouring households (typically female members) would come to dispose of waste at a convenient time amidst busy domestic schedules of work. As such, *dhalaos* would emerge as more or less localised sites of material accretion, where all kinds of garbage accumulated throughout the day, and the night. This included large quantities of plastics, albeit often containing food waste, or mixed with

materials which had the potential to 'spoil' their recyclability. In any case, as sites of material 'density', *dhalaos* afforded opportunistic sites for foraging, where large quantities of potentially recyclable materials could be sequestered within short time enabling *kachre binnewalis* to save (valued, gendered) time of work. For the municipality, the removal of *dhalaos* constituted wider reforms of 'cleaning' space – or bureaucratic pressures, perhaps also strategic modes of enforcing material disposal and segregation disciplines to further a pragmatic of incinerability. But for *kachre binnewalis*, these sudden removals were a rude disruption to daily routines and practices, with potentially deleterious effects.

The years 2017-18 is when these measures of city-'cleaning' were being adopted by the Municipality, with new systems of waste collection and RTS-localisation being put in place, and street-sweeping routines reinforced ahead of the Swachh Survekshan Survey and Gandhi Jayanti 2019. These measures supplemented the removal of *dhalaos* in further threatening the practice of *kachre binnewalis*. With many residents and individual businesses starting to keep their bins behind closed doors, or locked inside outdoor cages, more sites/devices of plastic localisation were rendered out of reach, kept out of bounds, inaccessible to these foragers on foot. In effect, bins had turned into devices of municipal re-assertion over rights to waste. Furthermore, with authorised street-sweeping being practiced frequently along the busiest thoroughfares, parks, Riverside plazas, and around shopping malls, commercial establishments and sites of leisure and consumption, much of the choicest of recyclable plastics – PET bottles, polythene packaging, empty tea tumblers, otherwise strewn about on the urban commons, were sequestered, and incorporated into the municipal circuits of waste circulation, WTE-bound. With rights over recyclable materials thus re-claimed (through various routines, practices, infrastructures of segregation and

containment, alongside pragmatic removals of bins and enclosures), the pool of collectibles from across publicly accessible sites, but also the time windows for their recovery, seemed to be shrinking. Indeed, testimonies of disruption: from reduced access to the bins and receptacles, reduced access to *kachra*, reduced/changed time windows for foraging, police harassment, etc. proliferated in my field notes.

At a gathering organised by Manav Sewa at Ramapir no tekro, in early 2018, where over 35 *kachre binnewalis* were in attendance, the women shared their anxieties over the new ground measures. For some *kachre binnewalis*, these were challenges that had started to reflect in significantly longer (if not hazardous) foraging times, fatigue, with reduced daily collection and earnings for some, thus, directly affecting their (family) livelihoods. These often involved and accompanied knock-on effects on other gendered spheres, relations, and responsibilities (say, of domestic work, childcare, or wider community roles), which some of them spoke of. Facing economic precarity, many *kachre binnewalis* had already taken up authorised waste-work as street-sweepers, and occasionally as door-to-door waste collectors. However, I was also told that many of the newly subcontracted waste-workers found themselves in difficult work conditions with extra hours and low pay, exploitative, inflexible, even humiliating work arrangements, with minimal job-security and benefits. One such former *kachre binnewali* explained to me, regretfully, that the total time spent at her current street-sweeping job (together with unremunerated transit time to the allocated 'beats') would have fetched twice as much income in her earlier vocation. Many *kachre binnewalis* therefore remained cautious of committing to authorised 'day-job'. They continued freelance practice, albeit with due vigilance and calculation, always looking out for opportunities.

For *peethawalas*, the waste reforms posed a dual challenge. Many *peethawalas* feared a supply crunch with resistances in sourcing steady, or enough plastics of recyclable potential to be able to maintain daily operation. 'We are barely managing to stay afloat', one *peethawala*, based at Ramapir no tekro, told me, in early 2018. Dependent on *kachre binnewalis* for his daily stock of materials, this gentleman regretted how *kachre binnewalis* were negotiating 'new kinds of threats' in sequestering plastics and contemplated his own strategies for survival. In addition, following recommendations stated in the new waste rules, especially the PWM Rules 2016, *peethawalas* faced legal and representational challenges.

Although the SWM Rules 2016 maintained recycling ahead of energy-recovery within the official waste hierarchy (MoEFCC, 2016, pp. 55-56), policy preference earlier accorded to recycling in the MSWHM Rules 2000 were revoked. Indeed, the 5th municipal duty, in the new rules, encouraged authorisation preference to technologised solutions under PPP, with an explicit mention of WTE as a preferred large-scale technique to process dry waste. Recycling, notably, was not included in the 5th duty (see (MoEFCC, 2016, p. 59)). On the other hand, the PWM Rules made it mandatory for every entity handling and mediating plastic waste to be authorised in order to continue practice legally, but restricted these practice categories to either 'collectors' or 'processors' ('recyclers' and 'WTE units'). The legal definition of waste 'collection', proposed by the SWM Rules, adopts a limited understanding of material localisation. The work of the 'collector', newly defined, does not include segregation but alludes merely to gathering bin-contents from waste generators and passing them on to 'processors' (MoEFCC, 2016, p. 53). The work of the 'processor' (which includes a recycler), as newly defined (MoEFCC, 2016, p. 53), does not include the tasks of segregation either, perhaps under the assumption that dry-waste segregation at source would suffice

the requirements of recycling. Such a categorisation of practices/practitioners is clearly modelled around incineration where dry-wet segregation suffices. On the contrary, as seen above, recycling – especially of plastic – requires intricate categorisation by resin-type, colours, degree of contamination, etc., besides the cleaning and screening of unrecyclable waste, an elaborate set of practical disciplines to localise and re-localise heterogeneous matter before recyclable aggregates are produced and sent to the recyclers. Therefore, the new laws miss out on the intricacies of recycling processes. Finally, indispensable traditional actors, *peethawalas*, who lay in-between, linking gatherers and recyclers by performing the vital mediation works of material segregation and aggregation, go remarkably unrepresented, if not effectively excluded from new legislation.

Faced with the threat of being identified as an ‘illegal’ operation, *peethas* must identify themselves before the state either as waste ‘collectors’ or as ‘recyclers/processors’, and seek authorisation. However, while seeking authorisation as a ‘recycler’ appeared more profitable for *peethawalas*, actually becoming a recycler would involve animosity and competition from seasoned recyclers, who have also been long-term *peetha*-clients and allies in their commercial (and personal) journeys for decades. Indeed, *peethawalas* becoming recyclers would mean competition for pre-existing recyclers.

Furthermore, the PWM Rules mandatorily subject recycling to the generic Indian Standard: IS 14534:1998 titled as ‘Guidelines for Recycling of Plastics’, and applicants must fulfil a range of environmental criteria and bureaucratic templates in order for them to be authorised. Finally, authorisation required that SPCB officials, while inspecting the applicant’s site of operation, must be satisfied ‘that the applicant possesses appropriate facilities, technical capabilities and

equipment to handle plastic waste safely' (MoEFCC, 2016, p. 23). Albeit with the standards and forms of 'appropriateness' and 'safety' unspecified anywhere in the rules, and thus, effectively subject to the judgement and expectations of the inspecting officials. Many *peethawalas* were confused about these expectations, or were suspicious of top-down governance, and feared that their grounded technical skills, situated knowledge and expertise, technical vocabularies, competences, affordances, etc. would not be valued as 'appropriate'. Almost all *peethawalas*, I interviewed post-enactment of the new laws, despised the precarious position they were subjected to. They shared anxieties about the ambiguous techno-practical expectations that seemed mandatory for integration into the MSWM infrastructure (for 'infrastructural membership' see (Bowker & Star, 2000), also Chapter 6), and feared the 'nightmare' (in the words of one) of bureaucratic processes of licensing and renewal. Many contemplated closing down businesses.

'For systems to hold together, to subsist and to persist, they must discard', write Liboiron and Lepawsky in an upcoming volume (2022). Discarding – in its many sociomaterial forms and practices – amount to the exclusion of elements that outlie interest (whether socio-cultural (Douglas, 2002 [1966]), economic and ethical (Hawkins, 2001; 2006), political (Liboiron, 2019)), and has been a recurrent theme in the study of waste. Processes of exclusion are, thus, pragmatic and, as subjective and contextual phenomena and experiences, they underlie the priorities, desires, ideologies, and interests of those who assemble a system, get it to work. But producing and stabilising a system demands not just exclusions, but inclusions.

As waste emerged as new material frontiers in the calculation of value (Gidwani, 2015; Gidwani & Maringanti, 2016), especially with the potential incinerability of plastics, waste – unlike narrower interpretations of waste as inherently devoid of value (see (Gidwani & Reddy, 2011)) – becomes a subject of economic (besides civic and political) interests. This is not a new phenomenon, as Chapter 4 (alongside a large body of literature on material renewal and salvage practices across time and territory) elaborated earlier. For the new MSWM infrastructure, which premises itself upon the neoliberally-defined cost efficiency and profitability of solid waste incineration, imbibing and circulating desired quantities (also quality – hence the practical, and physical devices and infrastructural designs of segregation) of plastic waste emerged as a priority.

Planning and policy discussions, as we have seen, overwhelmingly identified the recycling economy (including our *kachre binnewalis* and *peethawalas* of Ahmedabad) as agents who ‘extracted’ materials of incinerable interest, and who must be ‘carefully managed’. In the ensuing regulatory reforms and large-scale legal, cultural and techno-practical infrastructures that followed across the various sites and scales of practice, pragmatic and uneven patterns of selective integration and exclusions become apparent. While waste-pickers are valued and desired to be integrated into the ‘system’ mainly as authorised labour, i.e., as actual feet that walk, hands and bodies that manually gather, transfer, compress waste, technically operate devices, etc. (selective inclusion), on the other hand, the more freelance enterprises and forms of foraging for recycling (as with *kachre binnewalis*), experienced exclusion, deterrence, disruption to mobility patterns, shrinking of foraging times, and various other mediations (selective exclusion). Even the selective integration (or infrastructural membership – as authorised workers) of waste-pickers, is shaped by selective incorporation of labour, but the

undermining of rights, job security and benefits (see (Roy, 2005; Breman, 2016; Jaffrelot, 2016; Shah, et al., 2018) for grounded critiques of informalisation in neoliberal planning and practice). Likewise, *peethawalas*, the mainstay within recycling networks who link together localisation and recycling, and string together the possibilities and conditions of material transfer, mediation, exchange and livelihood within these networks, are excluded, by default, from national legislation. And their integration would seem to be heavily mediated, unfairly and inequitably conditional upon the satisfactory demonstration of certain facilities, idioms of expertise and technical competence.

The pragmatic of incinerability, put to work through infrastructural designs and localised configurations for the recalibration of rights, spaces, times, practices and disciplines, thus constitutes certain modes of material accumulation (say, of incinerable plastics), conditioned by material dis-possession (of recyclable plastics), and de-stabilisation of competitors.

Drawing on some of the above responses and initial reactions from *kachre binnewalis* and *peethawalas* in Ahmedabad between 2017 and 2019, when many of the above measures were being initiated as part of the emerging new MSWM infrastructure, we can say that the reforms bore deleterious effects on the usual patterns and pragmatics of recycling practice. Many of the above testimonies echo observations from other Indian cities (e.g., see (Chaturvedi & Gidwani, 2011; Gidwani, 2013; Demaria & Schindler, 2016; Shankar & Sahni, 2018)). In terms of process, especially, it appears that some of the self-regulated practices, technocultural and exchange networks, which made plastics recyclable, have been variously muted: curtailed and constrained with limited capacities to act or to manoeuvre process as before. In the facilitating and valorising particular

mutabilities (incinerabilities), the state-mediated infrastructure would seem to have partly silenced the material and technical possibilities of plastic recycling as practiced by the enterprising lower caste and the urban poor in Ahmedabad and elsewhere. For the practitioners based at Ramapir no tekro, the financial weakening of the *peethas* and reduced income from foraging might lead to further social and economic precarity, with deleterious effects, potentially, on more political assertion of spatial and habitational rights in the city. As such, our processual interpretation of muting (that of plastic recycling) accompanies and links to wider occasioning of silence in socio-economic, environmental claims.

In the ensuing chapters, we investigate some of the modes of actual functioning of the MSWM infrastructure, some of its impossibilities, ambiguities, impracticabilities, frustrations, frictions, but also work-arounds and improvisations emerging in its wake. We unpick two broad occasions. One – discussed in Chapter 6, involves *peethawalas* and *kachre binnewalis* mobilising for authorisation as ‘recyclers’ and as ‘waste collectors’ – thus seeking integration into the new infrastructure. The other – discussed in Chapter 7, locates frictions and disorders and the emergence of new circuits of plastic circulation in the ‘shadows’, notably into recycling networks. Through these resourceful emergences, grounded and stabilised by the actual occasioning of the MSWM system in practice, plastic recyclability is re-enacted, kept ongoing, while state-planned incinerabilities appear variously re-mediated.

Is the state-mediated system able to maintain coherence, segregation, or property of plastic waste? Are the neoliberal arrangements of value extractions able to persist – if so, how? What kind of collaborative, conspiring communities and publics emerge from and around the unplanned circulations and ongoing

processes of plastic? What new plastic ubiquities – spatio-temporal patterns and sociomaterial concatenations emerge thus? I attempt addressing some of these questions within the small scales and specificities afforded by ethnographic enquiry.

Chapter 6: Plastic Mut(e)ability I: Integrating the 'System'

Through Chapter 5, we highlighted infrastructural plans and cross-scale programs under the new municipal solid waste management (MSWM) system for a pragmatic mediation of ‘informal’ recycling networks. On the one hand, while the material access of *kachre binnewalis* – who ‘extract’ incinerable plastics supposedly – were reduced and subjected to various spatio-temporal, material restrictions and competitions, on the other hand, *peethawalas* were excluded, prima facie, from centralised legislation. *Kachre binnewalis* could become authorised waste collectors or street-sweepers, albeit as casualised workers with little rights and low income. Facing potential illegalisation, *peethawalas* would have to re-position themselves vis-à-vis the state, notably by seeking authorisation as ‘recyclers’. However, there were various conditions placed on such forms of integration into the MSWM infrastructure. The definition of ‘recycling’, as we discussed, was troubling, and did not capture the realities and nuances of *peetha*-based practices, thus, potentially subjecting *peethawalas* to impracticable standards of techno-professional transformation. Indeed, there were expectations to demonstrate ‘appropriate’ technical competence in recycling, albeit in ways that were unclear and ambiguous and appeared simultaneously subjective, if not inhibitive. In any case, the possibilities of plastic recycling – as these practitioners were traditionally enacting – seemed to have been muted, curtailed in a variety of ways.

However, such forms of muting were variously mediated in actual practice. In this chapter, we explore one aspect of such mediatory improvisations. It pertains notably to *peethawalas* and *kachre binnewalis* seeking authorisation from the state to be able to continue their practice, legally, while also (largely) safeguarding their traditional professional practices, networks, and interests.

Troubling Definitions and Ambiguities

Throughout the tumultuous years of 2017 and 2018, when the new Solid Waste Management (SWM) and Plastic Waste Management (PWM) Rules 2016 were being implemented, anxieties were palpable among the *peethawalas* of Ramapur no tekro. Similarly, among *kachre binnewalis*, who besides challenges to their own practice, feared for the collapse of the *peetha*-network on which they depended for livelihood, access to finances, and various other socio-economic securities. There was considerable doubt about the future of recycling practice. The *peethawalas'* anxieties were not just due to the ambiguous and potentially uphill requirements of the state, but also drew substance from the potential resistances and disruptions that a re-structuring and re-identification of practice would generate within the recycling networks themselves. For all kinds of practical, financial, commercial, techno-logistical, cultural and socio-economic reasons, *peethas* would find it difficult to transform themselves into, or be able to sustain themselves as, points of 'recycling'.

As elaborated earlier, recycling plastics is a complex and distributed process, that involves the multi-modal and multi-stage practices of progressive localisation (including sequestration, screening, cleaning, segregation), mediation and scale-building which make plastics amenable to the practice of the 'recycler'. Named 'recyclers' like Aqibbhai, Anandbhai, who we introduced in Chapter 4, operate from small cottage-style 'factories' in the ruins of Ahmedabad's old textile mills, where they could only afford – in their limited spatial, labour and logistic capacities – to chip down, grind, shred, melt, extrude, incoming plastic feedstock into more elemental feedstock for onward processing and re-manufacture. Each 'recycler' specialises in particular kinds of plastic, their technical processes and commercial

networks vary. *Peethawalas* (also other localisation agents like *pastiwalas*, *kachre binnewalis*) situate themselves across and constitute key agencies within these highly differentiated and specialised networks of plastic supply and mediation, which make a wide range of plastic materials amenable to the specific demands and contexts of recycling. The networks of recycling are thus often-clustered by materials, complex (self-)organisations of techno-practical capacity, situated needs, skills, scale and market-based competitions, which are responsive to the differences in socio-economic and technical affordances and contextual specificity of the different actors. Furthermore, the networks of recycling do not just involve the circulation of plastics (or other materials). Alongside material exchange, there are also complex relations of financial transfer, obligations and sociomaterial favours, pinned down by ongoing relations of credits, professional trust, goodwill, socio-economic security, professional recommendations, etc., sustained over decades of practice between the mediators (from *kachre binnewalis* to *peethawalas* and ‘recyclers’) and their long-standing relations of inter-dependence. These complex relational overlaps and socio-practical and financial inter-digitations are barely captured by the new Rules which appear to adopt (and seek to impose) a more atomised and limited understanding of the plastic recycling process, and its practical relations.

These overlaps also make re-structuring (as proposed by the new Rules) difficult. For example, *peethas* turning to processing and feedstock production would need finances for re-structuring (say, for buying necessary machines), funds which are inaccessible from mainstream financial institutions given the *peethas*’ de facto unauthorised status. While *peethas* have traditionally borrowed money from ‘recyclers’ (thanks to longstanding professional partnerships), resistance may not least be expected from the ‘recyclers’ who would face extinction if *peethas* – their

primary suppliers – were to step into their core business of end-of-cycle processing. For *peethas*, this not only posed a threat to time-tested sources of finance, but also potentially jeopardised a range of social, cultural, and communal relations.

Another related hurdle lay in the form of technocultural performances of competence expected by the new regulatory framework. Indeed, underlying and constituting the plastic recycling networks are unevenly localised ecologies of ‘situated knowledge’, complex embodied, technical, social and cultural systems of making sense of plastics at various stages of mediation, each suited to and rooted in their respective sociomaterial context. For example, ‘recyclers’ have long assimilated the ‘Indian Standard: IS 14534:1998 titled as Guidelines for Recycling of Plastics’ (1998) – a short and generic state guideline highlighting recycling process flow and resin identification (based on the SPI – Society of the Plastic Industry, USA polymer nomenclature) – and devised their own nomenclatures, techno-cultural translations and mechanised adaptations to suit localised material (and market) demands and practical affordances (recall frugally prepared machines and localised terminologies of recycled feedstock varieties discussed in Chapter 4). *Peethas*, on the other hand, draw on the recyclers’ material requirements and emerge as related but separate sites of mediation, knowledge and processual terminology (as we elaborate below). Here, plastics are named and related to differently, they are part of different sets of embodied practices. These draw on localised community cultures, folklore, languages, and are linked to socio-economic conditions (for example, lack of formal education among the *peethawalas*, their workers and clients like *kachre binnewalis*), but also depend on the technical devices and machines used (embodied knowledges around plastic baling machines, for example). Despite their organic sociomaterial

roots, *peetha*-based technoscientific standards do nonetheless meet the demands and specifications of their respective buyers ('recyclers') more or less sufficiently, with scope for improvisation and fine-tuning. However, for a *peethawala* to become an authorised 'recycler', his operation must abide by the Indian Standards (IS) 14534:1998 of plastic recycling practice, according to the top-down impositions of the SWM and PWM Rules (2016). Although the IS document is indicative of broad processual frameworks at best, and is not necessarily prescriptive in terms of requisite techniques, many *peethawalas* wondered whether their pre-existing methods of technical practice would be valued as 'appropriate', enough to satisfy the state regulators. If not, what techno-practical and cultural practices might suffice to meet the estimations and expectations of these processual standards? If it was expected of *peethawalas* to adopt the specific techniques, machines, but also techno-cultures and material-practical nomenclatures used by the 'recyclers' as standard, was it practicable for them and their workforce to adapt and transform?



NOTE — PET - Polyethylene terephthalate, HDPE - High density polyethylene, V - Vinyl (PVC), LDPE - Low density polyethylene, PP - Polypropylene, PS - Polystyrene and other means all Other resins and multi-materials, like ABS (Acrylonitrile butadiene styrene), PPO (Polyphenylene oxide), PC (Polycarbonate), PBT (Polybutylene terephthalate), etc.

Fig. 31: SPI resin nomenclature recommended for usage under the Indian Standards by plastic 'recyclers'. In actuality, resin types manifest in more complex forms and must be segregated through localised scales, standards and methods of classification. Screengrab from Indian Standard: IS 14534:1998 titled as 'Guidelines for Recycling of Plastics' (1998) (pp. 2) [Open Data License – GOI]

'If we were to start recycling', one *peethawala* had told me back in 2017 over the phone – anger palpable in his voice, 'it would entail a near-collapse of my community. What? Am I supposed to re-train my staff? Teach them English? Educate the entire Tekro (in identifying plastics differently)?' 'Here we do not identify plastics merely by resin-type – our *ways of doing things* are different'. 'No recycler would lend money to me ever again', confided another *peethawala*, 'and suppose I became a recycler... then what? Where will I even sell my products? I do not have that kind of contacts or capacity to compete with big-time recyclers'. It was abundantly clear for *peethawalas*, who faced a dual professional existential crisis of sorts, that becoming a state-authorised 'recycler' constituted a potential means of integrating the MSWM infrastructure as legitimate practical-commercial entities, which would keep their enterprises and associated livelihoods and communities ongoing. However, a professional re-positioning and re-structuring of practices required to seek such an infrastructural membership was fraught with dangers from within the recycling networks, and would thus have to necessarily involve careful calculation and management of multiple expectations.

There are substantial ambiguities surrounding the standards of techno-practical expectation. For example, the PWM Rules define 'recycling' as 'the process of transforming segregated plastic waste into a new product or raw material for producing new products' (MoEFCC, 2016, p. 18) but leave considerable gaps in explanation, demonstrating ambiguity in meaning. For instance, what constitutes a 'raw material' is not specified. Would it suffice for a *peetha* to not change its *modus operandi* at all and claim its original consignments of cleaned, segregated bales and sacks of polythene films or lid-free PET as 'raw material'? Or must a *peetha* perform further technical mediation on its usual consignments and produce locally current forms of plastic feedstock like 'cakes', 'flakes', *mamri* and

pellets (discussed in Chapter 4)? If so, how much mediation of plastics was enough to satisfy the state yet not too substantial to pose a commercial competition of scale to the friendly 'recyclers'? These questions reflected significant gaps in techno-processual instruction from the state. The incredible sociomaterial variety of the plastic recycling industry (in materials, in conditions and so on) meant that there was an expected lack of 'official' answers to or clear consensus around many of the above key technical questions.

These ambiguities and silences of the state left scope and bred the grounds for more local standards of acceptable practices to emerge. *Peethawalas* (at least of Ramapir no tekro) agreed, more or less, that certain pragmatic improvisations would have to be made and acceptable technical standards devised and adopted locally in order to demonstrate competence to the state (agents) and thus, remain legally compliant. At the same time, these localised standards of recycling must protect the long-standing professional relations, networks, interests, and techno-practical legacies of *peethas*. As time progressed, by virtue of my working at one of the *peethas* and also dropping in and out of wider conversations and whisper networks within the community, I became privy to some of the emerging mobilisation within the establishment and ongoing deliberations across the community, which not only involved *peethawalas* and the wider socio-practical circles at Tekro, recyclers and the wider recycling circles, but also included parts of the civil society, and even local politicians and importantly, state officials.

Over time, the initial regulatory shock gave way to more pragmatic enquiries and calculations, which tended toward more collective forms of devising improvisations. Several points of ambiguity in the legislative infrastructure, discontents, irregularities but also opportunities in the regulatory and inspectional

bureaucracies were being pried out and identified within the MSWM system as potential areas of mediation. Since the national-scale practical guidelines were not possibly clear in their technical prescriptions, perhaps there was scope for more localised interpretations of what counted as ‘appropriate’ technology. Since the officials of the State Pollution Control Board (SPCB), were practically in charge of the authorisation process especially by undertaking site-visits and granting approval (or denial) to ‘waste processing’ applications (see Chapter 5), perhaps these state inspectors could be solicited. Notably, their subjective interpretations of the Rules identified (potentially influenced), their demands, technical expectations and flexibilities around the ‘appropriateness’ of technical facility learnt, and imbibed in limited ways into the modes of *peetha* practice in order to respond satisfactorily to these expectations.

Eventually, most *peethas* were devising ways to perform being a ‘recycler’ – if not as full-time recyclers in actual practice, but posturing before the state as one, nevertheless. In any case, *peethawalas*, recyclers and associated practitioners (*kachre binnewalis* and *peetha*-workers included) acknowledged that they could not afford massive change or risk disruption to their existing practical patterns and routines. A status quo would be ideal. In any case, while a few *peethas* struggled to cope and sold off their business and premises or converted to other vocations, most *peethas* of Ramapir no tekro, that were able to absorb the initial disruptions to commerce and practice, were devising ways to keep their operations and professional networks – by and large – ongoing. *Kachre binnewalis*, too, were mobilising for more favourable forms and terms of integration into the MSWM system than through casualised employment as street-sweepers under private labour agents and corporates.

In what follows, we offer instances how – through different topological alliances and cosmetic devices – some of the traditional agents of Tekro managed to devise a piecemeal but more or less collectivised ‘appropriate’ localised recycler identity. In particular, we shall show how these particular modes of integration (i.e., becoming authorised waste handlers) also attempt maintaining original practical networks and allegiances to plastic recycling. Despite limited refurbishing of premises, changes in the use of space, changes to practical temporalities, and limited re-organisation (on one occasion) in the hierarchies of plastic localisation, the everyday technocultures and *peetha*-based practices are more or less maintained and not hindered. Thus, though recyclability is kept ongoing, in the process, the networks and relationalities mediating plastic’s recyclability undergo limited transformation.

This chapter must be read as part of a pair, together and in conversation with the following chapter, where we discuss how these authorised *peethawalas* and *kachre binnewalis* would continue to source plastics, and manage to re-divert large number of sacks and baskets full of incinerable plastics from the Waste-to-Energy (WTE)-based incineration networks to *peetha*-based recycling networks. This is performed by a discussion of shadow infrastructures, which we shall elaborate as new patterns, routines, networks and sociomaterial arrangements of plastic localisation and flow across the city, which emerge from the frictions, liminalities, mismatches and discontents of the MSWM system. Therefore, if the previous chapter elaborated on the planned dis-possession and reclamation of incinerable plastics from ‘informal’ recycling practices and practitioners and the pragmatic exclusion of these independent actors from the state-mediated municipal solid waste management (MSWM) system, then this chapter, and the next, discuss how such planned ‘muting’ is denied in actual practice, if only

partially. By crafting a discussion around topological alliances, cosmetic devices (here), and shadow infrastructures (later in Chapter 7), here-on we offer instances how some of the recycling agents (*peethawalas*, *kachre binnewalis*), who are supposed to have been muted, keep their operations ongoing (if not thriving). They manage to re-mediate exclusion from the system by seeking integration as legitimate waste handlers, enacting new professional identities and practical bureaucratic standards in the process. Plastics continue to be diverted, siphoned off and tumble out of containment, almost routinely, integrating the recycling networks. In thus elaborating on modes of integration and limited improvisations in order to legitimise and protect the networks and livelihoods of recycling, we discuss further plastic mut(e)abilities, alluding, in particular, to how plastic's recyclability gets pragmatically re-enacted under the specific requirements and conditions of the new infrastructure.

We also shed light on how pragmatic arrangements laid out by the state to enact plastic incinerability get variously mediated, and fail to maintain their planned orders of sociomaterial segregation (say, of wet and dry waste) and exclusion (say, of recycling agents). As such, plastic mut(e)ability is also a commentary on immutabilities – say, in terms of the potential impossibilities of plastics getting incinerated in particularly planned ways. As a concept, therefore, plastic mut(e)ability aims to capture the complex of mutabilities and immutabilities as they unfold in relation to the multiple enactments of plastic waste in Ahmedabad.

In course of these two chapters, we shall also simultaneously grapple with how the elaborate neoliberal infrastructure of MSWM emerges in terms of everyday interpretation and practice. We shall find out about some of the points of mismatch, pressure, discontent, weakness and ambiguity (say, of technical

definition) which are inherent to this system, and analyse how these get translated immanently in practice. We shall learn about actual resistances, mediations and frictions faced by constituents of this infrastructure with wider constituencies, legacies, and contingencies of the city and the state, and of discontents, delays, shadows, but also generative inventions of material circulation and collaborative alliances that they co-produce.

Does the state infrastructure of solid waste management succeed in maintaining stability and coherence across the different scales and domains of practice? Is coherence even possible to practice? Does the civic infrastructure fulfil its promises to its citizens? Are the techno-practical and contractual arrangements of sequestering incinerable plastics as segregated from wet waste and inaccessible to recyclers successful in maintaining these pragmatically-crafted sociomaterial orders? Do plastics dissipate, instead, and become amenable to localised mediations? How is the state's infrastructure co-opted, undermined, re-interpreted in its diverse relationalities, and how does its (dis)contents draw diverse opportunities from it? Does the prospects of incineration also get muted? We shall leave the reader with informed reflections on such questions for them to estimate if through its many pushes and pulls, debacles, delays and breakdowns, co-options and hijacks, the planned centralised mode of promoting, ordering and pragmatically enacting plastic incinerabilities by the state manages to 'stick' in practice. Thus, in elaborating on the actual processes by which plastic's many mutabilities get enacted (or not, at least as planned), we join scholarly discussions on 'infrastructuring' (see (Harvey, 2012; Karasti & Blomberg, 2018; Michael, 2020). Infrastructuring, which studies infrastructures as a verb, i.e., as processes of becoming, sheds light on the various natures, technologies, affects, persons (but also other infrastructures and extended, persistent legacies),

intentionalities and processes which mediate infrastructures, and immanently enact them as dissipated, open-ended projects. Infrastructures, like the state's aspirational MSWM system, seen in this light, are therefore, suspended – never complete and fully realised; or materialised, at least as planned. They may defy original plans, develop through sociomaterial knots, alliances and assemblages often unexpected, hybrid – enrolled across difference, if not originally undesired by the proponents of the infrastructure. Through these topological, emergent accretions, what (plastic) ubiquities are, thus enacted?

Cosmetic Devices:

Back in Ahmedabad after a three-week-long summer stay in Mumbai, my first day back at work at the *peetha* was marked by surprise, as I was welcomed by the loud clatter of PET (polyethylene terephthalate) grinding. This was in 2019, and although I was in the know about the *peetha*'s ongoing application with the State Pollution Control Board (SPCB) for registration as an authorised 'recycler', I was unsure the 'grinder' was part of the plot. The grinder (mentioned above in Chapter 4), run on electricity or cheap diesel power, is a relatively simple mechanical device, whose variants are widely used in the recycling communities of Ahmedabad (as elsewhere in India and Asia – see (Hawkins, et al., 2015, p. 136), for example, for PET 'chipping' machines in Vietnam). It does not occupy much surface area, and could be installed in an unused corner of the premises. The device chips down – 'grinds' – PET objects (bottles, mostly) into 'flakes', which are then cleaned and dried through various techniques, including running through chemical (mostly alkaline) 'baths', and then drying under the sun, or through centrifugal machines. PET flakes are inducted into the polyester fibre industry, used in abundance for the production of (recycled) cushion fibre, sportswear,

shoes, etc. 'Will you also clean and dry the flakes here?' I asked Gauravbhai, the *peethawala*. 'Nah!' he replied, with a wink.

It turned out that the grinder was to be deployed as a device to aid in the registration process. This particular one was a spare, second-hand machine, recently serviced and brought in temporarily on loan from one of the old-timer recycler clients, and a trusted friend of Gauravbhai – Anandbhai. The day of my arrival marked the second day of its use at the *peetha*, a rehearsal for getting in grips with the machine, finetuning the process. Indeed, the machine was supposed to be run during the upcoming site-inspection by the SPCB officials. It was to constitute photographic evidence that the inspectors must collect during the visit; one that would demonstrate 'recycling' activity at the site, and facilitate the inspector to tick-box through the generic procedural requirements expected of a 'recycler' under the new Rules. Indeed, by actually producing PET 'flakes' – elementary plastic forms widely regarded in the local industry as standard raw materials for certain kinds of recycled manufacture – within the premises, the *peetha* would have, in theory and in practice, performed 'the process of transforming segregated plastic waste into a new product or raw material for producing new products' (MoEFCC, 2016, p. 18). That is, the *peetha* would have followed the legal definition of plastic 'recycling' as per the new Rules – to the word. Furthermore, the presence and use of the grinder during the official inspection visit would attest toward and support the *peethawala's* claim that he possessed 'appropriate facilities, technical capabilities and equipment to handle plastic waste' (MoEFCC, 2016, p. 23). In this case, the enactment of 'appropriateness' would again draw on the near-standard use of this technical device within the (PET) recycling networks of Gujarat (and elsewhere). Furthermore, the loud clatter of the PET grinder was expected to arrest attention,

offering a lasting impression of its overwhelming perceptibility and presence within the premises. After the official procedures were over, the grinder would be removed, and given back to its owner – the actual ‘recycler’. After all, official visits were expected to be annual (and at times, once in two/three years) as these were the stipulated intervals for site inspection and reporting laid down in the Rules. Furthermore, timelines were met with much difficulty anyway, under the conditions of scarce bureaucratic resources. Even in rare cases of *ad hoc* inspection, say by a higher authority, technical defects of the grinder could be cited by way of excusing its non-operation and temporary break from ‘recycling’. In the meantime, as Gauravbhai confirmed, the flakes produced temporarily at the *peetha* were not treated locally, instead contained in sacks and dispatched to Anandbhai’s ‘factory’ in Rakhiyal for cleaning and onward processing. Thus, mainly used semiotically, yet not quite materially, if only partially, the grinder, as we elaborate below, serves as a ‘cosmetic device’.

Throughout late 2018 and 2019, similar improvisations proliferated in the *peethas* of Ramapir no tekro. Many *peethawalas*, like Gauravbhai, temporarily installed grinder machines, especially around official inspection visits. Some *peethawalas* also managed to secure conveyor belts – either new or second-hand – and installed these in prominently visible places within their premises. The inspiration for conveyor belts was sought from a public presentation issued by the Ahmedabad Municipal Corporation (AMC) in 2017, where photographs from a recently authorised waste recycling unit was released. It prominently featured a conveyor belt, convincing many local *peethawalas* of the possession and use of these devices, at least during inspection visits. Conveyor belts were expected to communicate to the inspecting eye a narrative of legitimacy to the facilities, technical capabilities and equipment available to the *peetha* for ‘handling plastic

waste safely'. It would let the authorisation agents know that the *peetha*'s practices were at least as 'appropriate' and 'safe' as those projected for handling plastic waste in other authorised establishments. They would mirror what might be deemed within the techno-bureaucratic circles of Ahmedabad to be 'state of the art' standards for recycling.



Fig. 32: Conveyor belt photographed in use at a state-authorized plastic recycling plant in Ahmedabad. Screenshot from 'Integrated Solid Waste Management System of Ahmedabad City' (AMC, 2017), a public brief from the AMC, released in 2017, available on its website: <https://ahmedabadcity.gov.in/> [Open Data License – GOI]

Like the grinders, as we shall see in further detail, conveyor belts too were used during site visits, but remained unused in their intended technopractical sense for plastic segregation at other times. They lay at one convenient corner, where they did not pose a hindrance to the routines, spatio-practical patterns and rhythms of actual *peetha* work, which kept ongoing – more or less along original modes of practice. Most *peethawalas* also refurbished their premises, painted graffiti on the walls and on practical devices within the *peethas* with pointed messaging and technocultural symbols. They also offered gloves, facemasks and uniforms to workers as part of state requirements for waste processors to secure worker safety (discussed in Chapter 5), though, as we shall elaborate, these devices

were mainly impracticable for actually securing workers' health, instead used for the selective and limited purposes of projecting 'safe' workplaces.

A wide range of objects – whether actually recommended by state legislation or visibly favoured by the authorisation agents – were being cherry-picked from across different practical, regulatory, promotional domains and infrastructures and attempted to be re-embedded and integrated into *peetha* practice. Through the highly tactical spatio-temporal placements, patterns of deployment, (subversive) forms of use and non-use, of these material and semiotic objects, artefacts, a certain narrative of the *peetha's* competence was attempted to be spun. Although, in 2019, when these improvisations were starting to be tried and tested through individual cases of application – trial, error and improvisation – these narratives of competence were rarely uniform, or stable, in their persuasion or adoption across different *peethas*. Nevertheless, in their piecemeal adoption, combination, and proliferation across the *peethas*, the devices do point at an attempted standardisation and stabilisation of semiotic narratives of technical competence. In the process, SPCB officials and inspectors were offered material evidence and persuasion to potentially approve of the *peetha's* application for registration, if they so desired. With each case of authorisation, a certain combination of devices was promoted, imitated, and more deeply embedded into the mobilisations adopted by other *peethas*.

However, while we notice the embedding of these objects into *peetha*-practice, this only seems to constitute a specific form of integration, which is at once somewhat superficial and rare (in its temporal frequency). Indeed, these objects were being tested predominantly to perform 'cosmetic' functions once in every few years in the way of demonstrating desired versions of technical competence

to the representatives of the state – the custodians of the MSWM system and its infrastructures of registration and renewal of licences. At the same time, as I shall elaborate further – with a particular case of ‘using’ a conveyor belt, wall graffiti and personal protective equipment – these devices did not constitute the everyday praxis at *peethas* where a combination of techniques, skills and practices of mediation were routinely applied on a wide range of plastics. Cosmetic devices were sometimes even practically impossible to be integrated, sutured into the actual modes of *peetha* practice, and were thus, removed, tucked away in convenient folds and corners, when the demands of posturing and the priorities of performance became irrelevant. In their selective non-use within the everyday routines, patterns and technocultures of *peetha*-practice, cosmetic devices do not constitute or hinder the actual pragmatics of recycling. These techniques, skills, practical routines and patterns are instead attempted to be kept separate, as if untouched, not tinkered with too much – as desirable to the *peethawalas* and the wider recycling networks.

Cosmetic devices, individually and collectively, constitute a pragmatic ‘surface’ of *peetha* operations, a façade expected to promote a carefully curated narrative of expertise in order to satisfy the state by potentially fulfilling the expectations of the state’s representatives. At the same time, they would seem to protect the ‘core’ of everyday practice. As such, they draw together multiple spheres, cultural domains, narratives of expertise, practical devices, and standards into lively surface interactions, which are simultaneously performative – i.e., outward facing, and yet conservative in their motive – i.e., inward facing and protective (of the *peetha*, of recycling partners, clients, networks, techniques, legacies). Cosmetic devices, as used by my *peethawala* interlocutors, thus serve a vital function of careful co-ordination, catering to a complex of multiple expectations, demands,

desires, and affordances, which are to be managed, localised preferably at the level of the superficial, distinct from what needs care and protection, i.e., the everyday practices of recycling.

Finally, cosmetic devices are not merely responsive, but are also performative. In their attractive yet deflective potentials – recall the loud clattering of the PET grinder or colourful eye-catching graffiti with messages (as I elaborate below) – cosmetic devices enable an intentional and pragmatic slippage between the surface (what is demonstrated and promoted during the official inspection visits) and the core of *peetha*-practice. They also create conditions for a narrative re-packaging of the core, certain representations of the *peetha* and its environmental, socio-economic significance – for example, which may selectively appeal to the developmental or protective priorities of the welfare state. In therefore, drawing from a wide range of material-semiotic infrastructures which promote, privilege, justify its works, cosmetic devices enable tactical shifts in the techno-practical narrativisation of *peetha*-practice – all assembled and marshalled together for the purposes of *peetha* registration. In their facilitating role in getting *peethas* registered into the MSWM system, cosmetic devices thus enable *peethas* to integrate and simultaneously inhabit multiple infrastructures and domains of expertise – at least in theory. For instance, by privileging dual ‘membership’ of the state’s MSWM infrastructure, while also constituting their bonds and interests within recycling networks and infrastructures, *peethas* could continue plastic recycling, albeit as legitimate commercial entities (Bowker, et al., 1996; Star & Ruhleder, 1996; Bowker & Star, 2000).

Topological Alliances: Collectively Translating Troubling Definitions

To be sure, the registration of a *peetha* does not rely purely on cosmetic make-overs and deflections. Crucially, cosmetic devices also serve to reveal the dense sociomaterial formations and processes of deliberation, interpretation, calculation, persuasion – collaborative knowledge-making and mobilisation, that the *peethas* have come to constitute as a part of their situated response to the new regulatory framework.

If we look closer into some of these collaborations taking place at Ramapir no tekro – where I was working, we find multiple actors enrolled in a project of infrastructural interpretation and mediation in practice. More obviously, this involves *peethawalas* – not acting alone but also collectively. Indeed, negotiating the demands and discretions of the new MSWM regulations – identifying challenges and opportunities – required more collective forms of deliberation, translation and concerted action, especially since most *peethawalas* lacked formal education and access to mainstream legal counsel and lobbyists. The situation demanded the strategic production and sharing of knowledge and resources (not just technical but also bureaucratic, social and practical). In these regards, *peethawalas* reached out not only to one another (despite competitive relations) but also to ‘recycler’ clients and wider professional networks for counsel and consensus, alongside the loan of second-hand devices and instructions to run them. Notably, the *peethawalas* and the recyclers both stood challenged by the new MSWM infrastructure which clearly favoured end-to-end governance of plastic waste for incineration and tended to treat the recycling networks as a threat and competition. As such, these actors – inter-dependent professional partners as they were – chose to work together in order to devise improvisations

and modes of systemic integration more collaboratively, so as also to ensure the protection and maintenance of the broader recycling network. As we shall later see, a collective of *kachre binnewalis* too came forward to work together with the *peethawalas* and recyclers, and together, they would devise another nexus of obligatory relations of plastic localisation, exchange and mediation for recycling.

The practitioners are not the only participants within these new deliberative networks. During my fieldwork, I observed *peethawalas* derive assistance from immediate and wider socio-professional networks (where I also played minor roles in policy interpretation and networking), but also from anybody trustworthy, who held a stake in their fate, or were also frustrated in their relations to the MSWM system and sought mitigative or improvisatory action. Indeed, as discussed earlier in Chapter 5, infrastructures are heterogeneous and relational in the sense that they enrol, cater to, draw from, but also leak into a wide range of sociomaterial constituencies, who would relate to it in different ways, but also hold different kinds of expectations from it (Star, 1999; Bowker & Star, 2000; Larkin, 2013; Anand, et al., 2018; Michael, 2020). For the MSWM system to persist and work, for example, different actors and communities, like ministry officials, state bureaucrats, inspectors, municipality agents, contractors, managers, waste workers, citizens (waste generators), must fulfil duties but also have their expectations met and (essential) demands fulfilled. Citizens demand their waste be collected in time, contractors expect profit, state officials and inspectors expect reasonable workload and pay, sections of the civil society represent and demand redressal of socio-economic grievances, or environmental pollutions left in the wake of the MSWM system, waste-workers expect reasonable work conditions and pay, and so on. Most of the times, as it turned out, a range of expectations from the neoliberal system remained unfulfilled (we

shall expand on the priorities of profit versus public good in the next chapter), leaving many constituencies to be frustrated. In effect, members of the recycling networks are joined by other actors, networks and communities in shared (albeit uneven, uncommon) grievances and dissatisfactions with the system. Many of these agents may be 'promiscuous' and amenable to co-option by other disgruntled agents to assemble strategic alliances that are mutually satisfactory.

Demaria and Schindler, with others (Schindler, et al., 2012; Demaria & Schindler, 2016), discussing citizen protests at the environmental pollution from plastic incinerators in Delhi, describe, for example, how 'unlikely (civic) alliances' emerge from within the urban population, otherwise stratified and fragmented along interests and prerogatives of caste and class. In their case, this involved informal waste-pickers (whose recycling-based livelihoods were compromised by large-scale incineration projects) and local residents (who were irritated – not least physically – by toxic fumes and derivations from plastic burning) come together to protest incineration-based public MSWM policy. Actors relating differently to the state's MSWM infrastructure, thus, converge over parallel agenda – one fighting for environmental, sanitary rights, the other for socio-economic rights – find common grounds to stand together and collaborate on shared goals of action: i.e., to remove the incinerators. Several transversal alliances of expertise, co-production, and facilitation proliferated Ramapir no tekro over the latter half of 2018 and throughout 2019, orientated toward helping *peethawalas* get authorised as legitimate entrepreneurs. Many of these collaborative exchanges were less dramatic (unlike a public protest) and were often embedded within mundane social, professional, and political networks.

As the reader would recall from Chapter 4, *chamaar* settlement in the marshes of Tekro (which included the early *peethawalas* like Jamirbhai, Bhimabhai, etc.) followed a phased emigration from the old city on the other side of the Sabarmati. This was a movement that carried with it remnants of shared pasts which were embedded in the spaces, infrastructures, social networks and practical-professional solidarities of the old city (accrued notably from working at the textile mills or from living in proximal mill *chaalis*, which again drew and built up on pre-existing caste identity allegiances or village/region-group convergences – which we described). *Peethawalas* (revived and) drew on their social embeddedness: inter-generational acquaintances, kith and kin groups, friendships but also mobilised wider social networks to seek help. In effect, *peethawalas* were rarely socially isolated as they had large safety nets of immediate kin-groups and dependents (who also contributed to, worked for, or earned benefits from the *peetha* in various ways). Indeed, *peethas* were as much socio-economic institutions – single-most important sources of income, work and social sustenance for the community – as they were material localisation and mediation centres, and their social networks extensive. Family groups of the *kachre binnewalis* and *pastiwalas* were dependent on the *peetha* for economic sustenance and on the *peethawala* for other social and economic favours (like loans and recommendations for local employment). Local *chai* shops would draw much of their daily clientele from *peetha* workers; youths looked forward eagerly to hourly or daily work driving *peetha* consignment vehicles or physically moving heavy plastic sacks and bales, especially as more permanent service-sector jobs were difficult to come by. Each of these local actors had a stake in the *peetha*'s stability and were often happy to help within their limited capacities.

Furthermore, residents from the more elite neighbouring quarters, who would historically sell old newspapers or scrap items accumulated in their households to the *peethawala* (see Chapter 4), would also offer help. Say, by sharing tips, privileged contacts, spare machines, technical and bureaucratic guidance, etc. Although local civil society at large – including at least two NGOs – working for socio-economic emancipation of the marshland community were generally indifferent to the *peethawalas'* plight, some of their volunteers and community-workers (including those who could speak English, and were familiar with digital systems, MSWM Rules, bureaucracy, etc.) provided assistance on individual capacities. Finally, since *peethawalas* (still) exercised much influence within sizeable sections of the marshland community to effectively swing local elections, politicians and 'corporators' (civic representatives) across party lines (notably the Bharatiya Janata Party, BJP, and the Congress) expressed willingness to aid authorisation (say, under tacit agreements of favour, where the *peethawala* would promise to campaign or influence local political mandate).

Eventually, strategic contacts were identified – that is, anybody who could offer valuable interventions in the decision-making process. This involved mediation at different stages of the authorisation process – from influencing (if not 'pressuring' (Anand, 2011)) bureaucrats and local officials to the translation and interpretation of key texts (SWM/PWM Rules, Indian Standards, or local state/AMC guidelines), drafting applications, etc. For example, one distant relative (of same sub-caste or *gotra*) of a PET 'recycler' worked as a clerk at the Gujarat SPCB, who could effectively draw 'insider' information from or mediate relations within the bureaucratic circles of the city-based authorisation agency. Some aspiring local political leaders could cajole inspectors, or apply political pressure to mediate outcomes, if needed. One *peetha* even hired an English-speaking local graduate

as a resource person to interpret, translate and annotate the Rules in Gujarati (which were originally drafted in Hindi and in English – neither of the two languages being vernacular to Ahmedabad), to download and fill application forms, help review applications, assist in environmental audits, etc. but also to accompany the *peethawala* to state and municipality offices for translation and support (I volunteered to perform a similar job for two *peethas*). One *peethawala* revived a ‘village-contact’ (hailing from the same village but now urbanised) who had work experiences in state offices and could familiarise the *peethawala* about processes, waiting times, show them who’s who within local bureaucratic circles.

Thus, a heterogeneous assemblage of transversal relations and alliances were pieced together across sites and domains (and time) to negotiate, interpret and mediate various aspects of the authorisation process. These motley alliances were generative in a variety of ways, not least in terms of the interpretation of Rules, performances of pragmatic calculations in order to device feasible middle-grounds between policy expectations and socio-practical feasibilities. Even elected representatives and public officials were enrolled in these localised co-productions through ‘temporary, contextual and unstable arrangements arrived at through direct political negotiations’ (Chatterjee, 2008, p. 58). To Chatterjee’s conceptualisation of post-colonial citizenship and ‘political society’, here we add further social, professional and material layers of compounded mediation. Cosmetic devices are thus, not isolated objects, instead they objectify some of the more backgrounded bonds, alliances and mobilisation of careful calculation, persuasion, and co-ordination.

The uniformalised Rules and their national standards are partly to blame for why these sociomaterialities emerge. Indeed, the Rules bear text-based messages

which do not, on a routine basis, translate into practice – across the different scales and points of bureaucratic mediation. Say, Federal to State, one Ministry to another, between municipalities, from one inspection/authorisation agent to another, between state agents and *peethas* and so on. As discussed earlier, certain definitions and recommended practical scales and standards are simply impracticable within particular contexts of practice. This visibilises some of the critical limits to the implementation of the authorised MSWM system, and also their actual sociomaterial translations, transgressions, and emergences within and generative of localised standards and practices.

Indeed, over time, as we demonstrated, gaps and areas of substantial ambiguity in meaning (but also potential points of flexible, feasible, desirable interpretation) were found out, and more localised standards and modes of meeting state expectations devised to suit the priorities and limitations of these contexts. In the process, many new kinds of material and semiotic performances, devices, routines and exchanges emerged and stabilised unpredictably, within and across municipalities, state offices, pollution control boards, civil society, recycling actors, materials, sites, societies and networks. Cosmetic devices, like the photographable and demonstrable (if not noisy) PET grinders, and their tactical modes of (non-)use visibilise these critical inputs and negotiations. The grinders' relatively small size and mobility (from recycler's factory to the *peetha*), straightforward operations, temporary and balanced use (the actual nature and scale of 'flake' production did not make *peethawalas* actual competitors to the 'recyclers'), yet effective ability to produce 'raw materials' locally (thus, the inspector could easily tick-box through technical requirements being fulfilled) are all accretions of these alliances and intricate networks of co-production. These connections outlie many of the standardised duties and terms of relationship pre-

drafted under the Rules (but also drawing in new actors previously excluded from the Rules). As such, in their subversion to planned relational infrastructures, these new relations of duty, care, opportunity, obligation and interest are topological, i.e., they emerge immanently beyond the geometries of official (techno-bureaucratic) rules of conduct.

As mentioned in Chapter 5 in the case of spectacular city-‘cleaning’ drives just ahead of the Swachh Survekshan Survey, 2018, local bureaucrats and state officials too performed a range of cosmetic improvisations to focus or distract public attention. Similarly, all too aware of local contexts – expectations, affordances, vulnerabilities, limitations, compulsions but also opportunities (for themselves and *peethawalas*) – site-inspecting officials were often amenable to negotiation. As noted in the Rules, the site-inspector must check for ‘appropriate facilities, technical capabilities and equipment to handle plastic waste safely’ (MoEFCC, 2016, p. 23). However, what is ‘appropriate’ (or ‘safe’) has not been specified in the Rules in great detail, apart from the generic recycling process-guidelines excerpted from the dated Indian Standards document. In practice, ‘appropriateness’ would be locally enacted through technocultural improvisation and solicitations. Site-inspectors had their own ideals, but these were mutable, mediated potentially by a range of performances, projections, socio-political negotiations and extraneous exchanges (financial, material or otherwise) that could take place around the event of site-inspection. In performing the assessment of a *peetha*, the inspector not only emerges as a privileged custodian of empirical knowledge (about the *peetha*) but also forms the most important link and relay-point between the *peetha*, the SPCB and higher state bureaucracy. Inspectors embody the state during the critical ‘event’ of site assessment, and it is their approval that matters. For all decisive purposes, then, authorisation

translated not so much to the ticking of boxes (Raman, 2020) of (nationally-standardised) requirements and service criteria like safety, production of raw materials, presence of adequate facilities, etc. (which cosmetic devices met anyway), but ultimately to two key 'events': the site-inspector's signature and a rubber stamp from their office signifying approval. *Peethas* could become authorised as long as these were obtained. The signature and the rubber stamp were thus embedded not only within purely technical lexicons and expectations but also crucially dependent on other more local 'infrastructures' – socio-political, financial and so on. Key definitions pertaining to the MSWM infrastructure, are thus, effectively re-interpreted, re-enacted, and co-opted – translated – into actual lives and networks of recycling, in ways that were originally unplanned.

Cosmetic Devices and Situated Technocultures

Objects *made* for a purpose, or meant to integrate one particular community of users ending up mediated by, mediating and co-ordinating between many different practical contexts constitutes a recurring theme in sociological studies of technology. There are various scholarly lineages (from scientific constructivism to feminist technoscience, cultural studies, Actor-Network Theory), often overlapping, that have approached the complex problem of materials and technical-configurations exceeding prescribed modes, sites, and relations of use. Hawkins et al. show, for example, how PET bottles become part of multiple value relations and calculations (2015). Building on an engaging conceptualisation of material properties and capacities, philosopher DeLanda elaborates how the potential of materials emerges relationally within given contexts (2011). Material capacities are not fixed, as such, as under various sociomaterial conditions, objects 'express' themselves in particular ways vis-à-vis the relationalities that

they inhabit. PET bottles, that may manifest as malleable at a product design stage, may come off as recalcitrant and immutable when informal recycling workers in Hanoi try to chip them down to flakes (Hawkins, 2013). In the above sections, we have presented occasions where technical devices designed to serve a purpose – say, to chip down PET bottles – do so within particular relational contexts where their technical performance is valued not as much commercially (on the contrary, commercial ‘recycling’ is met with professional resistance) as culturally. They draw significance because of the particular projections of technical competence they may enable, or the regulatory purposes they may fulfil. They are valued for the delicate co-ordination they perform between multiple regimes of obligation. We captured this complex relational dynamic and its superficiality by the heuristic of ‘cosmetic devices’.

In this section, we subject to closer inspection some of the forms and relations of use (and non-use) of such cosmetic devices, when placed within the premises of a *peetha*. Drawing on empirical evidence specific to a *peetha* (in Ramapir no tekro), where I worked, I first describe the multifarious material-based practices of plastic mediation and their patterns and distributions within the *peetha*’s spatialities and temporalities. In this regard, I show how a conveyor belt is emplaced to draw prominent attention to an outsider when they step into the *peetha* premises, but demonstrate how the device’s placement is non-obstructive to and removed from the actual spatio-temporalities of plastic mediation there-in. By elaborating on the situated technocultures (including emerging knowledge, localised terminology, bodily training, divisions of labour, clustered use of space, etc.), of plastic categorisation and complex segregation practices, I demonstrate how the conveyor belt is largely unsuited to many of the practical requirements and specificities of plastic recycling in these contexts. In this space, I discuss

another cosmetic device, notably – state-recommended SPI resin categories painted prominently on plastic baling boxes (see below, and Chapter 5), although the actual terms and processes of plastic categorisation are much more varied, and changing with the complex and particular demands of the recycling supply chain. I also elaborate briefly on cosmetic devices like personal protective equipment, and performative wall graffiti, which communicate pointed messages to a specific regulatory and inspectional viewership.

In so doing, we demonstrate how cosmetic devices occupy a marginal, superficial place within the day-to-day performance of *peetha*-based practices. They are place-holders and signifiers, yet not hindrances, that are separated spatially, suspended from everyday practical mediation, whose technical requirements they cannot satisfy anyway. However, their ‘integration’ is pragmatic and valued for facilitating *peetha* registration. As such, they serve a crucial bureaucratic purpose, communicating to a specific regulatory and inspectional constituency. They are therefore still significant, acting as tactical props for the occasional photoshoots, and official visits, enabling box-ticking. Necessitated by the regulatory and inspectional infrastructure of the state, and by the ‘infrastructures’ of obligations and responsibilities characteristic of the recycling value chain, these cosmetic devices constitute a scaffolding – non-obstructive but differently enabling. They enact reactive/emergent border infrastructures that entail common practices mediating a specific sort of articulation between these other pre-existing infrastructures. They help hold the *peetha* in place in relation to the regulatory infrastructure, so that the vital everyday infrastructures of recycling may be kept ongoing. In so doing, cosmetic devices elaborate situated forms of (MSWM) infrastructuring, which enact plastic recyclability (mut(e)ability), albeit along slightly mutated pragmatic relational networks of practice.

Cosmetic devices can be practically incompatible to the complex and varying plastic mediation requirements at the *peethas*. Molecular configurations, to recall Barry, 'should not be viewed as discrete objects, but as constituted in their relations to complex informational and material environments' (Barry, 2005, p. 52). Drawing on Stengers and Bensaude-Vincent's conceptualisation of chemistry as an 'applied and empirical discipline' studying heterogeneous molecules (Bensaude Vincent & Stengers, 1996), Barry argues that material objects are specifically 'informed'; they retain (and are formed by) traces of prior encounters (events) where they are mediated in particular ways. Similarly, for plastic objects, we have seen that their ubiquity makes them common, yet uncommon, particular products of scale that become embedded, enmeshed within multiple complexes of sociomaterial relations and practices across sites, scales, and histories (see Chapter 4). Plastics become 'informed' with each passage through hands and localised encounters (material, social, biological, physical, practical) as each object is rendered specific (a polythene carrier smudged with oil is not the *same* as an 'unspoilt' carrier bag, at least for recycling purposes). Following Barry, who describes the granular practical enterprises of interpreting difference and mediating materials for induction into new practical-economic networks of use and value (in his case, pharmaceutical drugs), the technocultural standards of plastic assessment and mediation may arguably vary across different contexts of practice. In any case, we may contend that plastics evade uniformalised standards of classification (like the terminology for resin categorisation recommended in the Indian national Standard for plastic recycling), which may fail to reproduce the priorities and efficacies, or to represent the limitations, of more localised systems of plastic (r)evaluation.

Small-scale points of plastic mediation like *peethas* and *peetha*-based operations (like *kachre binnewalis*, plastic sorters, etc.) serve essentially to localise (gather) and re-localise (sort, clean, re-‘inform’ and re-channelise) the wide range of heterogeneous plastic objects from different places and times in the city into aggregated forms that are readily usable (with minimum mediation) by the ‘recyclers’. We have earlier described how certain *peethas* specialise in specific kinds of plastic and mediatory processes to cater to the evolving requirements of specific ‘recycling’ enterprises and value chains. In this way, we noticed a certain self-organised clustering of materials, people, societies and skills – material-based territorialisations of practice – along specific practical trajectories of knowledge and value production, mediation and exchange. The complex multiplicity, sociomaterial specialisation and malleability of these plastic practices is evident especially at the level of the *peetha*. For illustration, here we expand on some of these along the lines of space-use, technocultures, categories and identification. In so doing, we show how some of the cosmetic devices are redundant within the fast-moving, and mutable practical settings at the *peethas*.

Space:

Further to our discussion in Chapter 4, space constitutes a significant instrument in the commercial progress and technical prowess of the *peetha*. Whether deployed for plastic storage, sorting and cleaning or to put up a desk and shopfront for managing acquisitions, space is the other name for money in the recycling business. *Peethas* of Ramapir no tekro have – over the years – devised strategies to efficiently use space available to them, adopted practical routines and scale of operations to suit their premises. There are certain key elements present in every *peetha*. These include a manager’s desk where material,

financial and informational exchanges take place and where daily collects by *kachre binnewalis* are inspected/evaluated, a weighing scale next to the manager's desk where purchases are weighed (*peethas* adopted digital scales especially after 2015, I was told), assigned spots and corners where particular kinds of in-house mediation take place (say, finer sorting of film-based polythene (PE) and polypropylene (PP) products, or the emptying of polythene terephthalate (PET) bottles and separation of PE lids from the PET body), a baling area (where the manual trampling of plastic films takes place – see Chapter 4) assigned areas where already-processed materials are stacked in sacks/bales awaiting dispatch and a loading area where outgoing and incoming trucks (un)load consignments. There is no fixed template to ascertain how these elements might be located in space as every *peetha* has unique spatial dispositions, different scales of operation, devices, specific materials that they focus on, number of *peetha*-workers, etc. Furthermore, how people, practices, materials – their flows and fixities – are localised in space and time is often improvised according to the convenience and efficiency of operations and operational priorities.

In Fig. 33, we offer a simplified material-practical map of a *peetha* in Tekro – one specialising mainly in polypropylene (PP), polyethylene (PE) (including *ramakra* – or hard objects in PE, occasionally in polystyrene (PS), like shampoo bottles, toys, disposable tea tumblers, etc.) and PET. The map represents the territorialisation and de-territorialisation of practices, pointing out how particular materials and their mediators (humans but also machines) are distributed over space in the course of the multitude of *peetha* operations. The PE/PP sorting, baling and bale-storing areas are either adjacent or proximate – constituting a more or less closed cluster. This enables quick and efficient movement of

material forms, avoiding undesired collision and mediation. A similar clustering of material and practice in space is followed for PET and *ramakra* too, depending on the specific mediation techniques and practices that they undergo within the *peetha*.

These patterns are spatio-temporally specific and malleable to a limited degree. For example, mornings (9 am to 12 noon) are a busy time for material purchases and the transit of dispatches to recyclers. For efficient work-flow within the available space (also profitable allocation of labour), workers and managers postpone cleaning, sorting and baling activities to the afternoon. In the morning, they focus instead on the loading and unloading of trucks, material purchases from incoming *kachre binnewalis*, and the preparatory distribution of materials within the premises to set up the day's working order for in-house processing. During these times, spaces (surface area) allocated for activities like separating lids from PET bottles, PE/PP sorting, cleaning, etc. become available for the quick and unhindered movement of dispatches (bales and sacks) and workers carrying them. To offer example of a different (annual) temporal scale, during socio-cultural festivals or summers, when the inflow of specific kinds of materials (say, PP packaging, or PET water or soda bottles) increase, the spaces allocated for their processing and storage may be increased too (if deemed profitable) at the cost of space allocated to other materials. Similarly, metal cubicles allocated to baling film-based PE may be temporarily devoted to baling PP packaging to cope with the increased flux – supply and demand. In short, spaces, practices, materials, work routines and rhythms may be mutated, or muted, to accommodate specific needs and priorities as and when they emerge. The material mut(e)ability of plastics thus draws on a certain malleability of spatiotemporalities.

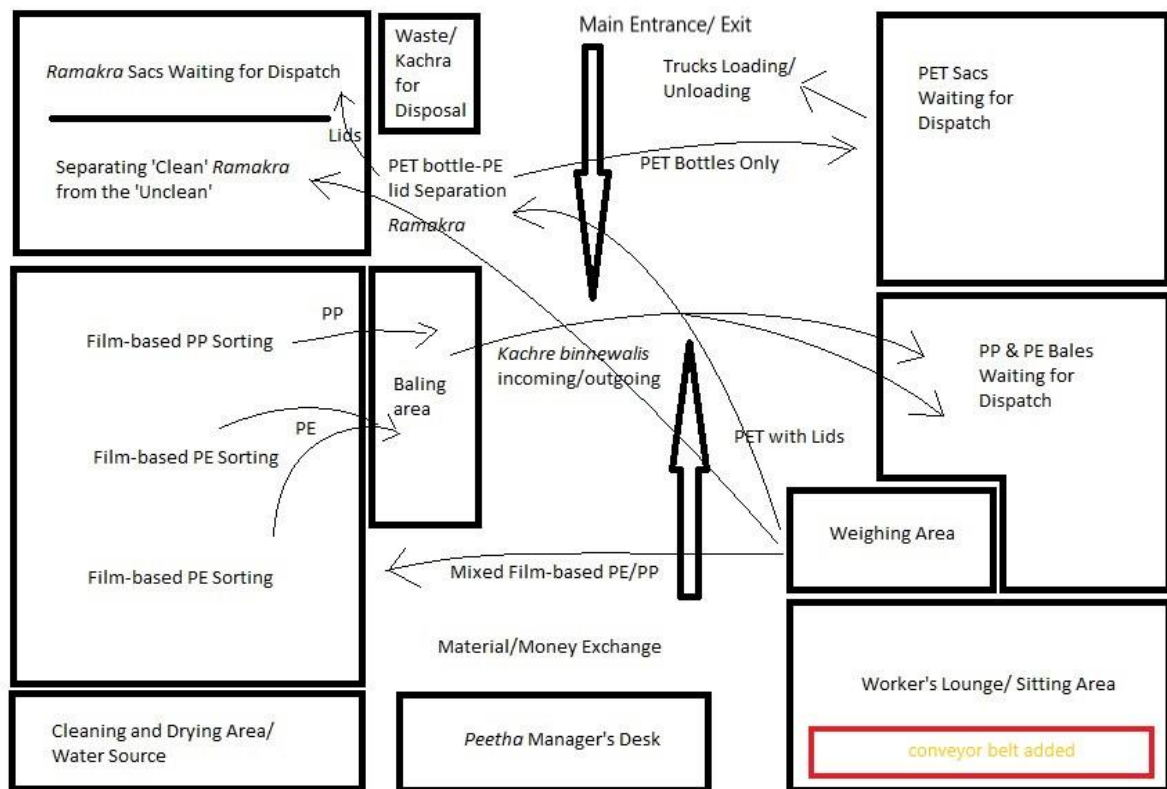


Fig. 33: A representative 'map' of workers, practices and material localisation and re-localisation patterns inside a peetha in Ramapir no tekro. Courtesy: Author; inspired from an establishment where the author worked.

How is a static artefact incorporated within such a dynamic, tightly-knit and pragmatic pattern of using space – yet privileged cosmetic visibility? In the *peetha* where I worked, a second-hand conveyor-belt was acquired and installed along the back-end wall on the edge of the worker's lounge, next to the manager's desk, in a manner prominently visible from the outside if one peeked into the *peetha* from the main entrance road. Despite its place along the entrance-facing wall and eye-catching prominence, note how the spatial positioning of the conveyor belt remains almost 'external' – disconnected – to any of the close practical-material clusters. In order to secure this place, however, the worker's sitting area was deemed partly dispensable by the *peethawala* and one portion of it was re-

allocated for the cosmetic incorporation of the new device. The device occupied 'excess' space (at the cost perhaps of some of the worker's lounge area), its being not directly affecting the pragmatics and the profitability of *peetha*-practice. There it lay unused – at least for 'conveying' materials to be sorted. Although occasionally, the materiality of the object, say, its flat sturdy surface, offered conditions for it to be used as a 'table' where workers posed tea-trays, cups, saucers, plates, snacks, etc. during breaks. The device was cleaned, serviced and made ready for official visits and photo-ops.

"This image has been removed by the author of this thesis/dissertation for privacy reasons".

Fig. 34: A photo session with a (rarely-used) conveyor belt. This is from another peetha. Courtesy: Peetha management

Eventually, the *peetha* premises were also renovated and re-painted ahead of the inspection visits. However, in the process of renovation, new cosmetics were

added. In Fig. 34, a photograph which constituted official evidence of technical competence for another local *peetha*, the conveyor belt figures prominently and *in the process* of use (as potentially expected by regulatory authorities and as projected by the *peetha* management). However, in the particular framing of the photograph, the reader will notice graffiti highlighting a gendered development lexicon, with words like gender equality and women's empowerment, written in English (which is not a local language that the *peetha*-workers understood). In this particular case, such messaging bore relevance from the fact that it was pointed particularly at representatives of the state – inspectors, authorising agents – who were in charge of the local implementation of the centralised MSWM, and who were supposed to understand English, the main official language of Indian bureaucracy. This particular graffiti was significant in that it constituted the *peethawala's* projected narrative enacting his establishment as a site where women's empowerment took place, where women workers were treated fairly, and where they earned their livelihood. These virtues were also highlighted verbally to support the *peetha's* application for authorisation during official visits. In incorporating socially progressive graffiti as part of physical infrastructure, the *peethawala* appealed to the 'state' to be mindful of the socio-economic stakes of denying the *peetha* an authorisation; a potentially useful reminder that significant projects of furthering socio-economic justice may be dismantled as a consequence of failure to receive authorisation.

After all, frequent and elaborate consultation with the local civil society had familiarised this particular *peethawala* of the Indian state's active pursuit of the 17 sustainable development goals drafted by the United Nations (Chaturvedi, James, Saha, & Shaw, 2019); an internationally standardised 'developmental' agenda (until 2030) where 'gender equality' was promoted alongside concerted

efforts towards sustainable cities, communities, sanitation, industry and environmental action. Thus, by combining the civic and environmental values of its original operation (waste recycling) with supplementary virtues, the *peethawala* made a stronger appeal to the state to authorise its operations. As with this particular *peethawala*, other *peethawalas* too performed repairs and refurbished their premises with freshly-painted walls, strong roofing and flooring (which also incidentally helped keep away rodents which damaged plastic stocks – see Chapter 4), and in course of these renovations, they incorporated strategic – if not cosmetic – artefacts, piecemeal improvisations and technocultural messages, as part of the physical infrastructure. One *peethawala* painted ‘Friends of the Environment’ in large caption on a wall as a prominent permanent fixture to highlight the virtuous environmental relations blossoming as part of its operations. In any case, these new additions were restricted mostly to mural embellishments and paintings on machines and the premises, which in no way meddled with actual everyday performances, patterns or rhythms of *peetha*-based operations. Therefore, these renovations constituted a cosmetic make-over for *peethas*. With an eye on authorisation, these mural devices drew from and embedded piecemeal material-semiotic fragments from other cultural domains and infrastructures of developmental statecraft, thus, elaborating further projects and cross-domain topological enactments of MSWM infrastructuring.

The cosmetic infrastructuring of *peetha*-premises in order for it integrate and elaborate the official MSWM infrastructure also involved, enrolled and enacted the workers’ bodies and clothes. The above image – used for official documentation – also projects workers donned in protective gear. The provision of cotton gloves and masks by the *peethawala* to his workers constitutes the obligatory ‘occupational safety and health aspects’ criteria included in the

standardised registration/authorisation form (the PWM Rules 2016, see (MoEFCC, 2016, pp. 26-27)) – one of the 13 cases that must be filled in/tick-boxed by the *peetha*. *Peethawalas* of Ramapir no tekro make sure that each worker is provided with such protective equipment as part of their ongoing efforts to follow the Rules and to satisfy the inspecting government official of adequate ‘occupational safety’. However, the official enactment of ‘safe’ practice does not necessarily translate to safety in everyday *peetha* practice. Indeed, many workers were unable to keep these devices on in the hot, humid weather of Ahmedabad. Some found this protective gear even counterproductive (gloves stopped them from ‘feeling’ materials thus slowing down manual plastic sorting, for example). Many workers, ironically, found it unsafe to keep the safety equipment on while performing a strenuous cardiovascular task such as trampling upon plastics to produce bales, or while carrying heavy consignments around. However, facemasks and gloves were kept handy (usually tucked into the pockets or folds of one’s dress) and put on when an ‘outsider’ visited the premises (whether for official inspection visits, or when members of the civil society came over), or during photo sessions in order to project an image of a ‘safe’ workplace⁷⁵. While designed and prescribed to protect working bodies within recycling facilities, these standardised devices are seen to lose their effectiveness for particular bodies within situated practical contexts and climates. Instead, the protective gear fulfil the cosmetic requirements of authorisation and compliance to given Rules; they further plastic recyclabilities in perhaps unpredicted ways.

⁷⁵ These observations, which I draw from ethnographic study, highlight the *peethawala*’s efforts to provide safe workplaces, but also draw attention towards some of the actual sociomaterialities that co-produce resistances to the state’s prescriptions for ‘authorised recycling’, thus rendering prescribed practices impracticable. Demonstrating actual emergences of the safety standards within a situated context of practice might point to new directions for re-thinking and redevising policy and programs of MSWM regulation.

Technoculture:

The conveyor belt is not just spatially disconnected, but is impracticable for sorting through the scale and variety of recyclable plastics that the *peethas* acquire, and which they must segregate and re-aggregate effectively for onward transit to the ‘recyclers’. Indeed, the more-or-less standardised shape of conveyor belts restricts spatial relations of object-use into a linear spatial orientation, its size limits the number of workers who may therefore sit simultaneously around it and the practicable number of material categories that may be sifted out with it. To be sure, these devices may be suitable for establishments which need segregation along smaller number of material categories. Say, at incineration-based WTE processing units, where incoming material feedstock might have to be sorted into incinerable/un-incinerable categories, or at recycling plants that only deal in a few material categories (thus ‘everything else’ may be screened out). However, the homogeneous pace and rhythm of material conveyance afforded by the device often proved unproductive; unsuitable for the variable times and practices of mediation merited by the different kinds of plastics processed by the *peetha*. Indeed, plastics acquired by the *peetha* are so varied and require re-localisation into so many recycling categories (as we shall now see) that they demand more personalised attention, varied skills, manual forces, and spatially distributed forms of mediation.

In effect, employed *peetha*-workers play a key mediatory role in re-evaluating and segregating materials, assessing their recyclability and determining future trajectories – which object goes to the recycler as part of an elite consignment, which one is relegated to ‘spoilt’ cheaper consignments, which one ends up discarded to be disposed in the landfills via the formal MSWM system of waste

collection. The work-floor of the *peetha* (the more central expanses pointed out in Fig. 33) constitutes the 'main' site for these mediations, each area provisionally allocated to material-specific sets of practices. For example, PET mediation involves two skilled workers sitting close by and collaborating, one patiently emptying and cleaning plastic bottles with water, peeling off wrappers; the other removing LDPE lids and rims from the PET bodies with a sharp object to distribute them separately into homogeneous sacs for respective onward journeys to different 'recyclers'.

The sorting of different categories of film-based PE and PP, and their packaging into homogeneous bales need even more workers, and space, and a considerable surface area is typically allotted to this complex set of mutually complementary tasks (like the large patch on the left of the above map in Fig. 33). Here, workers sit on low stools at the feet of a large mound of heterogeneous plastic films, and keep several sacs around themselves (corresponding to the segregated PE/PP categories elaborated below) for separate intermediate storage. They would grab each item by the hand, assess which recyclable categories they belong, and promptly contain them in separate sacs before they were transferred to the baling section. Film-based plastics, by far, constituted the most voluminous of acquisitions at the *peetha* I worked in; sometimes during busy periods, such as summers or festivals, *peethas* worked to fulfil ambitious weight targets of sorting up to 100 kg of PE/PP per day in order to stabilise supply and demand pressures. Film-sorting is, thus, entrusted to those who developed a quick intuitive 'feel' for the different material-functional categories by a mere look or touch, and offered speed and alacrity sifting through the mounds of heterogeneous plastic film. Women with thin, nimble fingers, especially former *kachre binnewalis* (with lifetimes of embodied skills assessing plastics) are

preferred for the task but the skills could also be learnt (see (Latour, 1992), or (Ingold, 2000), for example, for different ways of thinking about enskilment). The more the market-demand for film-plastics, the more workers and space were needed to sort them.

From the removal of lids from bottles by force, to the finer, more attentive forms of studying and separating the different categories of PE/PP films, the segregation of different plastic materials for recycling is a complex task which involves a variety of forces, skills, abilities, labour, temporalities and spatial demands. Once sorted, homogeneous plastic categories are either compressed into bales – i.e., if they are pliable (like PE/PP films); or contained within sacks if not easily compressible by manual force (like hard PET bottles or *ramakra*).

Categories and Identification:

Plastic sorting is a skilled task which involves assessing materials by multiple parameters and incumbent standards. The categories in which PE/PP films must be segregated are not just dependent on the resin-type of the particular plastic item at hand, but also on its colour (dyes), texture (additives), thickness, degree of 'spoiltness' (depending on the presence of contaminants like dust, oil, etc. – see Chapter 4). In the first place, of course, these categories are based on the specific demands of 'recyclers'; they change with the changing priorities of the recycler. Thus we find a large variety of functional categories sorted and produced from the stock of PP/PE-based films: 'white dull' (translucent high-density polyethylene – HDPE), *rangeen dull* (translucent HDPE of mixed colours), *meniyu* (coloured thin low-density polyethylene – LDPE), HM (high molecular HDPE, opaque and usually coloured), *kaalu* (black films, thus colour-coded to denote their make from pre-recycled feedstock), *kaala kachakra* (black recycled

films but thicker and constituting a slightly more expensive recycling category), and so on, with each of the above categories again sub-divided into *saaf* (highest quality, low contamination or spoiltness; constituting elite consignment), *ganda* (spoilt but recyclable and constitute cheaper feedstock) and *kachra* (too spoilt to redeem – to be discarded). These categories constitute separate consignments for respective recyclers who specifically seek them, while the *kachra* are thrown away.

The terminology and practical-material standards for identifying and suitably mediating this wide variety of plastic (film) categories are understandably difficult to map with the limited combinatorics afforded by the SPI guidelines recommended by the Government of India. This is also due, in part, to the fact that these standards are not fixed, set in stone, they mutate according to the shifting industrial demands. In effect, they emerge in more complex forms through localised networks of communication and interpretation. ‘Recyclers’ communicate their specific timely requirements to the *peethawala* or directly to the *peetha*-manager, who passes down information to the workers, messages which then seep through from the more senior worker to junior workers and so on through successive layers of mediation. Eventually, we find even more localised standards of material identification and segregation, which draw not only on the specific material itself but on the techniques used to mediate them, on the sensory faculties, bodily affordances and social camaraderie of the workers performing these mediations.

Polymers making up film-based plastic products – whether LDPE, HDPE or PP – are identified by the *peetha*-workers not with a microscope, obviously, but primarily by visible textures, light reflectivity (*dull* – translucent, transparent, or

opaque), sounds they would make when crumpled (*kachakra*), or by noticing whether they would snap clean when pulled or stretch before the polymer chains were completely severed, etc. PP made a ‘crunchy’ noise when crumpled, was resistant to pulling and if it snapped, it snapped rather cleanly; while HDPE stretched when pulled and produced curled, drawn out edges before the polymer strands broke. But HDPE stretched not as much as LDPE, which were the most gullible to manual pressures, my *peetha* co-worker-mentors would explain to me with sensorially rich and vivid live demonstrations. These material characteristics – sounds, sights, textures and tactile responses, etc. – interacted with the workers individually and collectively (for example, if doubtful of the polymer-type, it sufficed for me to hold up and smother a plastic film to elicit a sound to which my senior co-worker would respond: “PP”!). As such, some of the vernacular words representing these sensory experiences and feelings seeped into material terminology. Hence, the prevalence of words like ‘dull’, *kaalu* (black), *kachakra* (sound), *ramakra* (the Ahmedabadi term for colourful toys children play with). There existed a consensus about resin-identity, a consensus mediated by complex feedback cycles (managers would reproach workers if a PP batch contained too many PE), work experience and work-place hierarchies (for example, the senior worker’s verdict was final).

While the categories of colour (*white/rangeen/kaalu*) were visually relatively easy to judge, assessing *how much* (recall degree of spoiltness – Chapter 4) a plastic object was contaminated (say, determining whether a *ganda* plastic was redeemable or must be discarded as *kachra*) could involve more complex forms of subjective and social mediation and networked learning. As discussed earlier, *ganda/saaf* concerned the presence of contaminants like sand, dust, oil, food remnants, etc. which would subsequently reduce the material quality (and price)

of the recycled feedstock. In effect, contamination did not reproduce simplified moral binaries (say, 'clean'/'unclean') but generated a graded range of feedstock with different degrees of acceptability, price and 'quality' of end product. Even among contaminants, oil/fat reduced feedstock qualities more drastically and their removal involved more arduous and costlier technical mediation than the separation of sand particles from plastic objects. As such, plastic objects which were smudged with too much fatty materials were promptly discarded – termed as *kachra* – as it did not make economic sense to technically redeem them. Objects covered with sand and dust were dealt with more leniently, workers tried to brush the dust off with a sudden jerk and eventually passed them off as *ganda*, if they were still spoilt.

At the stage of regular plastic sorting at the *peetha*, managers would inspect sorted batches and comment if the sorter had incorporated too many *ganda/kachra* items into a *saaf* consignment. They would fish out and hold up (what they deemed) problematic items from the sack as a visual specimen – to set a standard for every worker. *Peetha*-managers themselves received feedback from the recycler's representatives if the previous batch had contained too much contamination. The feedback moved down the chain of commands and the graded categories of material contamination were practically refined over subsequent rounds of trial, error and exchange of information until the standards of *saaf/ganda/kachra* stabilised – more or less. These emergent knowledges were not written down in any paper-based or digitised manual, instead held in collective embodied memory⁷⁶. Thus, they were distinctly 'sociomaterial', in the

⁷⁶ Embodied knowledges have often been theorised as 'tacit knowledges', i.e., knowledge that cannot be communicated, or explained (for example, see (Polanyi, 1966; Collins, 2010)). In this case, however, these knowledges are sociomaterially derived, i.e., neither drawing exclusively from psychosomatic, social or material-physical domains, but in their combinations. They are also, clearly, communicated,

sense that they were produced, mutated and reproduced collectively through situated iterations and reiterations between hierarchised people and plastics. In everyday practice, a seasoned sorter could differentiate the *ganda* from the *saaf*, the passable *ganda* from the irredeemable *kachra* instantaneously by the eye. In case of doubt, a co-worker was consulted, and a consensus was reached.

The situated standards of plastic terminology for recycling – as varied and localised as they may be – may be even more differentiated within the practical contexts of everyday mediation inside the *peethas* and new standards routinely emerge. Workers who sort, bale, contain plastics inside sacks or transport them, engage physically with these materials, individually and collectively, to develop material semiotic idioms which draw on local society, culturally-grounded language, and mirror subjective preferences and experiences of the personnel. For example, PP was often described as *jiddi* (stubborn, recalcitrant) as these polymers famously resisted workers' efforts of compression by trampling under the feet, and refused to stay down. The more one pressed down on a mound of PP within the metallic baling containers, the more they rose to regain volume. PP was less *plastic* – as it were; it demanded more work, more perseverance and sweat, but also strategic application of pressure (say, quick trampling at the interstices of two films) to make them pliable, it needed support from another worker to hold the material down while the bale was secured by a metallic wire. Workers often swore at polypropylene, using socio-politically and even sexually charged language to describe an intimate material that refused taming. Jostling with PP could be an intense and energy-draining experience especially in the hot and humid weather. On the contrary, certain categories of HDPE was *saaru*

explained, learned, and 'spoken', if not through words (see also (McKay, Perez, & Xiaoyu, 2021) on 'plastics talk').

(docile, nice), they yielded easily to pressure, and everybody liked to prepare a bale of 'white dull'. Some of these ephemeral expletives or flowery references stuck; workers (at least those who were aware of the context) continued to refer to these plastic categories by these names instead of the more standard names deployed at the *peetha*. Thus, new standards and forms of identification arose.

Sorting plastic films, workers also drew socio-cultural parallels of *saaf*, *ganda* and *kachra* plastics with the caste system, for example. 'Ganda plastic is like lower caste', one senior co-worker, Neenaben, explained to me, 'they fetch low price upon exchange – but are still recyclable (into cheaper products); but if they are too dirty to be recycled' – *kachra*, the stabilised term used for this irredeemable category of plastics; 'then, we usually dispose them with the municipal waste collection system.' 'Kachra is even lower caste, we don't touch them'. *Ganda* and *kachra* were, thus, two material sub-categories of the 'spoil'. Yet, what became *kachra* – materials to be discarded, drew not so much on the material's inherent qualities but on local technical limitations and financial liabilities, i.e., their mediation was too costly to render them profitable. *Ganda* was still redeemable because they yielded to available methods of mediation within limits of profitability in the production of value, but *kachra* needed to be discarded. Neenaben's caste idiom, evidently, performed a narrative entanglement between material categories of 'spoiltness' and local social categories of value – or what was worthy of 'touch', as part of her commentary on the hierarchy of *things*.⁷⁷

⁷⁷ Certain lower castes (like the Shudras) are still integrated within the caste society (*varnashrama*) while others (like the Dalits) are considered morally irredeemable, and 'untouchable' within these political economies. Dalits are remaindered; their social spatial exclusion – or externalisation, is fully internal to the logic of maintenance of the caste society where Dalit labour performs critical and hazardous tasks of repair, removal and maintenance (Teltumbde, 2018). Though the social and the material rarely emerge as such neatly dovetailed parallels, Neenaben's reflections on naming plastics would nevertheless mirror some of their uneven and complex recombinant emergence, which have received disciplinary observations and concerns in the anthropology of waste, where the production of

Yet this situated (and effective) assemblage of plastic nomenclature and technocultures find little representation within the generic process standards for ‘recycling’ recommended by the state at the national level. On the contrary, instead of promoting some of the locally-generated techniques and knowledges of plastic mediation, the incumbent PWM/SWM Rules and the Indian Standards expect a heavily Americanised industrial standard to be adopted by *peethas* to constitute the ‘state of art’ standard for authorisation requirements. One notable example is how the SPI-recommended 7-part resin coding is recommended to both producers and recyclers as part of the desired end-to-end model of centralised and ‘circular’ plastic governance from production to waste-processing conceived as part of Clean India technocracy, described in the previous chapter. However, the sheer disjointedness of the state’s recommended technocultures from the actual sociomaterial embeddedness, routines and patterns of *peetha*-based techno-practice reflect how such technocracy emerges as a curious cocktail of cultural hyper-nationalism and the uncritical adoption of international technical standards.

In any case, the state-recommended standards of plastic identification are nevertheless sutured into place, made a part of the physical infrastructure – if not practical ‘infrastructures’ – of the *peethas*. This is to ensure hassle-free authorisation. *Peethas* do not renounce but recognise, and actively project that they possess (and possibly apply) these standardised state-expected techniques and knowledges of plastic ‘recycling’. Similar to some of the cosmetic infrastructuring of cultural messages performed as part of refurbishing the *peetha*

the category of the waste (or, the more recent term – ‘discard’ to highlight waste’s political economy) constitutes an integral part of a sociomaterial system ordering or reproducing itself (Douglas, 2002 [1966]; Hawkins, 2006; Liboiron, 2019; Liboiron, 2021).

premises, many *peethawalas* have painted the names of recycled plastic categories, including standard SPI-drafted resin names, on the metallic baling boxes and on *peetha*-walls. These, alongside the conveyor belts and PET grinders, perform a technocultural window-dressing for *peetha* practices to the attention of the state and its local representatives (SPCB and municipality inspectors). These infrastructured markings constitute fixed physical backgrounds to everyday practices, a contrast to the moving, mutating, muting assemblage of plastic techniques and cultures emerging at the *peethas*. They quietly communicate acquiescence to the governmental Rules, even though these guidelines are impracticable in actual operation. There is also a preference among the *peetha*-owners to hire store-front managers with a working knowledge of spoken English and Hindi for effective communication with inspectors. These English-speaking managers have training in the international terminology of resin categories and 'recycling' process as per the Indian Standards and could explain *peetha*-operations, machines and processes in simplified, modified forms to the official visitors, if required. Again, these improvisations remained superficially performative to suit the requirements of authorisation and rarely mediated everyday practice, if not by helping the establishment stay legal and its networked pragmatic enactments of recyclability kept ongoing.

Cosmetic devices are therefore performative of certain competences that may be expected by the regulatory infrastructures of the state's MSWM system, and are yet non-obstructive to, protective of and enabling the practices and priorities of recycling. As such, when conceived as part of topological alliances and complex layered processes of deliberation, collaboration and facilitation emergent in the wake of the new MSWM regulations, cosmetic devices actualise the processes of plastic recycling under the new circumstances. They facilitate excluded

establishments to get integrated, to become members of the authorised infrastructure and perform as legitimate commercial entities who would not be forced by the state to close down. As such, they prepare the conditions for authorisation so that *peethas* may survive to continue operations and enact the pragmatic processes of plastic mutability. At the same time, these sociomaterial improvisations also embody and co-elaborate new standards and emergent/responsive mediations on the planned MSWM infrastructure, in that they re-interpret, re-enact, translate and localise more centralised texts and expectations into more locally amenable forms. In the process, the original infrastructure is also transformed – mutated, muted – in certain ways.

However, while such infrastructuring essentially constitute a *peetha* posturing before the state for the purposes of bureaucratic compliance and accountability, it would take *peethas* further effort to sustain operations on a day-to-day basis. This predominantly concerned the resourcing of recyclable plastics under the centralised MSWM infrastructure which aspires maximal sequestration and containment and plastic's end-to-end circulation from the streets, street-side bins, households and businesses towards the WTE plants for incineration. As such, with traditional plastic foragers like *kachre binnewalis* becoming increasingly marginalised, we shall turn in Chapter 7 toward further instances of MSWM infrastructuring, especially with regards to the emergence of new 'shadow infrastructures', through which plastics leak out of the state's proposed infrastructures, and *peethas* and *kachre binnewalis* continue to reclaim and remediate these for their everyday recycling operations. However, before we switch over to that discussion, in what follows, we describe an empirical case in Ahmedabad, where a group of *kachre binnewalis* collectivised; with strategic alliances, cosmetic devices, and efficient techno-practical re-organisation around

the specific requirements of scale, integrated the MSWM system as authorised waste handlers, and became contractors themselves in late 2018. As a result, these formerly freelancing foragers became legitimate 'owners' of plastic waste (because waste collection contracts transfer intermediate rights over waste for onward transit or processing), which they chose to partly mediate themselves (to earn greater profit) and partly to divert strategically to support the local *peetha* enterprises and recyclers of Ramapur no tekro. As such, these *kachre binnewalis* collectivising would also seem to enact a specific and situated articulation of plastic recyclability/mut(e)ability.

From Kachre Binnewalis to Authorised 'Integrated' Waste Managers

Instances of 'informal' waste-pickers collectivising to reclaim 'right to waste' are common, especially across Latin America and South Asia (see (Chikarmane & Narayan, 2000; Dias, 2011; Rosaldo, 2016; Shankar & Sahni, 2017), among others). While such processes of organisation are often called 'formalisation', the meanings and implications of the term are contested (Millington & Lawhon, 2019). Formalisation, in some cases, refers to the integration of waste-workers within state-authorised modes of waste management (though not necessarily with the rights and securities due with such association (see (Roy, 2005; Sassen, 2010; Breman, 2013)). In India, as we have seen, the integration of waste-pickers has often been marked by dubious standards of state-authorisation. Hazardous hard work of waste collection or street-sweeping are co-opted, but working rights tend to be undermined, often subjected to flexible policies of corporate contractors, leading to a systemic devaluation of waste-work and an exploitation of workers. There are exceptions, of course (Bhaskar & Chikarmane, 2012; Demaria & Schindler, 2016). Samson (2015), comparing three different forms of integration

of waste-pickers into state systems in India, Brazil and Colombia, urges researchers to be mindful of the specific dynamics of each organisation. These might include local histories of the civic governance of waste, political orientation of incumbent governments, civil society, social movements, etc. Similarly, Millington and Lawhon (2019) call for research into the actual materiality of the waste being handled (or materially-economically renewed), and about the specific material, social processes, and negotiations involved within such re-organisation.

In responding to these activist and scholarly debates, I empirically elaborate on the integration of a group of about 50 *kachre binnewalis* of Ramapir no tekro into the MSWM system of India. These women organised into a collective and obtained a door-to-door solid waste 'collection' contract from an autonomous urban local body (ULB) – the Ahmedabad Cantonment Board (ACB), a residential township of the Indian army, managed by the Ministry of Defence, situated albeit within the notional boundaries of Ahmedabad city. Furthermore, they also succeeded in securing a waste 'processing' contract from the same Board. This enabled the group to negotiate favourable terms of integration into the system, that ensured autonomy over the processes of waste mediation, and the sharing of economic benefits, while ensuring state legitimacy over their operations by contract. A number of sociomaterial factors, from operational logistics and scale, waste materialities, (tacit) strategic alliances, and a range of cosmetic devices may be observed to play critical and decisive roles into such an arrangement taking shape.

Though situated geographically within Ahmedabad city, the ACB is not subject to the civic governance of the AMC but to the jurisdiction of its own separate ULB.

The autonomy of the Board and its small scale (about 3000 households, population under 15,000 as per the Census 2011) enabled it to draft a more locally attuned MSWM policy interpretation of the centralised SWM/PWM guidelines, and propose suitable technical and organisational arrangement for the waste management of its residents. During one of the initial meetings with the *kachre binnewalis*, the Board CEO made it clear that he wanted the collective to assume total autonomy over the waste materials collected. That is, for the award of contract, the signatory did not only have to ensure regular and complete door-to-door coverage of solid waste collection but also exercise complete responsibility over processing and disposal. The official permit would provide autonomous control to the collective over material resources and offer their community stronger claims over onward techno-practical mediation, forms of exchange, product marketing and income. Given the scale of material operation which they deemed manageable, the collective decided that it was more sustainable and profitable to position their operation as an 'integrated' waste management facility. That is, they would not only gather waste from households (as 'waste collectors'), but also perform segregation (thus, the entire range of localisation activities) and 'recycling'. In theory, they could obtain state authorisation both as collectors and as plastic waste 'processing units' ('recyclers' in this case). This would equip them to exercise greater control and negotiation over the (recycling) market and also over the state's regulatory system. With two state-authorized licenses, they expected to achieve greater stability within a chaotic regulatory environment and to maximise income by providing a wider range of material mediation services and products (say, plastic feedstock for recycling, also potentially compost from collected food waste).

Following cues from many established *peethawalas* of Tekro, who had recently become authorised recyclers, the collective decided to project (not perform commercially) in-house mediation and grinding of PET (bottles) as a demonstrable evidence of legitimate ‘recycling’ activity. Strategically – in their quest to become doubly authorised, the collective demanded of the Board for one-time capital grants in the form of waste collection vehicles and equipment, together with financial assistance in the purchase of (cosmetic) machinery that were expected by the authorising agents of the state of competent practitioners of ‘recycling’ – like a ‘grinder’, and a conveyor belt. Finally, the collective also asked for a small piece of spare land within the premises of the ULB on favourable terms of lease and additional help to set up the operational facilities. The reader may recall from Chapter 5, that these are not unusual demands in the domain of MSWM as ULBs – in their fundamental civic responsibility to provide sanitary services to citizens – were recommended by the state to promote and provide grants to private agents for waste management under contract (MoEFCC, 2016). As a crucial point of difference in this case, these grants by the Board would favour a small group of female waste-workers and traditional recycling-based practitioners instead of being usurped by a private corporation performing large-scale WTE operations through casualised labour.

As a small ULB with limited staff but adequate (defence budget) resources, the Board was relieved to have its residents’ solid waste problems outsourced in exchange of these reasonable operational demands. By dealing with a collective responsible for its members (a ‘single-point’ contact), officials would not have to engage with individual workers. Furthermore, the Board readily agreed to the terms of one-time investment, as this would replace monthly and annualised payment of service fees to the contractor as current in other ULBs, thus,

minimising the frequency of bureaucratic contact and economising on repetitive paperwork. Things running on ‘autopilot’ – a word that the CEO used multiple times when we spoke – was an ideal situation for a small team of bureaucrats. Finally, residents of the Cantonment would revel in the reputation of having ‘helped’ marginalised communities and traditional female waste-workers of the city, while also championing a pioneering effort in the country where waste ‘collection’ and ‘recycling’ activities were combined to establish an ‘integrated’ state of the art facility. This presented them an opportunity to pursue a more independent set of programs, one that may be socio-economically as well as environmentally beneficial, efficient, and to compare and potentially ‘outdo’ the performances of the bigger neighbouring municipality (the AMC) and other smaller ULBs in the Swachh Survekshan Surveys.

The agreement fell in place thanks to a number of key alliances and local arrangements, which ensured that the scale, techno-practical, logistical (but also political) complexities involved in the operation were manageable. On the crucial aspects of representation and advocacy, negotiations with the particular ULB in question were mediated by an Ahmedabadi NGO, operational for more than 25 years at Ramapir no tekro and privileged with deep political connections that one could trace right up to Narendra Modi himself.⁷⁸ However, socio-political influence

⁷⁸ Manav Sewa, working as a charity in the domain of primary education, childcare, women’s health and socio-economic welfare at Tekro, had in 2015 purchased a struggling *peetha* and ventured into the business of plastic mediation, positioned as a non-profit. The new operation, which had surprised many locals, was stewarded by a new recruit at the NGO, a former engineer and a graduate in social entrepreneurship, and was justified by the NGO board as an additional method in their agenda to secure financial stability for the local women. Over the years of community contact, the organisation had come to realise that *peethas* constituted the lifeblood of the marshland community, where socio-economic and moral values stabilised. ‘Most of the *peethawalas* cheat these women. They offer low rates, tinker with the weights, extort money in the name of interest on loans’, one of the founders of the NGO, an upper caste Brahmin man in his late 60s, explained to me. He painted a simplistic demonic picture of malevolent and *gunda* (gangster) *peethawalas*, somewhat contrary to my direct ethnographic observations made within the community. The co-founder was explaining to me why intervening in the *peetha*-business constituted a necessary means in order to ‘uplift’ the local *kachre binnewalis* and their families. ‘These are exploited women, we needed to save them’.

alone does not run an operation, which demands deliverables, considerable technical mastery, experience and professional networking that would ensure the steady localisation, mediation and circulation of (waste) materials. With certain re-adjustments and learning, members of the collective started adopting the disciplines of timely, door-to-door waste collection. Instead of picking up materials by choice as freelance forager, as authorised waste collectors, they would collect solid waste from households without discretion, transport these by vehicles to their new facility and then subject the collects to segregation into the finer categories of recyclable, compostable, disposable materials, etc. The collective did not perform extensive sorting or processing on-site, instead outsourced them to trusted specialists. Many *peethawalas* from Tekro offered tacit support and counsel to the collective and offered to acquire their consignments of mixed recyclables (say, heterogeneous plastics), to further segregate the materials. They paid the collective a handsome 'cut' in exchange of securing a steady supply of recyclable plastics to mediate when other material-sourcing channels

Subsequently, Manav Sewa – supported by national and international donations, proved disruptive to the local commerce of recyclable plastics, not least due to their quoting higher-than-current exchange rates to *kachre binnewalis*. While many freelancing foragers flocked to them to sell their daily collections for higher income, other *peethawalas* had to raise rates by cutting down on already-meagre margins of profit. The unfair competition offered by the organisation made them notorious within the community, where *peethawalas* still held considerable social influence. Furthermore, access to the NGO's support programs being restricted to women and children, the men in the marshland community felt discriminated against. 'Why won't you give us job trainings and support as well? We have no source of income, no one gives us work.' clamoured a motley group of men gathered in protest in front of the Manav Sewa *peetha* one morning in late summer, 2017. The unrest caused by this civil society intervention within the sociomaterial fabric of the *peetha*-based community compounded residual fears and endemic anxieties generated by moralistic social elite interventions aimed at 'upliftment'. This alludes not least to a hegemonic reproduction of the Dalit as the downtrodden who needed saving and the upper caste who emerged as the saviour, a representation that undermined the socio-political (and material) self-expressions and economic progress made by the marshland community by themselves.

In any case, Manav Sewa offered a strategic value proposition to Tekro's *kachre binnewalis* who urged the NGO's management to represent them in seeking authorised MSWM contract as 'waste collectors' and 'recyclers' from a local ULB. Manav Sewa, for its part, was happy to expand its own operation and network of collaborative partners, but also redeem and demonstrate communal trust to their funders and stakeholders. The reader would recall my initial association with Manav Sewa as a volunteer.

were drying up. Recyclers, known from past professional connections, also advised the collective on the processes of limited production of raw materials (like 'flakes') on-site, not least cosmetically, which they offered to buy directly from the collective to boost their own feedstock volume. Partly processed 'flakes' (chipped but unwashed) were thus sent to these specialists for further processing and value addition. In this way, the chain of processes for producing PET 'flakes' of industrial quality was completed through a redistributed division of labour, visibility, and value re-assembled across different mediation sites.



Fig. 35: PET 'flakes' produced at the collective's 'integrated' SWM site (left) are transported in tightly-tied raffia sacks to commercial 'recyclers' (right) for cleaning and drying (via alkaline baths and centrifugal rotation in the picture). The two images on the right are from one such partner situated at a small warehouse remodelled from the ruins of an old textile mill in Naroda, whose specialisation lay exclusively in PET processing. Courtesy: Author

As of May 2021, when I last checked in over WhatsApp with some of the members, the arrangement was, despite small setbacks, strongly ongoing. It employed up to 30 women for regular door-to-door waste collection. They

managed a fleet of small and large container-carts and trucks (with separate wet-dry compartments) and went around the 3,000+ households of the ULB. In a radical departure from the gendered traditions of technology-use that we have encountered thus far, these women took to driving and operated most of these vehicles themselves. The rest of the team managed the sorting and 'recycling' operations. Depending on material, some worked on PET bottle mediation (separation of lids, wrappers, cleaning, grinding, 'flake' collection, containment, transportation), some specialised in and handled in-house composting with a few NGO representatives (student-interns and graduates) supporting vermiculture infrastructures; the rest of the women dedicated themselves to facility maintenance and accounting. The women earned substantially higher incomes (taking home between Rs. 7,500-9,000 per month) as compared to Rs. 3,000-5,000 earned by corporate employed casualised waste collectors and street-sweepers who I had also interviewed. Furthermore, the operation helped the women gather valuable technical and bureaucratic knowledge, market information about recycling value chains and privileged networks within the industry. Such knowledge was used to strategise individually (some of the women shared this privileged information with freelancing family-members and with *peethawalas* and other practitioners in exchange of favours) and collectively (navigating the operation).



*Fig. 36: Members of the collective posing with their material collection equipment.
Courtesy: Author*

Collective mobilisation by traditional waste-workers (especially women) in order to integrate municipal efforts at solid waste management is not novel in Ahmedabad. The long-standing 'Self-Employed' Women's Association' – SEWA – had managed to secure an official door-to-door waste collection contract for once-freelance foragers in Vejalpur, a neighbouring ULB to Ahmedabad that was later incorporated into the AMC. However, following the expansion, the contract was rescinded in favour of larger waste collection corporates and subjected to WTE-based end-to-end waste governance (we discussed the cited municipal logics of scalar and financial 'efficiency' in Chapter 5). Similarly, in Pune – another large Indian metropolis, the Kagad Kach Patra Kashtkari Panchayat (KKPKP) (see (Bhaskar & Chikarmane, 2012) for more details) had their municipal contracts annulled in the late 2000s, as the ULBs started gravitating towards large-scale for-profit firms which offered 'integrated' waste management services – waste collection and processing – and were, therefore, able to quote more lucrative service rates.

The stories of SEWA, KKPKP and other efforts across India at informal waste-pickers collectivising and faltering would seem to contrast with the above instance, where the MSWM integration seemed to work and persist. In this regard, one of the crucially decisive factors seemed to be the scale of the solid waste generated within the ULB per day. Indeed, the small size of the Cantonment Board meant that the ULB produced quantities of solid waste, which were manageable by a small operation run by former waste-pickers. However, this does not take away from the strategic professional, advisory and representational partnerships and topological alliances (both overt and tacit support mediated by a range of socio-economic, reputational and personal interests), which afforded the collective with representation and ability to make and keep techno-practical promises to the Cantonment and its citizens. Finally, these critical sociomaterial elements are brought together by the diverse processual and socio-economic possibilities actualised by plastics. Indeed, the appreciation of plastic waste (since late 2000s when the other waste-picker associations were operational) meant that relatively larger quantities of materials were now available within solid waste streams, which could potentially be diverted and made recyclable. Through their mediation, processing and exchange, profit and income could be derived.

Indeed, once the plastics – which constituted the bulk of daily collection – were separated, minimally sorted, diverted to *peethas*, or selectively ‘recycled’ locally (say, partial processing of PET) and directed to specialist recyclers, the rest of the materials, especially wet waste were separately composted (produce sold and redistributed via the NGO’s socioeconomic networks) and minimal quantities of waste were dumped (the ULB had allocated a small space for this). With no fixed capital liabilities on the collective, the quantity of plastics collected everyday

and their mixed methods of mediation (value addition) and exchange proved sufficient to run and maintain a profitable operation. The rest of the materials (say, smaller quantities of metals, glass, cardboards) were also diverted to *peethas* in exchange of money. The (sufficiently) small scale of the operation also made combining 'waste collection' and 'recycling' practices possible for a small team who relied less on large-scale machines and more on manual skills and tactics.

The strategy of integrating the two operations is key to the profitability, cost-efficiency (vis-à-vis the ULB) and the stability of the collective. This was unlike the earlier instances of mobilisation where waste-pickers' organisations were only able to offer door-to-door waste collection and quote service fees at the minimal cost of labour, unable to subsidize this cost through profit earned from processing the same waste and selling derivatives. Again, scale makes certain plastic mutabilities unfeasible. The small population of the Cantonment Board meant that their tax-based resources were also limited; as such, they were unable to solicit the kind of technology-heavy WTE-based costly and integrated infrastructures that the AMC could afford. However, these capital-intensive tech-solutions may anyway have been unsuitable for the smaller quantity of solid waste generated within the jurisdictions of this particular ULB. As such, the pragmatic practitioners and mutated networks of recycling seemed to offer this ULB an attractive proposition, which was technically feasible, dependable, involved less hassle (one-time payment of 'service-fees' in the form of seed capital and grants), and also, potentially, offered the opportunity to draw socio-cultural reputation from.

This delicate arrangement enacts a localised territorialisation of plastic flows, practical relations of obligations, and patterns of mediation. The plastic mut(e)ability, thus enacted, focuses on pre-existing but improvised modes and

networks of plastic recycling to keep them legally ongoing and sustainable for the near future. This 'against the grain' case visibilises what scholars and critics of scaled up and centralised MSWM infrastructure and corporate-privatisation to promote WTE have long been arguing. Technological 'solutions' afforded by WTE do not suit or are not fit for practice in every context, and that generally embracing more decentralised and locally-attuned modes of waste management practices and inclusive partnerships may generate favourable environmental and equitable socio-economic outcomes⁷⁹. The collective double-authorisation acquired by the former *kachre binnewalis* and their strategic re-relating with waste matter, plastics, recyclers, (authorised) *peethawalas*, municipality, state and civil society draw our attention to some of the almost-mundane overlaps, immanent crossovers, topological combinations and mutabilities enacted between the 'formal' and the 'informal', the 'authorised' and the not-yet authorised infrastructures, constituted locally across domains, especially at smaller scales of practice. This constitutes evidence that 'numerous policy options... complemented by institutionalizing the (diverse) linkages between the informal and formal value chains' (Demaria & Schindler, 2016, p. 301) are indeed possible.

Conclusion: Mut(e)abilities; Infrastructuring

This chapter assembles cases which demonstrate specific modes of authorisation solicited by recycling practitioners, who were either excluded from or offered unfavourable terms of integration into the centralised system of MSWM regulation and techno-practical infrastructure proposed by the Indian state. In particular, we described deliberative and practical sociomaterial topologies

⁷⁹ See (Gidwani, 2010; Bhaskar & Chikarmane, 2012; Schindler, et al., 2012; Gidwani, 2015; Samson, 2015; Doron & Jeffrey, 2018; Luthra, 2020), among others.

spanning multiple overlapping communities and networks, visibilised by an emerging set of interpretive standards and cosmetic arrangements, which afforded a delicate co-ordination between multiple (regulatory, socio-professional, commercial) regimes and priorities. We found multiple actors – from citizens to state officials, bureaucrats and recycling practitioners – coming together and acting beyond the on-paper rules of conduct (enlisted ‘duties’) under the SWM/PWM Rules, but also re-interpreting and enacting these Rules to suit local needs, affordances, vulnerabilities and opportunities. In these cases, especially, it would seem as if the integration of the *peethawalas* and freelancing *kachre binnewalis* into authorised modes of recycling even compromises the original policy and plans to prioritise end-to-end containment and integration of plastic waste almost exclusively for privatised WTE operations. In this regard, we can safely say, that the MSWM infrastructure has necessarily undergone localised mediation and transformation across the different sites, scales and knots of actual practice and practical feasibilities. Its original policy philosophy and plans are mutated, to an extent – if not muted. These limited mutations and mutings enact what actually becomes of this infrastructure in the above contexts, characterising its infrastructuring, as a verb, as infrastructure emerges through the granularities, tests and particularities of practice.

In the enactment of authorisation, i.e., in becoming new members of the state’s infrastructure of waste management, even the recycling networks and modes of practice would seem to be undergoing limited change, even if cosmetic. We find a range of sociomaterial and practical emergences, localised interpretation of the Rules, new material-semiotic standards and practical strategies for protecting the commercial and professional interests and particularities of plastic recycling. There are new and renewed community-formations (collaborative but also

potentially conflicting). There are efforts at re-furbishing old space, new routines and parallel temporalities emerge (say, annualised routines of servicing the 'grinder' and getting it ready for 'recycling' performances during inspection), new practical and hierarchical organisations (say, with the *kachre binnewali* collective), relationality with 'waste' matter, re-invented practices and practical networks (e.g. the new facility at the ACB outsourcing responsibilities but also co-ordinating control within the recycling network), and a range of sociomaterial performances. These improvisations effectively complicate the socio-practical landscapes and processes of plastic recycling. New standards and entities – 'authorised recyclers', partially mediated PET, part-time 'recyclers', 'appropriateness', 'safety' and so on – are enacted for the purposes of regulatory compliance and accountability. In thus seeking stability, some of the pre-existing networks, hierarchies and practical relations of plastic mediation and exchange also undergo limited mutation.

There are mutings too, as apparent from the newly authorised waste-pickers ceasing to choose and pick discarded matter, but these are folded into the ongoing changes, and processes of cosmetic, professional re-invention all in order to continue to enact plastic recyclabilities. Plastic's renewed recyclability, as evident from the particularities of the cases I presented, therefore, emerges as a situated and delicate assemblage of sociomaterial relations where heterogeneous elements from across governmental, civil, political, social, material and professional domains condescend unpredictably, unevenly, and enact 'authorisable' practice. These rest on co-ordination, microsocial re-negotiations and compromises, solicitations, flexibilities and freedoms. The threads of these cases are knotted around the historically marginalised communities of plastic foragers-mediators mostly based at the former marshes of Ramapir no tekro, but

in improvising to maintain continuity, they open up to wider networks and infrastructures, and to new possibilities of sourcing plastics, re-enacting if not re-inventing its mut(e)abilities.

The following chapter reveals mundane occasions of situated infrastructuring – what becomes of the MSWM system in actual everyday practice. It continues this ethnographic story of ongoing plastic mut(e)abilities – their complex emergence, immanent overlaps, tensions and topologies of practice, new schemes, calculations, arrangements and alliances, new circulatory networks of plastics and process, etc. grounded in the particularities of the cases I shall describe. There we discuss more re-territorialisations and occasions that enact plastic's recyclability, which also inform us of the localised mediations and (im)possibilities of WTE in actual practice. Thus, we shall also comment on the cross-links and enactments of plastic's incinerability (as part of the neoliberal municipal practice).

While the empirical focus of the present chapter remained on the favourable modes of integration into the MSWM infrastructure (of *peethawalas* and *kachre binnewalis*), the next chapter involves the empirical grounding how these practitioners (continue to) source plastic (waste), in order to keep their operations running and livelihood possibilities ongoing. Thus, the focus is less on positionality and posturing vis-à-vis the state or the professional networks, but more on some of the everyday practices and pragmatics of plastic localisation, and circulation. In crafting a discussion around the heuristic of 'shadow infrastructures', we describe processes and patterns that emerge to keep plastics incoming into the *peethas*, and into the sacks of *kachre binnewalis*, who still choose to remain steadfast freelancers. With recombinant sociomaterialities,

plastic recycling/incineration processes are kept ongoing. But these mutabilities engender and enact different forms of systemic muting, as we shall find out.

Chapter 7: Plastic Mut(e)ability II: Penumbral Circulations

“This image has been removed by the author of this thesis/dissertation for copyright reasons”.



Fig. 37: The circle in yellow points out Tishori Naka. This is where the narrow non-concrete road through Ramapir no tekro (shooting off on the right, almost indiscernible in the satellite image amidst dense housing) meets the main road (which is in North-South orientation). Across the main road on the west side are high-end housing complexes and commercial estates, served by wider, concrete-bound laned roads, more prominently visible in the map. Courtesy: Microsoft Bing Maps. Fig. 38: The Tekro central lane at its inner extremity deep within the settlement, taken from a pedestrian's perspective. Courtesy: Author

Now that we have studied some of the ways in which ‘informal’ practitioners are becoming state-authorised actors and continuing operations, legally, we turn to further processes that go on to (not) enact plastic mut(e)abilities. In what follows, we continue to study the ‘supply’ side of plastic recycling processes, and draw on how plastics get diverted away from the formal incineration network, or get resourced into the *kachre binnewali* and *peetha*-based networks. We map these modes of plastic circulation by the heuristic of ‘shadow infrastructures’, and situate these within a broader context of public life unfolding with plastic waste in Ahmedabad.

Shadow Infrastructures:

It was 9 in the morning, summer 2018, and there was pandemonium at the central lane threading into Ramapir no tekro from the main bus-road at Tishori Naka. After a light breakfast by the main road, I would head into Tekro for work at the *peetha* and this was a familiar scene. The confusion was due invariably to a 1 metric tonne (MT) capacity blue-green municipality truck which entered the passageway for door-to-door waste collection. The lane was narrow and lined densely with houses on either side (as seen in the satellite image, Fig. 37), but also uneven, bumpy, not laid in concrete and tar (as seen in Fig. 38). There was only enough space to allow two-way passage to smaller and lighter vehicles most commonly used by the Tekro population like two-wheelers, bicycles, autorickshaws (tuk-tuks), and *chhota hathis* – small trucks ferrying plastic consignments of all kinds from Tekro’s many *peethas*. It was no surprise, then, that large and heavy vehicles – like the standardised AMC-WTPL⁸⁰ waste

⁸⁰ AMC = Ahmedabad Municipal Corporation. To recall from Chapter 5, WTPL (anonymised acronym retained) stands for the anonymised corporate entity contracted by the AMC to perform door-to-door waste collection in the West ‘zone’ of Ahmedabad city municipality, which has 6 other constituent ‘zones’ under its jurisdiction (AMC, 2020). This outsourced zonal operation of WTPL is based at the

collection truck, would take up road space, face greater surface resistance, and nearly choke vehicular circulation. While these waste-collection trucks circulated near-seamlessly through the neighbourhoods of Ahmedabad with wider and concrete-bound roads (including areas on the left side of the map in Fig. 37), they were evidently unsuited for smooth operation in Tekro's narrow, coarse thoroughfare, especially during the morning rush-hours.

Indeed, morning was a busy time for the people of Tekro, as many would have to reach their professional destinations in time. Plastic consignments, similarly, had to be brought in early in the day to the *peethas* for sorting and storage, and sorted, baled plastic feedstock needed to be transported out of the *peethas* to the recyclers. All these inward and outward plastic circulations needed to be carried out in a regularised and predictable fashion. On the other hand, morning was the preferable time for domestic waste collection as discards stored inside the household overnight under warm and humid weather conditions, sent out putrefying gases and called out for timely and urgent removal. Therefore, a long serpentine queue of impatient vehicles and people had built up along the lane, and on the other hand, there was an eager waste collection truck trying to find its way in. Vehicles honked aggressively, men and women shouted. The truck-driver maneuvered his vehicle to position it right along one edge of the lane to give passage space to the waiting vehicles.

Remote Transfer Station (RTS) of the West zone set up in the marshes adjacent to the dense human settlements of Ramapir no tekro. The RTS premise, its attendant physical-technical infrastructures and door-to-door waste collection devices (including trucks) are constructed/commissioned and provided by the AMC to the WTPL for operation and maintenance (O&M type contract), with further commissions offered to the company for the delivery of waste collection services (AMC, 2017). Solid waste, collected from the different wards of the West zone, are aggregated at the RTS, compressed, and redirected to centralised Waste-to-Energy (WTE) plants for incineration. WTE plants usually run under separate contracts also from the AMC (AMC, 2017). In a multi-actor public-private partnership, therefore, WTPL is responsible for overseeing the everyday operation in 'end-to-end' (household to waste treatment plant) transit of waste materials from the West zone of the city to the centralised WTE plant.

As the truck inched forwards, women (men rarely performed waste disposal work) from the households on either side of the lane came outside their main doors and emptied their bins straight into the waste storage compartments of the moving vehicle. In haste, wet and dry waste – which were supposed to be neatly segregated and triaged into colour-coded compartments of the AMC trucks – would exceed the ‘authorised’ order of containment. Given the sheer spatio-temporal constraints of the operation, households emptied both their bins – green and blue – hastily into whichever compartment lay geometrically on their side of the road. Thus, in actual practice, the green compartment – reserved for wet waste and lying on the left side of the vehicle (facing the front) – served as mixed waste receptacle for houses along the left side of the lane, while the blue storage compartment – reserved otherwise for incinerable plastics, paper, etc. – filled up similarly with a mix of wet-dry waste coming in opportunistically from households along the right side of the lane. Furthermore, the smaller size of the green-coded compartment on the left meant that it filled up sooner, and therefore, its contents would spill either onto the blue-coded compartment on the right, or onto the road, or some passer-by, duly drawing ire, if not expletives from them. The uneven road layout caused bumps and did not facilitate segregated ordering by the colour-coded separate compartments either.

One of the busy passers-by had managed to squeeze his way past the truck – thanks to a newspaper which he spread out and held as a protective shield to his shirt as he skilfully maneuvered his way past the dirty mudguards of the vehicle. The man breathed a sigh of relief upon reaching the main road; he had evidently crossed the first hurdle on his way to work and managed to emerge unscathed, his newly washed white shirt, delicately tucked in, had remained untainted by any waste stain. Thanks to his little strategy. The man spit some beetle-leaf juice on

the roadside: '*Aa dar roj ka* (everyday) drama', he remarked before hastily moving on his way.

Behind the tall official claims of 100% daily door-to-door coverage of waste collection services projected by the Swachh Survekshan survey in Ahmedabad was tense and messy *dar roj ka* drama. Authorised waste collection could be a noisy, smelly spectacle of raw emotions, pungent remarks, material collisions and spills, mini-contests (for time, materials and space), compromises, confusion, and friction. In reality, the practice was neither imperceptible, regular and reliable – nor, mundane – as infrastructures are supposed to be (Star, 1999). It appeared far from normative, alive instead in more ways than one (Bennett, 2010; Amin, 2014). Also incomplete in practice, since as opposed to official claims, municipal solid waste collection did not provide 100% coverage to every household. Indeed, it took the truck too long to reach the other end of Tekro. Sometimes when the vehicle's waste containers filled up mid-way – say, during festivals when daily waste increased – the truck would not proceed deeper into the settlement, or come back, emptied, for a second round. Households deeper inside the settlement often went unserved, as the driver did not dare to make another trip inward. With a population of more than 150,000 (Marnane, 2019), one trip by a 1 MT truck often fell short of complete coverage of the all the households of Tekro. A bigger truck (say, of 2 MT capacity) was not an option as the road geometry would simply not allow the large vehicles to come in. Multiple trips by vehicles smaller than 1 MT capacity might do the trick, but the waste collection contractor did not have any of them in the fleet, and was unwilling anyway to allocate valuable labour and time to it.

'It takes me an hour to collect waste from Tekro, I have other neighbourhoods to serve', the authorised truck-driver later told me, describing the morning ritual of solid waste collection in terms akin to a total nightmare. 'Brother, believe me', he confided, 'I get my entire day's quota of expletives and *tension* (stress) in the morning hours.' Sometimes, he even avoided making daily rounds to Tekro (citing illness, for example) and resorted to three or two times a week visits unless there was too much insistence and pressure from the management above. Some days, he would even manage to convince another driver to perform the 'Tekro round' in his stead, as it was 'simply impossible to do this work every day'. Finally, in addition to the incomplete, irregular coverage of door-to-door solid waste collection, dry-wet segregation order also appears to be compromised. It would therefore seem that less waste quantities were being collected for WTE, and furthermore, the calorific value of the feedstock was being reduced too, thus, compromising the promises of cost-efficiency projected as the hallmark of the neoliberal municipal solid waste management (MSWM) infrastructure. Citizens also seem unhappy, as their daily waste goes uncollected (in time).

These events at Ramapir no tekro are not exceptional. Research on cities of the Global South has highlighted their intractability – albeit unevenly – to modes of urban governance and the provision of essential services in these uneven spaces (Simone, 2004; Roy, 2009; Chakravarty & Negi, 2016; Anand, 2017). In India, patchy public life has been linked to rapid urban growth; inadequate, inequitable (access to) infrastructures (Doron & Jeffrey, 2018), neoliberal flows of capital, the enduring legacies of civic and socio-demographic divides (McFarlane, 2008; Roy, 2009; Graham, Desai, & McFarlane, 2013; Doron & Raja, 2015), and political, material agencies 'from below' (Appadurai, 2001; Anand, 2011). Incomplete, 'inefficient' service coverage in solid waste collection has similarly been noted in

public and academic discourse. A 2009 multi-city case study estimated only up to 70 percent of urban households in India having access to waste collection services (Ohri & Singh, 2009). 'Poor collection efficiency of MSW' (municipal solid waste) was noted as a primary challenge faced by the AMC in a 2012 zero-waste roadmap document jointly drafted by the municipality (UNCRD & AMC, 2012). A recent 6-city case-study, including Ahmedabad, estimates that about 60% of collected waste gets 'mixed during the transfer and transportation' (Shankar Cheela, et al., In Press). The same study notes large percentages of mixed solid waste reaching WTE plants in Indian cities, a general observation also echoed by Shankar and Sahni (2018).

Most of these observations were made after and despite the federal intervention in the matter since the early 2000s (see Chapters 4 & 5). This would include the successive phases of pragmatic techno-legal, bureaucratic, civic, cultural, contractual and techno-practical infrastructural accretion across scale – both nationally and in the city (see Chapter 5 esp.), when technological intensification, privatisation, and 'cradle-to-cradle' integration towards WTE were promoted as silver bullet strategies to render MSWM 'efficient' (see also (Purohit & Bothale, 2011; UNCRD & AMC, 2012; Kothari, 2013; Gidwani & Corwin, 2017; Luthra, 2017; Oates, et al., 2018; Luthra, 2020)). As discussed above, in the case of Ahmedabad, the municipality's rapid territorial expansion in the 2000s – with ensuing growth in jurisdiction, waste generation and investable revenue, alongside high population density (11, 948/ sq. km; the highest among cities in India), were highlighted to constitute conditions for service-efficiency and profit maximisation in technologised, privatised waste collection and processing by large-scale incineration (Purohit & Bothale, 2011; UMC, 2012; UNCRD & AMC,

2012; AMC, 2015). Evidently, things appear much patchier and messier in practical reality.

If we were to unpack such occasions, where the infrastructure of waste collection manifested as 'simply impossible' to carry on as desired, or as planned, then we are rendered face-to-face with a number of resistances. To pick on a few, these include physical resistances, evidently – say, due to an unsuitably large truck entering a narrow road densely lined with houses and walls on either side, resistance from the road surfaces, the prospect of head-on collisions with impatient vehicles *en face*, or waste-depositors meeting the metallic resistance of the waste collection vehicle before resigning to throw waste in the nearest and the most convenient container available. We are made aware of temporal resistances – the driver could not afford a second round of waste collection if the containers filled up midway inside Tekro, as there were time-pressures to perform waste collection at other sites and neighbourhoods. Occasionally, there are pressures from RTS-based managers or co-ordinating higher authorities obliging the employed truck-drivers to accommodate ad-hoc waste collection rounds as part of more 'personal' demands, all such factors leading to incomplete or patchwork waste collection. Furthermore, the truck-driver must level with socio-cultural resistances that accompany his ritual handling of waste – manifest not least in the form of sneers, pungent remarks and expletives when the public is faced with the prospect of sticky, smelly (potentially 'polluted') matter spilling over or leaving their marks on them. The authorised waste collector tells us about other resistances, hinting at corporeal and mental fatigue which characterise the labour and time-extractive routines and patterns of the work. Finally, the materialities of waste raise their own set of demands and resistances, say, with regards to the tendency of food waste to spoil and stick, or the proclivity of certain kinds of plastic

waste to flutter or tumble out of containment. These materialities not only make claims that waste be collected in a timely manner, oblige techniques and conditions of processing or produce necessities of separation from other lived environments, but also – at the same time – make these very tasks of containment difficult (Hawkins, 2001; 2006; Hawkins, et al., 2015; Altman, 2018; Sosna, 2021)

Resistances – whether physico-material, spatio-temporal, contractual, political, cultural, biological, microbial, affective and so on – animate what Anna Tsing would call ‘friction’ (2011). Points and surfaces of friction are generated around ‘events’ when multiple elements congregate – if not collide – in tense, contested interactions. Frictions emerge likely out of differences, which may range from the ‘material’ – say, incompatible geometries between concurring objects and forms, to the ‘social’ – say, conflicting priorities and claims on a limited road space, different socio-cultural and economic ‘values’ mediating waste, etc. In the above vignette, we find multiple infrastructures and actors brought together in the occasioning of waste collection. They are intersecting, though not necessarily dovetailing in collaborative mutual alignment, thus, co-producing different forms of mismatches, and messy encounters. These did not just involve tangible elements of the AMC and WTPL-mediated system of solid waste collection, or prominent ‘heavy’ civic infrastructures like roads and housing in Ahmedabad city, but also fold in and link to various socio-economic routines, interests, cultures, processes, spatio-temporal patterns, techno-materialities and subjectivities across sites, scales and contexts that characterise the city (Roy & Ong, 2011; Roy, 2016) and co-create its ‘everyday’ (Graham & McFarlane, 2014) . Frictions mediate circulation and flow. They slow things down, hold them back. Frictions produce conditions where things do not reach destinations on time, or do not

reach there at all, or even reach unplanned, undesired locations (say, dry-wet waste getting mixed up).

However, occasions of friction, even disruption, clogging and breakdown (Bennett, 2005; Graham & Thrift, 2007), are generative, Tsing reminds us. Frictions bear methodological significance in that they enable us – researchers and practitioners – to grapple with and study large and complex ‘systems’, like the neoliberal MSWM infrastructure. In effect, frictions disturb the delicate ordering of elements, tinkering complex and fragile techno-material, and political relations otherwise territorialised in infrastructural forms. Thus, they arrest our attention to the relational arrangements of material and power that are meant to be mundane – not to be overtly seen, heard, or smelt (Star, 1999). In this regard, as made evident by the sights, sounds, smells, people and plastics leaking out of the above example, frictions visibilise the constitutive heterogeneity of and tensions and mismatches inherent to infrastructures (Bowker, Baker, & Millerand, 2010; Kallianos, 2018; Michael, 2020). Indeed, the MSWM system of solid waste collection in Ahmedabad comes across as a multiple; one that assembles several infrastructures and actors. These include, as evident in this anecdote, ordinary citizens who dispose waste (termed as ‘waste-generators’ in the federal-level (M)SWM rules of 2000 and 2016), socio-economic arrangements of waste-labour (Fredericks, 2014; Shankar & Sahni, 2018; Luthra, 2020), physical sites and infrastructures (like urban ‘zone’-based waste aggregation points or RTS), technical devices (trucks, compressors), and so on. In Chapter 5, we elaborated on the planning design of this infrastructure, which also included bureaucracy, (local, national) legislation, cultural reputation and contracts.

However, in their actual occasioning, infrastructures involve and reciprocally mediate a wide range of connections, legacies and relations (Star & Ruhleder, 1996)) call these the 'reach' or scope of an infrastructure, but these networks often exceed original relationalities included in infrastructural planning (Hodges, 2017; Michael, 2020)). Frictions reveal some of these wider relational fields and their tensions, as they congregate and emerge immanently under particular circumstances. In the above anecdote, for example, as the waste collection truck circulates through particular urban places and times, a range of resistances encountered in the event of waste collection reveals 'other processes (which) do not always constitute part of the initial design of infrastructure ... (but) become formative of everyday infrastructure experience(s).' (Kallianos, 2018, p. 759). Indeed, the truck must negotiate uneven urban topographies, the varying temporalities and pressures of road traffic, different work pressures, etc. in order to be able to dispense their duties. Again, the material partitions within the truck receptacles prove insufficient to maintain dry-wet segregation, and are, in turn, contingent upon a range of spatio-temporal, sociomaterial relations and constraints. As Law (2002) reminds us, the circulating object itself may get transformed through these mediations, and in turn, so do the functionalities and relational characters of the infrastructure that it enacts and represents.

Infrastructures, therefore, emerge 'topologically' (Harvey, 2012). Not simply a pre-defined arithmetic sum of multiple discrete parts, infrastructures are constituted instead by elements that unfold. They are rife with 'internal' differences, mismatches and tensions yet unevenly linked, their relationships more emergent and immanent than fixed (Michael & Rosengarten, 2012; Anand, et al., 2018). Constituents of an infrastructure may themselves be fractal and fragmented, made up of, nested within, owe to, draw from, and leak, seep or

collide into a range of other hierarchised bodies, relations, infrastructures, sites, routines, patterns, processes and histories (Larkin, 2013; Latour & Woolgar, 2013). That is to say, while the Solid Waste Management (SWM) and Plastic Waste Management (PWM) Rules enlist a range of actors, duties and mutual relations as part of infrastructural planning, in actual practice, infrastructures are distributed sociomaterial assemblages, which must negotiate, knot with and relate to a much wider range of historical and contingent relations. In the frictions and resistances encountered in the above example, some of these historical patterns come to the fore. For example, the waste-collector – a key constituent in the waste collection system – speaks of regular physical and mental exhaustion rendering his performance irregular. This experience alludes, on face value, to an exploitative arrangement of securing arduous (overtime) labour at inadequate wages and to a range of socio-cultural, financial, and microbial resistances faced regularly. However, as studied in Chapters 4 & 5, these dehumanising practices of labour are ‘embedded in’ and draw evidently from older caste-based, gendered, religion and class-inflected legacies and ‘infrastructures’ (Simone, 2013), whose patches and fragments have been co-opted, sutured into and re-packaged as ‘internal’ to a modern MSWM infrastructure, to offer it base and operational momentum. The ‘new’ infrastructure is thus embedded in traces of the ‘old’, drawing in age-old frustrations of violence but also the possibility of revolt and the hope of different futures of solidarity. Indeed, as Star and Bowker put it, an infrastructure does not emerge *de novo*; it ‘wrestles with the inertia of the installed base and inherits strengths and limitations from that base’ (Star & Bowker, 2006, p. 231), albeit with the base being distributed and contested. The field of relations that compose an infrastructure, that it must negotiate, and get

enacted by, in turn, thus emerging topologically, through the specificities of frictional events.

I offer another illustration how the diverse sociomaterial legacies and the interconnectedness of the MSWM system in Ahmedabad are compounded in actual practice by the inherent neoliberal contracts and pragmatics of profitability which constitute this infrastructure. The governance of plastic waste in Ahmedabad draws – as we have seen – on national-level enactments but more substantially involves localised State and municipality-level (AMC) interpretations, obligation and contractual neo-liberal techno-infrastructureal arrangements of material containment, transport and incineration at a large-scale (usually at the level of the entire city-municipality or at each of the 7 urban ‘zones’ of Ahmedabad and its different ‘wards’ – see Chapter 5). Tedious and elaborate as these arrangements may be, to incinerate plastics as desired, these elements must on the ground interact with, mediate, and be mediated by a range of real-life constituencies (we elaborate in Chapter 4 on some of these uneven sociomaterial, spatio-temporal ubiquities). Yet, ‘efficient’ incineration⁸¹ demands simplification of this mess, and adopts algorithms of optimisation as part of the pragmatic calculations of enacting profit and scaling up operation. Obligated by the centralised Rules to provide equipment and infrastructure (if not incentives) to the private waste management contractors, the AMC – as seen in Chapter 5 – arranged for batches of different devices to distribute; from hand-pulled carts, brooms, uniforms, colour-coded individual bins, community bins to door-to-door waste collection trucks with standardised size-ranges and containment

⁸¹ See Chapter 5 (also (Chaturvedi & Gidwani, 2011; Oates, et al., 2018; Kornberg, 2019; Luthra, 2020)) on the ‘efficiency gain’ achieved due to the adoption of privatised incineration regimes as claimed by controversial government reports and cited by waste governance bureaucrats and policy-makers.

capacities. However, as made apparent by the preceding vignette and discussion, the actual practices of access, waste containment and transport, etc. seldom toe the carefully drawn lines of optimisation.

If we follow the truck – a key device in plastic collection, some of the inherent tensions, non-representations, and problems of standardisation and neoliberal contracting manifest (Star, Lea, among others, have written about infrastructural discontents and the marginalisations produced and stabilised by standardisation – see (Star, 1991; Lea, 2020)). This is especially the case as the truck negotiates the city's uneven road infrastructures, housing patterns, traffic routines, etc., which are also key to the regular functioning and efficiency of waste collection but are not always governed by the waste management rules. The standardised lower limit in truck-size (1 MT), commissioned by the AMC, clearly follows an algorithm to ensure optimal functional efficiency (say, in securing household access) but also profitability in waste collection with consideration for operational costs – fuel prices, for example. In order to maximise plastic collection (beneficial for private WTE companies as they draw income from the measured weight of incoming incinerables and also earn from the energy produced – more mass, more energy; but also for the municipality in meeting its civic duties, and bureaucratic, political expectations to collect as much waste as possible from across the city), the trucks must be able to transit smoothly through the largest number of roads and access the highest number of households and waste disposal sites. To minimise costs for the municipality, however, the trucks should not have to make more trips than necessary (indeed, waste collection companies draw contractual income from the municipality based on the number of trips, and not on the weight of the materials collected). The inherent heterogeneity of practices, contracts, units of measurement, ethos and practice-based pursuits of

profit constituting the MSWM infrastructure makes waste collection complex, but also contentious. Yet, in this neoliberal system, the priority for universal public good is compromised in pursuit of the greatest possible good for the narrow set of actors involved in the contract. As a result, we have trucks which would pass smoothly through most of the city neighbourhoods, yet clog passage in places like Tekro where lanes are narrower and bumpier. Not by accident, these are also sites (as seen in Chapter 4) which evade the priorities of civic governance (hence, narrow, clayey lanes) and resist real estate co-option and the hazards of 'redevelopment' (Desai, 2012; Mathur, 2012). In the process, the historical marginality of (sites like) Tekro is re-entrenched as its residents' claims to the municipal waste management infrastructure and sanitary services are effectively undermined, reminiscent of older patterns of producing and perpetuating spatial, social differences (Chapter 4).

The state-mediated centralisation of plastic localisation for incineration at scale thus encounters its contingencies at specific locations, especially at the margins of socio-economic and civic political calculation: at sites and times (morning-hours, festive seasons) when the system manifests as 'impossible', leading to blockages, delays and frustrations (if not 'nightmares'). However, these sites and times also reveal the more political problems inherent to such a mode of civic infrastructure development, where marginalisation manifests not simply as an after-effect, but arguably, as a pre-condition instead. Treating infrastructures as topological enables such visibilisation. Critically, it is in the liminal spaces of infrastructures that the problematic and 'fragile relations between people, things, and the institutions (both public and private) that seek to govern them' become exposed (Appel, et al., 2015). As such, our interest shifts from a mere reckoning of liveliness of mundane infrastructure (Bennett, 2010) to more focussed and

specific questions (Braun & Whatmore, 2010; Amin, 2014; Liboiron, 2016). In view especially of our critical historical discussion above, one could ask what legacies and problematic pasts are being drawn into the sociomaterial patterning of the SWM infrastructure, and how are these being mediated through actual occasioning (Barry, 2001; 2013; Hodges, 2017)? In particular, what further forms of mutings, but also mutations, do these mundane frictions, performances, and systemic improvisations entail? This shift in regard toward emerging patterns – reproduction, but also new patterns emerging, potentially – leads us to a final observation. This is a crucial argument of scale and stability around emergence which lends conceptual bearing to the present chapter.

While the morning events at Tishori Naka may come across, for some, as points of disruption and instability, an ‘infrastructural disorder’ (Moessinger, 2000; Kallianos, 2018), which departs from an order that planners plan, and bureaucrats desire – on the large-scale to assume a life of their own, I contend that these events do nevertheless have a certain degree of regularity and predictable quality about them. They have a repetitive and reproductive character (Harvey, 2012; Harvey & Knox, 2015). Furthermore, I argue that they constitute, rather than outlie infrastructure. This is especially evident in the scale of everyday practice in this neighbourhood, where the apparent ‘disorder’ is not entirely contingent. The micro-events – from transgressive sociomaterial flows to frictions and blockages – constitute routines and patterns, which the local populations are well aware of, which they predict and duly adopt mitigative strategies for (recall the protective newspaper). The difficulty in access encountered by the waste-collection trucks, the traffic bottleneck along Tekro’s thoroughfare, the (dry) plastics and (wet) food waste becoming mixed in a containment infrastructure otherwise devised to keep the dry/wet separate in respective blue/green compartments, the material spill-

overs, frustrations, etc., are not aberrations, or one-off events. Instead, they constitute *dar roj ka* drama, as we have heard the passer-by comment (my own everyday experience of being in the thick of this 'friction' on the way to work would also attest to the same). They produce, animate and reflect the actual 'order' of events, as they repeat during waste collection rituals in this neighbourhood, and perhaps in other sites across the city too, where similar resistances might manifest. The above frictions and disruptions to the large-scale municipal order of plastic flows are more or less guaranteed at a localised scale of practice, sutured, as evident, into other routines (e.g., going out for work), infrastructures (e.g., the daily newspaper industry), etc.

According to the planning of the MSWM infrastructure, it was expected that the waste collection truck would turn up every day to collect the waste from every household. Indeed, the truck's itinerary was part of a planned and territorialised set of relations – proposed through a range of techno-practical, informational, bureaucratic organisational infrastructures where regular door-to-door waste collection was favoured and supported, at least on paper. In reality, however, say, for the residents of Ramapir no tekro, the truck did neither reliably turn up every day, nor did it do so at its scheduled time. However, if and when it did, it was nearly a matter of certainty that Tekro's main thoroughfare would be blocked, and pandemonium follow every time the truck tried to maneuver its way in. The local passengers, residents, shopkeepers, and bystanders expect that the truck's passage will be slow, and that it will hit somebody's wall, or stagger at a pothole at some point – mess and *drama* would follow. The high likelihood of the morning mess draws from the fact that Tekro's roads *are* uneven, narrow, and non-linear, that the AMC-WTPL trucks *are* unsuitably large and unwieldy.

Indeed, the whole situation transpires partly because the priority of providing equitable public service universally was undermined in the centralised standardisation of MSWM devices in the first place, side-lined in the pursuit of profit from the operation. Further irregularities are possible, say, with truck-drivers calling sick, wilfully missing a round out of frustration, or out of compulsion due to practical constraints. These possibilities too are not unforeseen in Ahmedabad's public life, as they link to and draw from stable socio-economic patterns, where waste-workers are routinely subjected to difficult working conditions, low pay, hazards and frustrations (founded nevertheless on deep-rooted and extractive social and economic legacies). Some of these irregularities may be partly stabilised by drawing in other mitigatory relations and exchanges (e.g., relations of solidarity where a co-worker stands proxy for a sick/frustrated truck-driver, through tips and incentives from households, solicitations, even complaints to the manager, to higher authorities, local corporators and so on in a 'political society' (Anand, 2011; Dey & Michael, 2021)).

The morning frictions are also due to a range of other stable but non-aligning (even contrary) sociomaterial patterns. From the socio-economic priorities and routines of the people of Tekro, also their directionalities and rhythms (one has to go to work in the morning, plastics must reach the recyclers early, and thus the anxious flow of people and things from inside Tekro outward towards the main road) to the materialities and the technopractical temporalities of waste-work (rotting waste must be collected early, recyclable plastics must reach *peethas* and recyclers in the morning for them to be able to set up their daily routine and work-orders). Under the immediate spatio-temporal, physico-material constraints, thus produced, what transpires at Tekro are more or less expected, at least locally. Plastics ending up mixed with wet waste in both the green and blue

compartments is an outcome which is more likely than their dry, neat sequestration into blue compartments separate from moisture, as infrastructurally aspired. Thus, dry-wet waste getting mixed is, again, *the* 'order'.

We are thus looking at localised orders of sociomaterial encounter, flow, frictions, and fixity within the municipal waste collection system which are more or less stable, predictable. These routines and patterns constitute the actual enactment of the MSWM infrastructure in this neighbourhood (and perhaps in many more). As such, they are better represented as situated forms of 'infrastructuring', more localised emergences of an infrastructure, instantiated in actual practice. The constituent patterns of plastic containment and flow within such infrastructuring may not align with the original material localisation pragmatics incorporated into the planning of the state-sponsored infrastructure, indeed, even prove disruptive to the profitability and the functionality (even viability) of its incineration-based large-scale and costly technoscientific and public-private contractual arrangements. They clearly exceed some of the pre-defined territorialisation of authorised waste sequestration and segregation, and yet, are mediated, grounded, by it. They emerge in forms that are more non-linear and topological than planned, and span multiple actor-networks, infrastructures and times than the MSWM infrastructure (despite its complexity) could originally encompass. But these are more-or-less patterned arrangements – territorialisations; re-territorialisations perhaps, with 'network, ... speed and direction of ... movement, ... temporalities, and ... vulnerability to breakdown' which are all variously stabilised and rendered as reasonably regularised predictable occurrences (Larkin, 2013, p. 328).

As shown above, these specific patterns emerge from the uneven assemblage of the MSWM infrastructure, its links and overlaps with multiple other infrastructures, drawing on their respective stabilities, enduring legacies but also mutual differences, mismatches and frictions. Again, the 'neoliberal' state MSWM system itself is composite and heterogeneous, complexly nested and enmeshed within, scaffolded and mediated by a range of territorialised sociomaterial relations and mismatches. These include historical inequalities in socio-economic, civic, spatial and labour relations which have been compounded – made durable – through techno-practical instantiation and stabilisation (Latour, 1990; Harvey, 2010). The orders of material (non-)circulation, emerging from these cross-infrastructureal tensions, frictions and cracks, are therefore, hybrid, embedded in and patching together many places, plastics, peoples, practices and infrastructures (reach, or scope). The relative immutability of incompatible cross-infrastructureal relations (say, between the stable width of roads at Ramapir no tekro, and the stable standards of municipal truck sizes), their unresolved tensions and persisting differences lend substance, content, texture and stability – various degrees of regularity, predictability and expectation – to these very patterns. These actual orders, *dar roj ka* patterns and routines of sociomaterial circulation (or stagnation), however dramatic or delicate, topological and transient, as they may be, constitute a range of phenomena that I shall henceforth elaborate under the heuristic of 'shadow infrastructures'.

Shadow infrastructures are, in many ways, necessary entailments of the MSWM system, constitutive of, and elaborating its infrastructuring. They emerge from the various points of opacity – 'shadows' – produced and left behind by the neoliberal systemic orchestration of MSWM. These opacities may refer to the delays, irregularities, non-coverage or lack of access to municipal waste collection,

enacting sites, times and ethico-practical standards that waste collection cannot attain, or reach, or does not prioritise, plan or desire to reach. Shadow englobes materials (plastic and other waste materials) that go unattended, unpicked; 'societies' and populations that go unserved (say, residents whose waste go uncollected) and marginalised – if not overlooked (say, *peethawalas* and *kachre binnewalis*, but also overworked, underpaid waste workers invisibilised under uniforms), living in the shadows of unfulfilled state and infrastructural promises. These shadows are produced by the various resistances, frictions due to 'external' mediation (say, by uneven roads, narrow lanes, oncoming traffic) but also 'internal' calculations (say, certain sites were never prioritised for coverage), discontents (say, frustrated truck-drivers), and tension (say, multiple practical contracts for waste collection, processing, etc. which do not necessarily co-align on their respective priorities), the 'internal' and the 'external' often overlapping and producing generative mismatches, as we have seen.

Shadow infrastructures are also sites for processual improvisation, and inventive collaboration. As the MSWM system is slowed down, stopped, when trucks do not arrive on time, material categories mix, when the infrastructure fails, frustrates, manifests as 'impossible', symbiotic sociomaterial alliances, hybrid exchange relations, patterns, routines, routes, ethics, and organisations emerge from these shadow spaces. These are partly embedded in and draw from the contents and discontents of MSWM, but also in other networks.

In what follows, we describe and grapple with some of the new orders of plastic flow (but also fixity) emerging from the opacities and shadows produced in the wake of the MSWM system. These emergent patterns, which are more hybrid and topological than planned by the state (or its neoliberal agents) constitute and

are reproduced by ground realities. As we shall see, these circulatory patterns also enrol multiple actors (often across and beyond the planned domains identified under the SWM/PWM Rules) with different relational obligations (again, these duties do not necessarily map neatly onto the official codes of conduct under the MSWM guidelines). Therefore, in some sense, these emergences (the MSWM infrastructure working here as a verb form – infrastructuring) are re-territorialisations, if not derivate ‘infrastructures’ in themselves in their gradual stabilisation. In the cases that follow, shadow infrastructures will stand for blurry sociomaterial productions and slippery circulations of incinerable/recyclable plastic waste, as if occurring at the penumbra left behind by the planned regime. They do not always have clearly defined boundaries, edges, and do not lend easily to knowledge and strong theorisation. Like light that falls on an uneven object to produce shadows not necessarily even and well-delineated, perhaps even topological to an extent than predicted (light beams proximal to one another may end up reflected, diffracted and dissipated to distant locations after hitting opaque resistances along the uneven surface of reflection), shadow infrastructures, too, represent something akin to a penumbra (Law & Lien, 2013).

Some of these new routines and patterns of plastic access, flow and fixity may be recalcitrantly local, tucked (often decidedly) in places and networks difficultly accessible by large constituencies and governance infrastructures. The ‘reach’ of shadow infrastructures pervades sites that the MSWM infrastructure cannot reach. That is, they may have connotations of being ‘in the shadows’. In any case, shadow infrastructures span across multiple constituencies, sites, scales and infrastructures, and as such, they tend to be liminal, situated at delicate interstitial sites and times of friction, when the authorised orders of MSWM are unable to be present, or maintain distinct sociomaterial boundaries, cohesion, stability,

expectations and alliances there-in. In their specificity, but also in their simultaneous distributedness, reach, and localisation at the points of absence or weak presence of more prominent infrastructures, shadow infrastructures may be able to evade surveillance – in this case, by the state or its (contracted private) MSWM agents. This is further due to large systems – like the state or the municipality-level waste governance infrastructure – being limited by their scale, architecture and complexity to be able to detect (or perhaps bother about – as we shall see) anomalies. In effect, they may even be desired by MSWM authorities, silently approved, favoured and held discretely in place, allowed to go on because they may serve or maintain larger interests. In this regard, shadow infrastructures tend to be ‘unseen’ by the state (Scott, 2008) and may even be extra-legal, grounded in complex and localised moral economies (Roy, 2009; Shah, 2010).

I argue that, and illustrate how, shadow infrastructures constitute some of the actual conditions and processes how plastic mut(e)abilities are enacted. Here we can trace the state-mediated efforts of incineration getting muted, mutated (say, its efficiencies reduced) through a range of local contingencies, and intentional mediations, and where, as we shall see, new possibilities of recycling co-emerge. These comprise new spatio-temporal and practical routines of plastic localisation (and flow), forms of alliances, collaborative ethics, materialities, relationality and networks, which (continue to) enact plastic’s recyclability under (and despite) the inclement circumstances following the state’s regulation of SWM. However, the story of multiple plastic mut(e)abilities unravel much more complex processes of sociomaterial becoming than a simplistic precedence of one set of plastic processes (recycling) muting, or thriving on the failures of the other (incineration). There are more twists, turns and folds that will complicate our understanding of plastic processes across scale. In what follows, I illustrate three penumbral cases

where plastic mut(e)abilities get enacted, analysing how new sources of recyclable plastics, networks, and times of mediated circulation are crafted and stabilised. As promised in the last chapter, these cases will empirically concern alliances and arrangements how *peethas* (including ones recently authorised) and freelancing *kachre binnewalis* source recyclable plastics in order to keep their livelihoods and enterprises ongoing, as part of everyday practice. While cosmetic devices (Chapter 6) help some of the key agents of recycling strategically posture and legitimise their operation in the eyes of the state while also safeguarding original technocultures, networks and routines of practice, shadow infrastructures keep their technical processes ongoing on a daily basis by ensuring a steady influx of plastics. Put more simplistically, while Chapter 6 concerns statutory means to hold enterprises and networks in place legally, the present chapter concerns more mundane occasions of process management and co-ordination.

Sack-Droppings and Basket-Transfers: Waste-Workers Unite

If the authorised waste workers (truck-drivers, street-sweepers, truck-driver's aids) are frustrated by the daily regimes of overtime work and underpayment under the new MSWM system of Ahmedabad (see above, but also Chapter 5), then the recycling communities (*kachre binnewalis* and *peethawalas*) also have their own reasons to be disgruntled. Despite assembling careful arrangements to protect their practice from the regulatory, inspectional infrastructures of the state, *peethawalas* must still struggle and invent ways to source recyclable plastics to keep their daily operations ongoing. This is because their traditional channel of plastic acquisition through freelancing *kachre binnewalis* have become precarious, especially after 2016-2017. From late 2017 through to 2019, when I talking to or conducting fieldwork among these freelance actors, they manifestly

spoke of increasing resistance and unfair competition in their practice. This was notably due to restrictions posed by the municipality, as it sought to sequester plastic waste preferentially by 'authorised' waste-worker and divert it to the RTS-networks for centralised incineration. As such, municipal measures – as noted in Chapter 5 – made it difficult for the recycling practitioners to access plastic raw materials. With community bins (*dhalaos*) disappearing, new street-sweeping, and door-to-door waste collection routines intensified, obligations put in place by the AMC deterring households to put their bins out during the night, metallic cages with locks installed around residential society bins, and so on, informal *kachre binnewalis* struggled to collect plastics in weights comparable as before. *Peethawalas*, in their turn, experienced dwindling influx of recyclable plastics.

Under the circumstances, when multiple communities (whether freelance or state-authorised actors) are variously muted and dissatisfied in their respective relationalities vis-à-vis the MSWM infrastructure, we find localised alliances and symbiotic relations emerging between them. In particular, new modes of circulation come up, whereby incinerable plastic waste are diverted into the recycling networks as part of secure everyday routines. We describe some below. The shadow infrastructures described here constitute supplementary networks of plastic sourcing and localisation for recycling. I elaborate upon two sets of cases where authorised waste collectors made individual arrangements with *peethawalas* (including those authorised as 'recyclers' and those not-yet), and with freelancing *kachre binnewalis* to constitute a range of shadow networks of plastic sequestration and exchange. Plastics were thus diverted, 'unseen' and routinely, from the state-mediated privatised incineration channels of plastic localisation to the networks of recycling, patching together two mutabilities, enacting lively and composite shadow infrastructures.

Peethawalas and Door-to-Door Waste Collectors:

The first case, of which I became aware from late 2018, involved sack-droppings and brought together *peethawalas* of Ramapir no tekro and municipality truck-drivers, some 70 of them working from/living in the neighbouring West-zone Remote Transfer Station, RTS. In this arrangement, the companions of the truck-drivers played an important mediatory role. In Chapter 5, we had introduced the truck-driver's companion – usually the wife, as a non-payrolled un(der)paid aid in the process of door-to-door waste collection, one who accompanied and supported the husband in his 'trips', a seemingly muted intermediary whose domestic allegiance and gendered labour were conveniently capitalised by the husband's employer – the contracted waste-collection company, WTPL. In actuality, these women were rarely disempowered or neutral. Accompanying the drivers to their waste collection trips, the companions came equipped with large plastic (polythene or woven raffia) sacks. As the truck inched slowly through dense residential areas and as household bins were emptied hastily – often haphazardly as illustrated above – into the storage chambers, the companion would climb onto the back of the vehicle. They would cursorily skim through the blue household (plastic) bins (before they were emptied into the vehicle) and through the surfaces of the mound building up within the receptacle, and selectively fish out recyclable plastics, tucking them away separately into the sacks. This was necessarily a quick and superficial dredge filtering out saleable recyclables from each bin, but over several repetitions, the separate stock of recyclable plastics built up. Small, improvised hooks were installed on the truck, where these sacks were hung, as they filled up. The work of plastic separation required alacrity and skill – a keen eye for identifying plastic objects with high

recycling value, economy of movements, adjustment of bodily balance as the vehicle negotiated uneven surfaces, besides practised discretion and presence of mind for quick, efficient diversion without attracting too much attention to the separatory act.

These sacks of plastics were diverted to the recycling networks, dropped off strategically by the roadside for pre-arranged *peetha* representatives to pick up. Exchange rates were pre-negotiated as a function of the number of sacks deposited (instead of weight which is more difficult to measure under these hasty circumstances). Indeed, many *peethawalas* of Ramapir no tekro had opened small shopfronts by the main roadside for these very purposes; these were extensions to their more insular larger establishments nestled inside the densely inhabited settlement of Tekro, assembled to mediate, keep an eye on, and negotiate new contacts and relations by the road. Especially after 2017-18 (when the West-zone RTS was established), more than 15 such makeshift shopfronts and intermediary storage spaces had mushroomed up along the main roads right in the vicinity of the RTS. These shops – more like shanties – lay by the final stretch of road just before the trucks turned the New Wadaj road-corner to enter the RTS premises. They served as convenient points of contact and exchange – both material (plastic sack droppings after each trip during the day) and financial (monetary settlements later in the evening). They also offered opportunities for stories, strategic information, and messages of solidarity or complains to be shared. Thus, this shadow infrastructure of plastic (re)localisation also leads to and is supported by new material structures and relational knots of community formation between dissatisfied Dalits across infrastructural relationality, regimes of practice, and shared-yet-different histories.

“This image has been removed by the author of this thesis/dissertation for
copyright reasons”.

*Fig. 39: The premises contained within the red rectangle constitutes the West-zone
RTS. The yellow oval loosely denotes the high concentration of small peetha
shopfronts newly opened by the side of the main road leading to the RTS.
Courtesy: Microsoft Bing Maps*

As alluded to above, shadow infrastructures nestle within, between, and bridge together multiple domains, societies, histories, materialities and infrastructures, which support and mediate them in different ways. We can cite a complex collaborative sociomateriality and spatio-temporality to highlight how the relative obscurity of this particular infrastructure of plastic flow is enacted. The new makeshift *peetha* shopfronts, their strategic location, traffic patterns, roads (including the roadside as a strategic exchange-space), urban topography and temporality, the waste-collection trucks, the installed RFID (Radio Frequency Identification) tags, the plastic sacks, etc. all act as mediators – besides *peethawalas*, truckdrivers and their aids – in this enterprise, where conscious efforts are taken to restrict its scope to the smaller local scales of practice. For instance, the sack-droppings took place necessarily *before* the trucks would enter

the RTS premises for weight measurement and transfer of their collects. As such, no 'loss' (say, in high calorie incinerable plastics) in material weight or quality of the collected materials was officially recorded by the 'system'. Furthermore, the trucks dropping sacks of recyclable plastics adopted clever tactics to mask detection by the GPS (Global Positioning System)-integrated RFID tags physically mounted upon each vehicle. These tags were meant to track vehicular movement and halts along pre-allocated waste collection and RTS-deposit routes. This surveillance information was integrated into digitally centralised databases archiving usable, accountable ward, 'zone' and city-scale records by date for potentially wider access (Fig. 40; also see Chapter 5 for more details on this state-mediated surveillance infrastructure). Truck-drivers made sure that their sack-droppings went undetected by the digital tracking system; they avoided halts, if only rarely slowed down, as their companions dropped the sacks off by the roadside near their pre-arranged *peetha* shopfront. The proximity of the New Wadaj road-corner (the T-shaped junction in Fig. 39) and traffic lights facilitated and offered further excuses for slow movement. The tight tying of the mouths of the plastic sacks and the durability of their materials not only secured containment and avoided spillage, but also enacted discreet units of plastic that were easily dropped without attracting too much attention to the act. As the vehicle moved on, no significant (or suspect) change in vehicular motion was detected, no spatio-temporal trace of routinised halts and information about material diversion picked up by the 'system'. The shopfront manager would promptly come and pick up the sacks and send them off to the main *peetha* premises for onward sorting, cleaning, processing and storage for recycling.

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Fig. 40: A model of RFID and GPS-enabled truck surveillance proposed specifically for the AMC, where data about vehicular movement, bin identification and route are integrated to centralised digital servers to connect to clients (citizens, monitoring agencies, municipality, etc.). From (Purohit & Bothale, 2011)

Discretion and the highly strategic handling, if not localised guarding, of information is also performed in the practised silence of the RTS manager, who also acts as a point of mediation between the relational practices of waste collection and the relations of accountability with higher authorities in the corporate. In effect, while the RFID tags or the RTS-installed weight scales fail to detect the shadow infrastructures of parallel plastic flow, it does not mean that these operations are necessarily covert. Instead, they are selectively muted. The RTS managers – who waste-collectors report to and who are responsible for the latter’s discipline and conduct – are well-aware of these parallel modes of plastic re-localisation. In effect, it was one of the site-managers, who informed me – in 2018 – of these shadow arrangements in the first place. However, managers choose to turn a blind eye and seldom report these activities to the higher

authorities, thus turning this sociomaterial arrangement effectively local, grounded in the micro-scales of neighbourhood and road-based operation, recorded not on paper but active and retained in 'social' memory. However, the managers' silence is deeply meaningful. It speaks to, affects, and spans across multiple domains and scales, revealing the shadow infrastructure's distributedness and complex enmeshment with and mediations in several infrastructures, patterns, routines, relations and materialities, alongside disjuncture and internal mismatches of the city's MSWM system. Indeed, one of the managers said he did not mind workers supplementing income as long as they were contented. After all, he explained, dissatisfied workers were likely to cause greater disruption if they organised a strike against overtime work and low salary. Instead, 'if they earn Rs. 300-400 extra a day, what is the big harm, it is their labour after all...'

O' Hare, in his account of a state-supported *requeche* recycling facility in Uruguay (O'Hare, 2020), describes similar material leakages and extraneous income subsidies earned by plant workers under the silent approval – if not active co-operation – of the manager, who preferred to avoid the 'cost' of strikes. The author makes an argument on the 'formal'/'informal' classification of these shadow operations, and argues that the 'informal' arrangements (covert leakages) indirectly support the state-mediated 'formal' establishment of recycling, thereby, constituting what-he-calls a 'quasi-formal' arrangement, a bridge between two relational domains of accountability. Without going into the political economic debate on formality-informality, we can say that the tacit knowledge and strategic silence of the RTS-managers, as occasioned in our case, also perform a certain stabilisation of the 'authorised' MSWM infrastructure. However, in this regard, with the manager citing 'big harm', the algebra of scale

– which we earlier discussed in Chapters 5 and 6 albeit in different contexts – assumes prominence again. Evidently, the quantity of plastics diverted for recycling through the shadow channels would seem insignificant to the managers when compared to the bulk of materials amassed regularly for incineration across an urban ‘zone’ (estimated to be around 400 MT) or cumulatively across the entire city of Ahmedabad, which is estimated to generate at least 4000 MT of solid waste per day. A few handfuls of recyclable plastics siphoned off per trip, and a limited number of sacks diverted would not cause substantial damage either to the waste collection companies, to WTE units, or to the municipality. In contrast, these stakeholders might respectively fear a total collapse in their operation, disruption in feedstock supply and break in the essential service provision of waste collection to its citizens, say, by a waste-collection workers’ strike, as techno-financially and ethico-politically more disruptive. As such, in this case, the continuity of the operations takes priority over the marginal reduction in plastic incinerability, constituting an ‘allowable’ compromise on the systemic efficiency.

Therefore, the scale of shadow plastic diversions and recycling mut(e)abilities did not simply make them undetectable. More accurately, the small scale of plastic diversion made these shadow operations significantly insignificant for the authorised system to bother about or take prohibitive actions against. Instead, their presence and practical reproduction ensured that bigger ‘losses’ for the waste collection companies, WTE plants, and the municipality were likely to be averted. To let the shadow diversions continue would therefore appear like a calculated compromise. By thus assuaging exploited workers, the daily chain of events involving door-to-door waste collection, aggregation and transport to the WTE plants, incinerations, etc. are maintained, and larger-scale material and political-economic interests across multiple constituencies safeguarded. This

confirms that this shadow infrastructure of plastic diversion is more or less acceptable, held in concession by most authorities, albeit through strategic silences, pragmatic calculations of scale and value, and exclusion from official documents. However, in the process, exploitative company-policies and routines obliging waste-collectors into extra working hours against incommensurate wage also continued. As such, we wonder if these new enactments of plastic recyclability, notably, through shadow diversions of plastics to the *peethas* may occasion, or re-produce and re-entrench, further systemic mutings.

Writing on rural elites in the underdeveloped tribal state of Jharkhand drawing income opportunities from and reducing general access to governmental programs, Shah, in 'In the Shadows of the State' resists a formulation of 'corruption' that conjures up loaded images of immorality. Instead, Shah persuades readers to a more relational understanding of practice as 'embedded in a local moral economy' ((Shah, 2010, p. 72), see also (de Sardan, 1999; 2005) for similar discussions vis-à-vis governmental development regimes of Africa). Much like the so-called 'corrupt' practices of Shah's research subjects which are rooted in, gain legitimacy and anchorage from local social logics, the above shadow siphoning of recyclable (but also incinerable) plastics too are socially legitimised and anchored in a complex overlapping political economy. They are constitutive rather than denunciatory. Indeed, nurtured in the strategic silences of RTS managers and operating in narrow (scale) margins wilfully conceded by higher authorities (or state agents), these shadow infrastructures stabilise rather than dislodge the wider neoliberal patterns of value extraction from waste.

Furthermore, in this case, the managers or the waste-collectors did not counter the immediate interests of their employer – the waste-collection company

(WTPL). As the reader will recall from Chapter 5 and the brief mention above, waste collection and waste processing (say, for WTE) at the AMC, though constituting (and enacting) the same process, are often covered by separate contracts and performed by separate agents (AMC, 2017). In Chapter 6, we noted an exception involving the *kachre binnewali* collective for ‘integrated’ waste management with a small neighbouring municipality. However, when it concerned a big municipality like the AMC (India’s 5th largest), the scale and complexity of waste collection and processing operations often demanded separate governmental contracts to ensure feasibility, expertise, and maximal profitability in each set of practices. Indeed, given the variable quantities of waste produced daily/seasonally, and the unchanging (if not rising) operational costs of door-to-door waste collection (fuel, labour, etc.), waste collection contracts were drafted to secure payment-rates from the AMC assured to the contracted company on a per trip basis. The RTS manager – who was employed by the waste collection company, did not, therefore, have to bother about losing weight (say, in the form of plastics getting diverted) as long as the recorded number of waste collection trips (say, through security cameras installed at the RTS and confirmed by the managers themselves by noting down on a ‘register’) were maintained – if not increased.

In effect, motivated by the possibility of supplementary income, waste-collectors often maximised collection trips and worked overtime out of their own necessity to earn. Here again, we see how the internal neoliberal ordering of contracts, practices, units and devices of measurements, relations of accountability, etc. concreate unevenly to create generative yet problematic liminal spaces in their specificities. Here alternative interpretations, ethics, practices, relations, patterns of material flow, and containment emerged. But, in the process, these shadow

infrastructures were also indirectly co-opted to further larger political-economic interests at the cost of systemically disadvantaging casualised waste-workers⁸².

In any case, the RTS managers occupy a critical boundary-position, whose tacit knowledge and pragmatic management of information mediate, guard the interests of, stabilise multiple forms of sociomaterial territorialisation. In particular, with the RTS-managers' muted yet re-assuring approval, or practised 'indifference', authorised waste collectors continued to divert sacks of plastics to the neighbouring *peethawalas* of Tekro for recycling. The shadow infrastructural practices, in turn, drew sociomaterial legitimacy and durability over time. Within the year, some of these routines, ethics, places and place-based practices had expanded (new *peetha* shopfronts came up, jobs were created locally, say, to manage the shopfronts, or to transport plastic sacks in bulk) and stabilised (sometimes makeshift shopfronts were expanded to accommodate the intermediate storage of more materials, or were made more durable in concrete).

WTPL's regular techno-labour arrangements of door-to-door waste recovery, and co-dependent infrastructures (say, of waste processing, but also civic, legal, bureaucratic, commercial, political, and so on) were thus conditioned to continue without major disruption. The *peethawalas*, on the other hand, kept their practices ongoing, able to secure regular supplies of recyclable plastics, thanks to the

⁸² Therefore, though pursuing a different theoretical-conceptual framework, my observations here confirm, but also adds substantial and compounded empirical layers to Roy's theory where 'informality' is considered a necessary pre-condition to and constituent of neoliberal planning regimes in India. See (Roy, 2005; 2009). Gidwani, along with various co-authors, has discussed how surplus populations dealing in waste, constitute externalities which are strategically 'internalised' (say, their labour co-opted but the workers not offered job-security and benefits) for the accumulation of private profit. See (Gidwani & Reddy, 2011; Gidwani, 2015; Gidwani & Maringanti, 2016). Sociologists of labour and political economy working in the region confirm these tendencies in Ahmedabad's (and broadly India's) neoliberal experience. See (Breman, 2004), also (Breman, 2016; Jaffrelot, 2016) for critiques of 'growth without development', 'growth without jobs', pauperisation and experiences of being 'ground down by growth' (Shah, et al., 2018). Here we complicate these understandings of exploitation by incorporating the sociomaterialities and the co-opted dimensions of appeasement and inventive appropriation.

regular, predictable patterns of systemic failure, abandonment and improvisation emerging around the municipal waste collection system. To be sure, this shadow arrangement also produces exclusions; for example, it enables *peethawalas* to bypass *kachre binnewalis*. The *kachre binnewali*'s vital labour of localising large quantities of moisture-free plastics with high recycling value, being performed in this case by the truck-driver's aid who selectively picked these out from the blue household bins before they got mixed with wet waste inside the vehicular container. As such, while the *peethawala*'s operations could continue, without much disruption, *kachre binnewalis* were effectively replaced. As the above mode of circulation of recyclable plastics into the *peethas* gathers regularity, scale, and stability (like an infrastructure), the noteworthy exclusion of *kachre binnewalis* from this shadow arrangement assumes durability: re-organised processes of enacting plastic recyclability thus based on new forms of systemic muting. However, we shall see, *kachre binnewalis* also devise inventive techniques.

Kachre Binnewalis and Street-Sweepers:

According to a 2012 city-report commissioned by the AMC, at least 24% of the city's collected solid waste were localised by authorised street-sweepers (UMC, 2012). As discussed earlier in Chapter 5, public passages within the municipal jurisdiction are divided into 'beats', units of 'street length allotted to each street-sweeper to be swept every day ... , dependent on the width of the street, average waste generated by that street, nature of activities on the street, traffic volume, etc.' (UMC, 2012, p. 83). As such, there are more than 10,400 beats under the AMC, managed by more than 13,000 street-sweepers working under the AMC (AMC, 2017). These employments are made directly by the municipality, though rarely (Oates, et al., 2018), and more frequently through indirect arrangements and rules of employment mediated by private labour agents (Chaturvedi &

Gidwani, 2011), local residents' welfare associations (RWA) (UMC, 2012; Dey & Michael, 2021) and sometimes by NGOs (UMC, 2012). Sweepers are responsible for removing 'litter' (defined in the Solid Waste Management Rules (MoEFCC, 2016, p. 58)) from allocated public places but end up having to handle other types of material discards and residues not covered by the Solid Waste Rules (UMC, 2012). Workers are provided with standardised equipment on behalf of the AMC – 'a pushcart, broomstick, and scraper' (Sankar Cheela, et al., In Press) with colour-coded removable baskets mounted on pushcarts (handcarts) – to aid beat-based localisation and segregated storage of plastics (and other waste). Supposed to work in morning and evening shifts, street-sweepers are expected to transport their collects to 'secondary points of collection' – usually at fixed yellow community bins (before their removal in late 2018 for the Swachh Survekshan Survey) or to municipality bin collection trucks at pre-decided spots at routine times – so that these materials could be carried off to the nearest RTS and thus integrated into the incineration networks eventually for energy generation.

New routines of freelance plastic foraging, but also new kinds of shadow infrastructures emerged in the form of strategic plastic transfer and circulation, collaborative alliances and ethics generated between *kachre binnewalis* and municipality street-sweepers. As discussed in Chapter 5, sweepers tend to be female, often former *kachre binnewalis*, who resorted to authorised employment in search of state-legitimacy and security as their original freelancing vocation became progressively marginalised and precarious under the privatised waste management regime. However, given the unfavourable terms of casualised employment – especially for women (over-time work, underpayment, inflexible timing, and the alienation of working alone in often-distant beats/neighbourhoods

away from home with unpaid travel time, etc.), many *kachre binnewalis* chose not to get employed yet, and continued freelance practice. Unlike the 50 *kachre binnewalis* of Tekro who were able to organise, and with strategic alliances and cosmetic infrastructuring, able to become authorised waste collectors themselves, many *kachre binnewalis* resorted to more individual-scale adjustments and spatio-temporal recalibrations to their practice in order to mediate and mitigate precarity, and gather more plastics. Since authorised street-sweepers, under the new regulation, held the first right over waste (including recyclable plastics) accumulating during the day and the night over the busy roads and public spaces of Ahmedabad, many *kachre binnewalis* competed for access to 'littered' sites before these authorised uniformed street-sweepers would arrive, or alternatively, vied for their favour, friendship and co-operation.

The new infrastructural designs in 'litter'-removal from the areas of public access in Ahmedabad meant that each street, neighbourhood road, or public place was accorded specific standards and routines of sweeping and cleaning (from twice a day to three or two times a week to practically never) based on civic priorities (depending on surface area, regular footfall and density of activities, but also how desired these road territories were in terms of urban real estate, or how privileged the neighbourhoods in terms of their civic-political clientelism). Echoing earlier observations on the uneven ubiquities of plastic waste in the city (Chapter 4), some of the popular consumption sites like parks and the Sabarmati Riverfront (with food stalls), commercial plazas (with restaurants and street food), and busy thoroughfares (like Ashram Road which assembled many commercial activities, routines, people and their retail and food consumption, etc.) tended to accumulate higher quantities of plastic waste (say, from discarded packaging) than elsewhere. However, while these have been some of the preferred sites for

plastic foraging, under the arrangements of the new MSWM system, these sites have also been accorded more frequent sweeping routines. As such, some *kachre binnewalis* preferred sidestepping street-sweepers and if possible, tweaked their foraging routines for maximal collection.

Kantaben – who I used to accompany and collect plastics with, would set out from home inside Ramapir no tekro at 5.30 in the morning, while it was still nearly dark, and time-manage her pedal transit so that she reached the Sabarmati Riverfront about time the sun peeked out of the skyline. Whenever possible, Kantaben offered herself a margin of 1 hour in order to pick out recyclables from a sizeable stretch of the Riverfront before the municipal sweeper would arrive for her scheduled round of street-cleaning at 7 am. It was not certain that the sweeper would arrive every day, or at 7 am sharp. What was predictable with near-certainty, was that the sweeper would not come to work before time. Given the low pay and work pressures, sweepers tended to ‘take their time’, Kantaben explained to me. This gave her a safe time-window to glean over the Riverfront, without having to permanently look behind her shoulders. Later, Kantaben would then move on to the neighbouring residential lanes where the authorised sweeper would arrive after first tending to the Riverfront. It was therefore the routinised order of authorised practice which allowed the freelancer to organise her itinerary in order to stay ahead. It enabled her to have a first go at the plastic waste scattered over wide areas of public places for an efficient, profitable haul. However, the shorter time-windows were also likely to increase competition between freelancers.

The above instance points towards a strategy which many *kachre binnewalis* adopted. As such, we can argue that these also constitute a set of shadow

'infrastructures' where the internal problems (underpayment, 'lack of motivation' (Goswami & Divi, 2019)) of the street-sweeping infrastructure prepared conditions for freelance practitioners to plan ahead and prepare for re-temporalised, re-spatialised foraging. As such, plastics would continue to be picked up and re-localised into the recycling networks – circulated – albeit in smaller quantities due to the shorter time windows available for foraging. Plastics unpicked for time constraints or judged not-so-profitably sale-able/recyclable were left behind. These were sequestered later by the municipal sweeper as part of her routine and thus, the desired orders of civic aesthetics and material ubiquities were maintained – more or less. Sweepers would not report on, but instead quietly support some of the road 'litter' being removed by *kachre binnewalis* before their arrival. In effect, this arrangement alleviated some of their workload – if only marginally – by reducing the mass of materials that they would otherwise have to pick up and carry themselves.

There were instances of more direct forms of solidarity and mutually beneficial relations of exchange and favour negotiated between street-sweepers and *kachre binnewalis*. These instances did not involve freelancers rushing and trying to stay two steps ahead of the sweeper, instead allowed the latter to have a first go at the littered sites. As the sweeper went about gathering materials off the streets and storing them within dedicated baskets in their handcarts, a *kachra binnewali* would pass by at a later time and place pre-arranged with the sweeper, pick up the baskets of recyclable plastics from the sweeper's cart and re-localise them securely into their own sacks. The sweeper – whose itinerant physical labour is capitalised in this case by the *kachre binnewali* – would be offered a financial commission from the daily material sale performed by the latter or sometimes favours and remuneration in kind (e.g., see the Inhabited Sea

PlastiCity project [website](#) for a 'garlic for plastics' exchange relation). Since, many street-sweepers were former *kachre binnewalis* themselves, the two set of actors (one now authorised, the other not-yet) often have overlapping socio-economic networks and relations, kinships or caste-connections and so on, which facilitated the formation of new relations of exchange, solidarity and trust. Given the underpaid extractive contracts on offer for authorised street-sweeping, these practitioners were happy to oblige and help their former colleagues and familiar *kachre binnewalis*, especially, if doing so enabled themselves to earn extra income or benefits in kind. Furthermore, and this was especially true for early-morning sweeping routines, there was no present form of surveillance in operation to mediate or reprimand such material transfers. To be sure, however, these are tactful and pragmatically calculated exchanges in that sweepers do not violate the immediate interests of their employer – to whom they are responsible. Indeed, in the pattern of techno-commercial heterogeneities in neoliberal contract, common – as we have seen – within the MSWM infrastructure mediated by the AMC, the employing labour agents were paid service fees on monthly/yearly basis for each 'beat' cleaned, and not for weight of (incinerable) materials localised for incineration.



Fig. 41: One of the street-sweeping handcarts used in Ahmedabad. Courtesy: AMC [Open Data License – GOI]

In addition to the sweeper, there are additional components of the municipal infrastructure which get directly/indirectly co-opted into and which stabilise these shadow infrastructures of recyclability. If we look closely at this complex layering of multiple mediation and labouring in terms of material localisation, valuation, sorting, transport and exchange, we shall uncover the critical role played by a range of municipal equipment, devices and tools. Evidently, the sweeper shares much of the *kachre binnewali's* original labour and process sequences in plastic localisation. As the sweeper walks routinely along city streets to localise plastic litter into segregated waste-baskets in their handcarts, they add collection value to the materials, which are then transferred selectively to the *kachre binnewali* concerned, who picks up only the recyclables, in exchange of remuneration. The *kachra binnewali*, therefore, has much of the spatio-material labour of plastic collection and manual transportation of collected materials eased by the laborious mediation performed by the authorised sweeper. However, these localisation efforts of the sweeper are also facilitated by the AMC-commissioned carts (which

aid mobility and transportation), colour-coded segregation baskets (which aid segregation of the recyclables and the non-recyclables, reduce the chances of plastic contamination, facilitate shadow exchange relations by producing 'units' of material transfer, easier to negotiate financially, easier to translocate), brooms and scrapes (machines which reduced efforts in material gleaning and gathering), etc. In this case, these devices constitute non-human labour which are co-opted to produce value indirectly for the shadow exchange infrastructures. A range of authorised actors (human and non-human) are thus, partially co-opted to indirectly constitute and contribute to the city's recycling networks. As plastics continue to be siphoned off, jumping networks, moving hands, transiting between authorised containment baskets and the *kachre binnewali's* plastic sack, and end up in the *peethas* to potentially get recycled, we are again familiarised with the inherent ambiguities, hybrid composition and messy topologies of a shadow infrastructure. Personnel, equipment and constituent devices enrolled to constitute a complex infrastructure to cater to a certain pragmatic of incinerability, end up 'working' for other (if not competing) interests and infrastructures (recycling). Through these plastic transfers, we find further instances how shadow infrastructures are discursively justified but also materially, processually and socio-economically scaffolded by a range of relatively stable materialities, technologies, extractive arrangements and solidarity relations alongside their uneven linkages, generative tensions and mismatches.

Beeja Arrangements: Temporalities, Alliances, & Matinal Plastic Transfers

If there is one salient feature of the municipal solid waste collection infrastructure of Ahmedabad city, then it would be its irregularity, and the unpredictability of its routine. If the opening vignette was any indication, there are a number of

sociomaterial resistances which stop vehicles, emergences which slow down machines, frictions with parallel infrastructures and priorities which hold bodies back. And yet again, waste collection practices are part of a wider nexus of practical, social, economic, civic, political, commercial and spatial relations which produce their own time pressures, bottlenecks, constraints, obligation and exception (say, improvisations like skipping a route to prioritise another).

Time and temporality are integral components of any infrastructure, Barry reminds us (Barry, 2015). Spatially distributed, socio-economically, politically mediated and animated by generative disputes (Barry, 2013), infrastructures are not only situated in and defined by history, but are also reciprocally shaped by the temporal rhythms of mundane sociomaterial contexts they actualise. Every so often, waste collection vehicles would get stuck, gear-boxes and engines break, equipment rust, waste collectors protest, managers run away with money, incineration furnaces choke, garbage spills, incineration fumes with fly-ash and furans fly out endangering communities and ecologies – provoking protests and stoppage of work, contracted companies would underperform, fail to file reports, or go bankrupt. Transections of multiple processes, topological relations and sociomaterialities thus regularly produce congestion, deferrals and delays to the times and temporalities that infrastructures falsely promise (Appel, 2018). In the tensions between multiple temporalities, new shadows in the provision of civic service are generated, new articulations of frustration but also improvisations and work-arounds devised.

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Fig. 42: “Women throw garbage at AMC office in Ghatlodia”: Residents of Ghatlodia, Ahmedabad protest against waste collection delays and non-coverage. Screengrab from Times of India (Full story: <https://timesofindia.indiatimes.com/city/ahmedabad/garbage-collection-punctual-only-32-of-the-time/articleshow/66102970.cms>)

As the news headline suggests (Fig. 42), municipal waste collection in Ahmedabad (as in other cities in India) is unreliable, often incompatible with the different socio-economic routines, rhythms and priorities of the everyday lives of its citizens. Especially, for the middle-class – the most significant constituency for MSWM – who must leave for work early in the morning, escort kids to school, commence everyday business, and so on, temporal irregularities in garbage collection produce disruption, and dissatisfaction. After all, following the new waste regulations, citizens have been discouraged from putting their bins out. Moreover, the re-assuring presence of the yellow community bins at the street-corner or by the roadsides used to offer citizens the option to dispose waste when convenient. But their removal by the AMC for the ‘beautification’ of roads under the Swachh Survekshan (see Chapter 5) put an end to those flexibilities too, making citizens dependent on door-to-door waste collection.

Irregular and unpredictable door-to-door waste collection produced different kinds of sociomaterial problems, but also compulsions and opportunities, for different kinds of residences and commercial establishments. The reader would recall the entity of the 'waste-generator', defined in the MSWHM Rules 2000 but amended in the SWM Rules 2016 to include not just individual households and small businesses but also hotels, and residents' welfare associations (RWA) – entities which represented multiple households; housing blocks and 'societies'. The SWM Rules 2016, as we discussed in Chapter 5, obliged these large collectivised 'waste-generators' to devise their own arrangements to process 'wet' waste (food remains, peels, etc.) locally within their premises (MoEFCC, 2016). In Ahmedabad, in-house composting pits and vermicultures became commonplace at these establishments; where 'wet' waste was localised, while 'dry' waste was supposed to be picked up by the authorised municipality trucks. For individual autonomous residences and small businesses, who could not afford/access a composting device, municipality trucks constituted the mainstay for disposing quickly-rotting 'wet' waste. The truck's irregularity produced more vulnerabilities for these populations, who therefore, often resorted to alternative, if not clandestine, techniques of waste disposal, including in empty plots of land, by the roadside, etc. For these populations, storing 'dry' waste also proved to be a challenge because the volume of durable plastic objects produced constraints of bin-space (Hawkins, 2006; Dey & Michael, 2021).

Kachre binnewalis, always on the lookout for the secure supply of recyclables, formed strategic alliances with individual households and businesses which produced waste in quantities manageable by the former to carry manually, and who were dissatisfied by the regularly failing promises of municipal waste collection themselves. Many of the *kachre binnewalis* of Ramapir no tekro, who I

accompanied on daily sorties, had managed to persuade old familiar clients (especially elderly residents whose domestic scraps and discards they used to collect for decades before the authorised MSWM took over) to transfer their (recyclable) 'dry' waste to them. *Kachre binnewalis* requested households to put their garbage out in the morning half an hour before the scheduled passage-time of the authorised door-to-door waste collection truck. Not too early, in order for the households to avoid potential municipal penalty. However, this tactically short but adequate time window enabled the *kachre binnewali* to make a quick passage and dredge up sizeable quantities of recyclable plastics out of the household's blue bins. Despite financial incentives not being involved, many households followed these matinal routines as it offered them some security of (dry) garbage reduction. However, some households also failed to maintain such arrangements and shadow routines, and did not bother if the municipal truck came on time, or if dry waste volumes were insignificant. However small-scale, or unstable, these shadow 'infrastructures' did nevertheless generate the possibility for immanent civic networks to emerge, especially amidst agents dissatisfied in their respective dealings with the MSWM system. In the process, recyclable plastics continued to be sequestered by freelancing *kachre binnewalis* and were eventually integrated into the *peetha*-based process chain and economies of recycling.

This takes us to the final illustration of shadow infrastructures, where *peethawalas* – larger-scale material aggregators (as opposed to foragers), liaise directly with waste-generators, especially with larger resident associations and commercial establishments for securing steady streams of plastic raw materials. These arrangements are usually more reliable and regular than the near-altruistic plastic transfers involving individual households/businesses and *kachre binnewalis*. This

owes to the modalities of scale, materiality, technical affordances and various financial and extra-financial incentives, and agencies involved, as we shall see.

Large hospitality businesses, including some of the biggest five-star hotels on Ashram Road, restaurants, shopping malls, cinemas, etc. generate substantial quantities of 'dry' waste – plastic bottles (packaged water, soda or alcohol), packaging materials and empty containers (say, of food and beverage) or used hospitality items (say, plastic slippers for guests), also cartons and newspapers. These materials, sutured into the everyday practical-commercial routines of these establishments, need to be disposed of – once discarded – in a reliably regular manner in order to keep the daily hospitality offerings and in-house consumption routines running. While the AMC-contracted waste collection trucks are responsible for securing such discards daily, their delays and gaps in coordination lead many of these establishments to become dissatisfied. Since 'dry' waste could not be locally processed, their non-removal produced rather uneasy accumulations of plastic in substantial quantities. At times, garbage went uncollected for days together, as was the case when one of the municipal truck-drivers entrusted to cater to a local hotel near the Gandhi Ashram fell ill, and proxies were not available. Similarly, for RWAs, the standardised large bins filled up and leaked into the neighbourhood roads when garbage went uncollected for days, or during festive seasons, when more waste was generated than containable. While residents felt frustrated by municipal failures, these frustrations led to *beeja* (alternative) arrangements of material removal – shadow infrastructures.

Indeed, the stockpiles of recyclable plastics accumulating in the bins of some of these large establishments did not go totally unseen. One of the *peethawalas* of

Ramapir no tekro devised an arrangement. He already possessed a small truck (suitable for delivering *peetha* consignments to 'recyclers' and correct in size for seamless passage through Tekro's narrow lanes; colloquially called a *chhota hathi* – or 'small elephant' to denote the vehicle's small size but strong capacity for goods carriage) and had employed a local youth to drive the vehicle around. In early-2018, this *peethawala* made his first contact with a 4-star hotel at Subhash Circle, at the more proximal end of Ashram Road – within 2 km from Tekro. He promised the hotel manager to send his driver with the *chhota hathi* every morning at 5.30 to collect the hotel's previous day's stock of 'dry' waste. A regular and more-or-less steady supply of recyclables (especially polythene terephthalate, PET, and high-density poly-ethylene, HDPE, containers) meant that the *peethawala* could keep his daily operation running at an optimal scale. The early-morning collection was favourable for the *peethawala* as he could plan ahead on the day's priorities, set work targets and schedules for plastic sorting, strategise consignments, etc. This was a beneficial arrangement for the hotel too, as the *peetha* representative came on location and collected 'garbage' at no additional cost to the establishment. It constituted an extra layer of security in case the municipal truck failed to turn up. Despite occasional challenges – say, when the driver had to take a temporary leave to attend a family marriage, the *peethawala* himself stepped in and drove the *chhota hathi* to collect stocks from the hotel. Such motivation to secure the relationship and to ensure steady supply of recyclables into the *peetha* meant that collections were made in a more or less timely and regular manner. The collection time also suited the hotel as they could begin daily operations early, uncluttered, more or less certain that dry waste would be collected by one method or the other. This shadow arrangement of plastics transfer, occurring literally in the shadowed liminalities of night and day,

thus, drew not only on the frustrations and vulnerabilities of citizens under the MSWM regime, but was also shaped and stabilised by a co-alignment of temporal routines and commercial-material interests of the actors.

The above arrangement was successful, and over time, this became a local trend. During the next 1.5 years when I worked (discontinuously) at Ramapir no tekro, I noticed many *peethas* forge similar arrangements with big businesses in order to secure the plastic waste that they would generate. Although some *peethas* also collected plastics from RWAs, such arrangements were rare, and points perhaps to the materialities of middle-class household waste as compared to 5-star hotel waste, where the latter may be of high recyclable quality and constitute a more consistent daily scale. Given the limited scale of *peetha* operation and the logistical affordances and constraints of the *peethawala* (say, labour and vehicular availability for material collection and transport, access to space for material storage and stockpiling, etc.), these matinal plastic transfers were essentially small-scale operations, restricted to one round-trip made by the *chhota-hathi* (or, at most 2) per day.

Peethawalas refrained from over-promising, though occasional lapses in routines and breakdowns were not uncommon. These were due not only to mechanical failures (say, the *chhota hathi* needing repair and maintenance) or to physical fatigue and absences (say, of the driver), but rarely also involved the uncertainties of plastic trade and the volatility of wider networks. Over the present pandemic (following my fieldwork), when global crude oil prices plummeted and demands for recycled feedstock fell (as opposed to 'virgin' plastic feedstock rising), *peethawalas* struggled to clear stock to free up storage space and levelled with the possibilities of moral and practical failure in having to forego some of these

material collection routines. Thus, while the small scale of shadow infrastructures made them more malleable, attuned to particular routines and personalised demands – hence, potentially regular, reliable, and favourable in ‘normal’ times, difficult times evidently rendered these arrangements vulnerable and fallible.

These new matinal arrangements of plastic transfer and transit drew on, enacted, or re-entrenched a range of socio-economic legacies, technologies, and civic infrastructures.

In effect, individualised contacts were often established on inter-personal recommendation and reputation (say, one hotel-manager satisfied by the reliability of a *peethawala* may recommend his services to a colleague). Such relationships of trust could also draw on the capital of social acquaintances (see Chapters 4 & 6 for a historically-contextualised discussion on the wide social networks of Tekro’s *peethawalas*) or on extended kinship, caste, or village-based solidarity networks. Sometimes, cultural-economic capital was produced from these transactions. On one occasion, the CEO of a noted five-star hotel, which had a *beeja* arrangement ongoing with a *peethawala* from Ramapir no tekro, publicised this arrangement at a public-relations event. However, the transaction was strategically framed as his establishment ‘helping out’ a small and struggling business, run by poor (also ‘lower’ caste) people, potentially in an effort to gather moral cultural capital from the client community. In this case, but also in general, the alliances and arrangements for material ‘donation’ and recovery were not sociologically neutral. They drew on the stability of ‘softer’ infrastructures, like caste society (its idioms of superiority, hierarchies, fragments, angsts, saviour complexes, solidarities, and possibilities). Indeed, the idea of caste is relationally embedded in the very directionality of material flow occasioned in these transfers,

reproducing the Dalit-ness of the *peetha* (its owners, workers) who accept 'waste' in these cases. In any case, these shadow infrastructures did not deny social hegemonies; but were instead embedded within. Nevertheless, they generated conditions and possibilities for increased contact and exchange within expanding urban networks, people, and establishments.

A matinal plastic collection trip itinerantly linked together a range of hotels, restaurant chains, offices, and RWAs across the city, with which the *peetha* had managed to establish points of individual contact and secured obligatory routines. This pattern of itinerant material collection is evidently reminiscent of the older profession of the *pastiwala* – material aggregators with no real estate for storage and mediation who acquired stocks for landed *peethawalas* (see Chapter 4) – a profession one rarely comes across in Ahmedabad today, except in the old city. In its 'revival', however, plastic localisation is re-mediated by the affordances provided by a machine-driven vehicle and other communication technologies. Unlike the earlier pattern of area-based solicitation for material acquisition (usually the *pastiwala* called out loudly – '*pastiwalaaa...*' – to attract the attention of households and businesses), these new forms of civic contact and negotiations are often performed over phone and WhatsApp, new media where introductions are made, complaints and explanations shared. This technologically mediated arrangement enables *peethas* to subvert some of the constraints of space, labour, and personnel, and shed traditional dependencies on more territorially-restricted practices of plastic localisation and practitioners, including the foragers on foot (*kachre binnewalis*), tricycle-based material buyers (*pastiwalas*) and local households and housing quarters (*pols*). They mark new ways of making and maintaining socio-professional networks and alliances, and depending on their scale of operations, stabilise smaller-scale sociomaterial connections: intra-urban

'eddies' of plastic circulation co-animating the shadows and dissatisfactions of large-scale MSWM.

The emerging re-territorialisation of plastic localisation practices from across points in the city draws evidently on the (in)stability and civic mediations specific to the road infrastructure. Indeed, while *beeja* arrangements for plastic donation and transit were not prohibited by law, the *peetha* trucks did occasionally get intercepted by the traffic police on charges of endangering public safety on the road (say, on the speculative premise that plastic from the truck chambers would spill over onto the road during transit and cause accidents). These police interceptions never went to the court or were recorded officially. This was from my personal experiences accompanying the driver of a *peetha's chhota hathi* during many of his matinal plastic acquisition 'rounds', and the numerous informal chats and interviews I had with other drivers. Here again, we touch upon another instance of civic infrastructural discontent shadowed under the orders of road administration, marked on this occasion by underpaid traffic personnel. Indeed, these personnel could be assuaged by the discreet payment of a bribe and intra-city plastic transit from hotels/RWAs to the *peetha* would continue with reasonable ease. Nevertheless, *peethawalas* attempted to minimise these interceptions and the financial losses they entailed. Many ensured that morning plastic collections were terminated by 7 am, before the traffic personnel arrived at their street-postings. In any case, these occasions involving police intervention and bribe elaborate further inter-leakings, alliances and elaborations of pragmatic material-financial exchange. Again, the state manifests not necessarily as oppositional to shadow circulations of recyclable plastics, but in practice, as an enabler, provided that right prices were paid to the particular traffic personnel, or to the state-representative involved in the specific occasion. These transactions

uncover a wider emerging political economy of public life and work in the wake of a haphazardly assembled but situated neoliberalism. Here dissatisfied citizens, state-employees and associates, private corporate managers, ‘informal’ workers, etc. ‘look out’ for new opportunities, constitute (and care for) shadow ‘alliances’ and routines, that may be co-enabling. In this case, some of these assemblages facilitate, rather than oppose, micro-level movements (of plastic) (Simone, 2019).

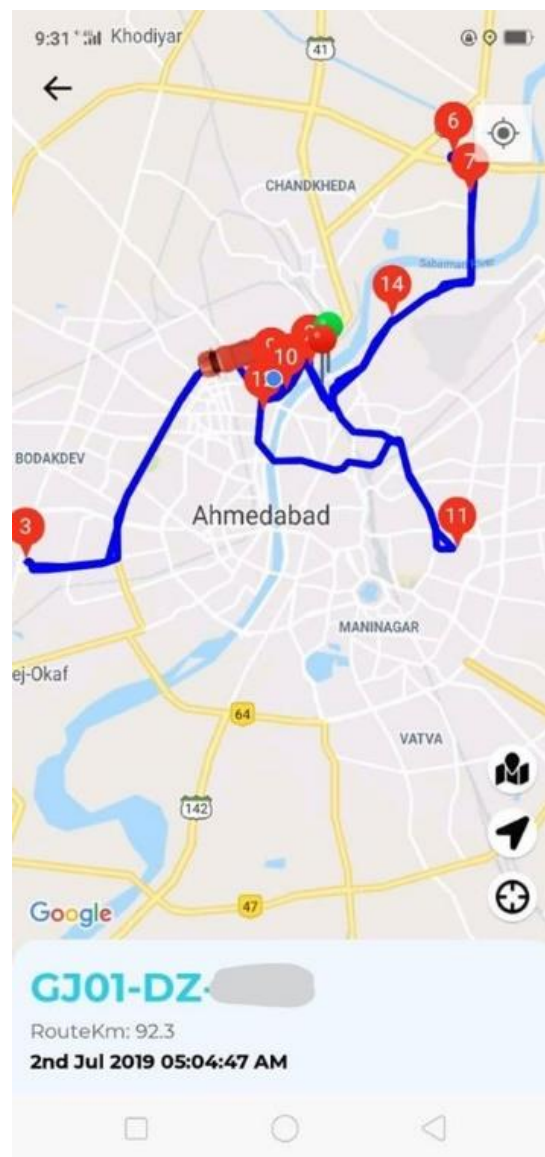


Fig. 43: In order to further stabilise and render accountable the point-wise localisation practices of plastic waste collection from hotels and RWAs (alongside other transits of the chhota hathi with consignment, etc.), a peethawala had installed RFID-tags on the vehicle to monitor its circulation, thus, emulating the MSWM infrastructure to an extent (see Chapter 5). Courtesy: Asimbhai (name changed)

Conclusion: Plastic Mut(e)abilities and Further Notes on Infrastructuring

Building on Chapter 6, here, we assembled further cases of improvisation and hybrid appropriation. Here we focus on more mundane, regularised techniques and penumbral practices of localising and circulating plastic waste, devised and routinely performed by a range of actors across domains, that would seem to keep *peethas* and recycling operations ongoing. These improvisations emerged from the 'shadows' left behind by the MSWM system, from its frictions, inaccessibility, gaps in coverage, delays, marginalisation, and irregularity. As such, a range of dissatisfied, but also opportunistic, actors from diverse constituencies come together under alternative arrangements. These include waste-generators, authorised street-sweepers, door-to-door waste collectors, state representatives, contractors, (newly) authorised 'recyclers' and so on, i.e., constituencies 'within' the MSWM infrastructure as originally planned. But these also involve actor-networks – like *peethawalas*, freelancing *kachre binnewalis*, traffic personnel, etc. – who were originally not included within the infrastructural planning of MSWM. These arrangements include and involve non-human elements too, like sacks, baskets, trucks, handcarts, brooms, GPS devices, etc. and infrastructures (like roads, traffic circulation, mobile phone networks, WhatsApp, etc.). An uneven range of such arrangements essentially maintain consumption and sanitary orders in the city. In the absence or the inadequate presence of the state, they re-move accumulating plastic waste, while also re-enacting and maintaining plastic recyclabilities, notably by channelling already segregated plastic waste opportunistically to *peetha*-based recycling networks. They uncover and elaborate a zone of opacity but also invention in Ahmedabad's public life, where they tend to people, places, plastics and processes that remain

unattended to, unpicked, unreached and unsupported by the state-mediated MSWM infrastructure, thus, completing the latter but also co-elaborating it. As my historical backgrounding (Chapters 4 & 5) informs us, these irregularities, delays, partialities are not novel to civic infrastructure (at least, verifiably, in Ahmedabad). Even work-arounds did exist earlier, patched more locally around local caste-gender networks. As such, in the new shadows of the MSWM infrastructure or in the *beeja* arrangements worked out in its wake, we do find lingering patterns of the past, albeit with crucial differences – mutings, but also new mutative possibilities.

In the maintenance of regular routines and patterns of plastic circulation, in the immanent concrescence of multiple constituencies in mutual relations of mercy and obligation, in their embeddedness within and across multiple infrastructures (and their mismatches and generative tensions), the above improvisations project an infrastructural character, however small-scale, delicate, and transitory as it may be. However, these arrangements are also piecemeal, localised, and reactive, often without a centralising agency for co-ordination. As such, one might doubt calling these arrangements ‘infrastructures’ at all, strictly speaking. Although these are early developments, and more careful research into what forms these gradually stabilising – accreting – sociomaterial networks assume, or how they unfold over time, may suggest otherwise. In any case, without any aspiration for strong theorisation, I have merely tried to capture the relative persistence of these sociomaterial relations, even in their slippery emergence. I have therefore, elaborated these penumbral practices of plastic localisation and circulation by the heuristic of ‘shadow infrastructures’.

Shadow infrastructures stand for immanent sociomaterial topologies and (penumbral) forms which are not quite realised as planned by the state and its agents. They stand for localised patterns that are often elusive to top-down modes of knowing (if not technically unknowable, 'unworthy' of knowing, or perhaps, 'worthy' if not known at all?). Merging in and emerging (one could say, e-merging) with multiple 'authorised'/'informal' infrastructures, sociomaterialities and spatio-temporalities, shadow infrastructures are often blurry, hard to grasp, and do not yield easily to formulaic academic theorisation anyway. Yet, through them, we have spoken about plastics tumbling out consistently, 'slipping' through, like Law and Lien's pacific salmon, generating a penumbra of possibilities.

Shadow infrastructures, as we have presented them, also shed light on further infrastructuring of the MSWM system, i.e., 'the ongoing and continual processes of creating and enacting ... infrastructure' (Karasti & Blomberg, 2018, p. 234). In this regard, how shadow infrastructures actually enact the MSWM system leads us to critical observations. Indeed, these arrangements emerge from the various kinds of failures (whether by intentional, calculated lapse, operational limitation, or due to contingencies) of the MSWM infrastructure. These failures and ensuing 'shadows' manifest as municipal waste management meets and gets mediated by the uneven sociomaterialities and spatio-temporalities of urban life, inflected, and re-shaped by surfaces, peoples, plastics, patterns, routines, infrastructures and idiosyncrasies. The frictions, as we have shown, visibilise the discrepancies (say, contractual), mismatches (say, between infrastructural standards of MSWM in Ahmedabad and the range of other sociomaterial infrastructures like narrow uneven roads that these standards must negotiate), fatigue, solidarities and discontents (say, of workers) proliferating the ranks, contracts, calculations,

infrastructures, and organisational arrangements that actually constitute what one may call the 'MSWM system', or the infrastructure in this case.

Shadow infrastructures draw upon these tensions, factions, and dissatisfactions, and put to work a range of cross-scale, cross-site infrastructural elements in re-territorialised assemblages. Therefore, in their topological emergence, shadow infrastructures, visibilise, as well as enact, some of the actual entailments of the relations, practical devices, and standards of neoliberal MSWM. They stand for actual emergences of infrastructure, not as originally planned, but as practised.

The particular links and critically co-dependent relations with the MSWM system are revealed if we examine the plastic mut(e)abilities that are actualised by these shadow infrastructures of plastic localisation and re-mediated flow. Indeed, as my thesis has shown (especially Chapter 4 and 5), the processes of plastic mutation – whether by incineration or by the multifarious category-specific techniques of recycling – are distributed across stages, sites, scales, where they are mediated by and are contingent upon a range of practices, people, natures, policies, politics, technologies, infrastructures, materialities, and histories. The multifarious relationalities and networks that topologically enact process are realised even though we only discussed the 'supply' side of these two processes, where plastics are localised and mediated, even contested for, re-negotiated, and wrested, in efforts to make them amenable to various mutative techniques further upstream.

It would appear that the pragmatics of plastic incinerability, as enacted by the state-mediated neoliberal infrastructure, are variously compromised. From the cases we demonstrated in Chapter 6, actors within the recycling networks, who were identified by planners as agents who extracted incinerable plastics and thus reduced the operational efficiency of WTE, and who were subsequently excluded

from or offered less favourable terms of membership into the new MSWM infrastructure, found ways to become 'authorised'. Some of them subsequently integrated as legitimate actors nevertheless under the new regulatory and inspectional regime. As such, their competitive silencing, despite the various conditions placed on integration and practice, turned out to be impracticable and incomplete projects under the particularities of the cases that we studied.

Throughout the current chapter, we presented occasions that shed light on the actual supply side of the WTE process. Plastic waste (besides other waste materials) went uncollected (thus, less quantities were imbibed than planned), and the planned end-to-end techno-practical and cultural, obligatory enactments of dry-wet material segregation were routinely breached. In particular, we shed light on some of the inevitabilities that lead to such incomplete, irregular, piecemeal performances of plastic accumulation and disruptions in material orders, deemed so critical for the functionality and profitability of incineration-based techno-commercial infrastructures in WTE (see Chapter 5). In this sense, we visibilised the multiplicity and fragility of actual sociomaterial relations that make plastics (non-)incinerable.

We also showed, on the other hand, how plastics got routinely separated, picked and diverted from these very impossibilities, frictions and breakdowns of the incineration networks. These plastics subsequently constituted new networks and routines of circulation, spilling into other sites of containment, other hands, sacks and networks of alternative forms of processual mediation (recycling in this case). Therefore, as 'authorised' waste-workers earned some extra cash to supplement meagre casualised income, underpaid traffic personnel earned penalties (without receipt), and citizens found temporary relief and reasons for gratification, sacks

and *chhota hathis* full of plastics continued to slip out, reaching the hands of *kachre binnewalis* and the establishments of *peethawalas*. There they continued to be exchanged, segregated, aggregated, cleaned, dried – made recyclable – before being consigned off to the ‘recyclers’. Thus, plastic’s recyclability is kept ongoing, albeit re-enacted – re-spatialised, re-temporalised and re-embedded in the new sociomaterial, ethico-practical and financial interests, technological networks and topologies of emerging everyday life in the city. As such, plastic recyclabilities continue to be enacted. It might appear that these ongoing recyclabilities are enacted at the ‘cost’ of efficiency reduction in the incineration-based neoliberal arrangements of enacting WTE, i.e., one form of mutability muting the other. Indeed, as sacks, baskets and *chhota hathis* full of incinerable plastics never reach the WTE plant, the net calorific value and profitable incinerability of solid waste feedstock would seem to be routinely reduced.

However, as demonstrated by the cases above, the picture is more complicated. In effect, the extraneous arrangements for plastic diversion into the recycling networks are not simply deleterious in their mediation and co-option of the broader MSWM system. As it turns out, even the system co-opts the shadow penumbral circulations, perhaps more silently, insidiously, into its own pursuits of acquiring profit, reputation, and more critically, attaining continuity. Indeed, this is partly a complex argument of scale, where a small margin of incinerable plastics are *allowed* to leak out into the recycling networks, almost as part of calculated concession, thus guarding more vital interests of systemic stability. These are not just commercial-financial interests – pertaining to contractual waste operations, but also civic-political interests – of municipalities and politicians, say, to guard the integrity and reputation of Mr. Modi’s grandiose ‘Clean India’ program.

Indeed, as the neoliberally constituted MSWM system emerges through the granular specificities of actual practice, the shadow infrastructures and practices of plastic recycling appear to be necessary constituents of its infrastructuring. In the actuality of the cases we describe, plastic recycling networks and shadow infrastructures comprise not so much a competition (although recycling agents tend to be treated as threats).

Instead, they emerge as a parallel set of networked practices and obligations enacting alternative plastic processes, which in various ways, holds the 'system' in place. For example, in mopping up plastic waste uncollected (or uncollectable) by the municipal network, shadow infrastructures fill up the gaps and shadows left behind by the WTE-based system, keeping (sections of) citizens appeased, for the time being, by a range of *beeja* arrangements that keep their basic needs and demands fulfilled, immediate environments and urban civic orders sorted. Residents, thus, liaising with *peethawalas* and *kachre binnewalis* to devise improvised strategies for plastic waste collection do not necessarily protest outrightly against the state's irregularities and failures in waste collection. Shadow infrastructures thus act as buffers, saving the day for municipal officials, and politicians. Therefore, in some sense, the (renewed) networks of plastic recycling act as proxies to the infrastructures of the state, as they continue to absorb and perform (as they used to in the past – see Chapter 4) what essentially constitutes civic responsibility. Without much state support or subsidy, the decentralised recycling networks continue to bear part of the civic responsibility, that is apparently compromised by the state in its 'obsessed' techno-cultural and infrastructural pursuits of efficiency and profit, or to attain political reputation.

These alternative shadow infrastructures devised by citizens would thus seem to elaborate what the French call *le Système D* (for *se débrouiller*) or in North India, called *jugaad*, standing for subaltern techniques of improvisation, infrastructural hacks, and appropriation, performed under conditions of chronic abandonment, material lack, and lack of representation (Rai, Saigal, & Thorat, 2015; Rai, 2019; Dey & Michael, 2021). However, as Hodges (2017) warns, techniques of work-around – simply by co-existing – justify and enable techno-cultures and practices of abandonment and lack of accountability. In effect, tactical toolkits for *jugaad* have, over the recent years, come into and decisively been co-opted within neoliberal management lingo offering corporates practical hacks ‘to do better with less’ (see (Radjou & Prabhu, 2016) for example). In our case, as sub-contracted waste-workers and citizens are assuaged by work-arounds, thus dissuaded from outrightly protesting, larger scale incineration-based operabilities are maintained, municipal and Central governmental policies are kept on. Private contractors keep earning public money as payments and subsidies, political parties and leaders keep winning local and federal elections. A marginal reduction in the processual efficacy of plastic incinerability is evidently much more preferable than a complexly intertwined systemic disruption and breakdown.

Therefore, shadow infrastructures of plastic diversion might appear to marginally reduce the energy efficiency of WTE operations, or compromise their profitability, but in reality, they constitute necessary allowances, factored into pragmatic calculations of neoliberal value and its fractious political and economic redistributions. Plastic mut(e)abilities, whether centralised incinerability or decentralised recyclability, thus, appear far more insidiously inter-linked, even mutually constitutive, and not necessarily disjoint. In any case, employees and stakeholders in each set of practices routinely lend their labour, feed into, enact

and mediate the other set of practices. Plastics tumble out, change hands, and thus routinely circulate across the networks. Tools, devices and techno-practical infrastructures enrolled into one also contribute to and is co-opted by the other. Such topological intersections and immanent crosslinking re-enact two sets of practices in a much more complex and 'hybrid' manner than planned, with a series of mutations and mutings, each nested, adjusted, co-opted, folded in and mapped onto the other, co-elaborating and emerging together in complex ways. Shadow infrastructures feeding into, and scaffolding *peetha*-based plastic recycling networks are, therefore, not external to, but are firmly constitutive of the complex sociomaterial emergences of the MSWM system.

The hybrid co-becoming of multiple plastic mut(e)abilities bears upon plastic's ubiquities in the city. This pertains notably to changes how plastics get localised as part of everyday processual routines under the new circumstances. With the introduction of the new techno-practical infrastructures of waste collection, containment and circulation in the city, some of the prior practical patterns, routines and relations of plastic localisation (described in Chapter 4) ceased, or transformed. Indeed, new objects, devices and disciplines of plastic localisation have been introduced by the state (and its agents) and older disciplines and sites of interest either removed or subjected to new sociomaterial relations, routines and regulatory mediation. For instance, while the once-ubiquitous large yellow bins (*dhalao*s) – a usual point of stoppage and plastic sequestration for *kachre binnewalis* – are gone, there are new spatio-temporalities, orders, and points of localisation (of plastic waste) emerging across the city. These would include the street-sweeper's segregated containers and handcarts, the household or hotel (blue) bins, the truck driver and aid's alternative sacks and receptacles. But these plastics are only accessible at specific times, and through the careful mediation

and co-option of agents who have been accorded the first right to these materials. Sites with high likelihood of occurrence of recyclable plastic waste – like the Sabarmati Riverfront, parks, urban commercial districts and the surrounding of shops and shopping complexes still persist, but again, all these sites are now mediated by new obligatory relations, practices, and temporalities of practice (like sweeping). Likewise, bins at households, RWAs and commercial establishments continue to contain recyclable plastic waste but are mediated by new municipal obligations, and material barriers, albeit still amenable to maneuver by these more-or-less autonomous actors. As such, the ubiquities of plastic waste in the city have undergone spatio-temporal changes, albeit unevenly, with sites of localisation becoming part of and constituting new routines, obligations, and emerging sociomaterial relations (shadow infrastructures).

More practically speaking, some of these new orders of material localisation (say, dry-wet segregation at source but also by the self-motivated authorised waste collection and transport agents) might even constitute beneficial changes and entail opportunities for the recycling networks. For instance, instead of ending up at the *dhalaos*, much plastic waste now occurs in segregated state whether in municipal containers or within shadows sacks and baskets, thus relatively free-er from admixtures. This reduces the chances of moisture, oil contamination, etc. on plastic waste (otherwise an inevitability at the *dhalaos* where mixed waste materials accumulate), thus, raising the quality of recyclable feedstock (smaller number of ‘spoilt’ batches, effectively – see Chapter 4). And as such, *kachre binnewalis* and *peethawalas* could even expect higher exchange rates for their stock. Therefore, the techniques of material mediation (secure containment, segregation, etc.) recommended and put in place by the MSWM system do at

times end up re-enacting material quality, enhancing the recyclability of plastic waste.

In any case, just to re-iterate, ongoing recyclabilities have entailed significant changes within the practical networks of plastic we had described in Chapter 4. They now involve some of the state-proposed new sites, times, devices, rules, practices, and practitioners of plastic localisation, which are variously interpreted, side-stepped, mediated, solicited, cajoled, co-opted and collaborated with under more local assemblages. These are shaped by situated micro-social rules, practical material transfer relations, but also technologically-mediated frameworks of mutual obligation and communication. Through these situated incorporations and improvisations, the practical networks of recycling have been recalibrated and re-constituted. The recycling networks have thus become more complex, undergoing necessary mutings (replacements, redundancies) and mutations (re-valuation of practice, re-hierarchisation) in emerging and specific modes of organisation. The redundancy of *kachre binnewalis* within the *peetha*-truck-driver nexus is a case in point, as is the vital incorporation and valuation of street-sweeping labour in the localisation of plastics for the freelancing *kachre binnewalis*. Again, with the doubly-authorized collective (Chapter 6), a specific sociomaterial arrangement also rendered *kachre binnewalis* indispensable, with unprecedented autonomy in dictating terms within the professional networks.

Plastic mut(e)abilities, thus, help us tap into the delicate, often deleterious, yet sometimes promising, sociomaterial lives of plastics in Ahmedabad (and India). It helps us map and study a range of cross-secting opportunities being continually opened up (mutations), but also closed down (mutings), as a wider public life, and its various infrastructures, natures, legacies, and futures, unfold and emerge

in the presence of these shiny new things. As we conclude this chapter, and near in on the end of the thesis, we must be circumspect about the specificity, contingency, and fragility of shadow networks that sociomaterialise some of the more hopeful (but surely remaindered) possibilities for the public, especially for those marginalised. Indeed, shadow infrastructures are sensitive to dominant territorialisation, changes in policy, urban topography, modes of governance, critical events (like a pandemic), etc., which necessitate changes in (even cessation to) some of the routines and patterns underlying essential livelihood. Therefore, these networks also deserve dignity, care, and contextually-attuned empirical engagement, if not necessary governmental support, and subsidy.

Chapter 8: In Conclusion

Mutings and mutations are co-constitutive, relative, and continually wrapped up in the ongoing elaboration of worldly possibilities. As the thesis ends, I highlight key points of conceptual and theoretical significance that may travel. I reflect how the thesis may have ended differently – empirically, conceptually, and what beginnings may be thus constituted. I also leave brief notes on some of the policy implications of the thesis.

Key Contentions:

This thesis studies situated occasions of plastic's mut(e)ability. It presents the concept as a tool that helps untangle plastic's complex ubiquity in generative formulations. Studying multiple plastic processes together, it enables a view of cross-cutting networks, inter-leaking plastics, publics, and infrastructures. It also visibilises, critically, historical chronicities and change, unfolding stakes, and material-practical, infrastructural, and political possibilities embedded in plastic's complex, compounded sociomaterial entanglements. The work is ethnographic, based on practical, personal, and professional experiences and relations, both present and continuing from the past. Theoretically, it aligns with a post-Actor-Network Theory (post-ANT)/ assemblage sensibility, whereby, reality and its uneven sociomaterialities are emergent, thus, studied not through pre-received categories and scales, but through concepts emerging from actual ethnographic case studies, events, and practices. It leaves methodological reflections from practice for studying plastic and plastic multiplicities in their specific occasioning as encountered and aggregated through an ethnographic trajectory.

I begin by presenting a complex historical picture where plastic – including discarded plastic objects and materials – is shown to be linked to all sorts of ongoing socio-economic, spatial, technical, commercial, cultural, and political

processes across India's (and Ahmedabad's) overlapping epochs. This is a necessary disaggregation of plastic's ubiquity – its 'everywhereness'. Not least as market devices, commodities, waste, and techno-commercial raw material again. And simultaneously, that of different overlapping political economies and 'infrastructures' that reciprocally enact, or (re) localise specific plastic objects in specific places/times. I discuss localisation and recycling processes and practical networks in thick details, as following these practices (as an apprentice) enabled me to practically encounter many of these plastic ubiquities and mutabilities across the city. I highlight how plastics are made recyclable, and through inter-linked and overlapping sociomaterial enterprises, a range of other possibilities and trajectories are also enacted. 'What else could your life become in the company of this shiny new thing?' With plastics becoming ever more ubiquitous within urban solid waste streams and accumulating in the commons, claimed (albeit unevenly across the population – which we show) as matters of (sanitary, aesthetic, sensory, ecological, economic...) concern, the state steps in. An elaborate infrastructure is planned from the start of the new millennium, drafted for implementation across scale – from Centre (the federal) to the State and to the municipal, enacted more forcefully after 2016, after Mr. Modi comes to power. Responding to the chronic lack in public resources and technical affordances at the municipal level, this new infrastructure favours a particular form of privatisation of essential services, and its technologisation through large-scale incineration to turn Waste-to-Energy (WTE). The promises of (cost, time, scale) efficiency within this arrangement are highlighted, aspirationally calculated from the appreciation of plastics in scale within solid waste, and its high calorific value for energy production. Another form of potential plastic mutability in operation. I show, however, how the 'new' arrangement draws inevitably on older networks

of meaning, stigmatised sites, bodies, sociomaterial patterns of unevenly localising harm, allocating work burdens, extracting labour, disavowing socio-political responsibility, etc. The pragmatic occasioning of this new set of plastic processes is extractive and exclusive in more ways than one. Translated and enacted through extensive sets of rules, culturally political programs (Clean India), mundane technical tools, devices, civic disciplines, infrastructures, etc., the new MSWM system and its ordering exclude, by design, traditional networks of recycling (these private actors, unsubsidised and unsupported, do not fit into the ideals of private-public partnership by the neoliberal state) and seeks to divert plastic waste away from them, stowed away in secure, segregated containment. I call this form of historically-shaped but presently contingent form of processual, infrastructural othering as 'muting'. How certain plastic processes are enacted by excluding and curtailing the possibilities of another.

However, we soon learn how such muting is incomplete and impermanent. This is again highlighted through the notion of plastic mut(e)abilities, supported empirically by cases occasioning inventive re-ordering and re-sourcing of plastic (waste) to enact remaindered recyclabilities of plastic, despite the new reforms. Furthermore, the success of the state-sponsored incineration programs are not guaranteed either.

As such, large infrastructures and political economies are shown as being locally instantiated: mediated, resisted, co-opted, and sociomaterialised in many different emerging ways than originally planned. However, these new forms of plastic mutability – a much more hybrid and dynamic, even penumbral concatenation between different plastic processes and work networks – offer more complex ways in which the public is eventually undermined, and patterns

of resource extraction (say, through state subsidy to private contractors) are kept ongoing despite delays, irregularities, gaps, and failures in service provision. Informal work-arounds and *beeja* arrangements assembled by citizens and recyclers to enact ongoing recyclabilities proxy for failing incinerabilities, but without institutional support, or accountability. Mutings continue to enact mutative processes.

Theoretical Implications:

Plastics are ubiquitous. Plastic mut(e)ability helps disaggregate this complex ubiquity by splitting the ontology of plastics. I have studied situated processes that enact particular forms of plastic, separately, but also in combination as they co-enact and co-elaborate (infrastructuring). As such, this thesis builds on an empirical ontology of plastic (Gabrys, et al., 2013) which does not pre-suppose a separation between multiple plastic realities, or their unification under some abstract notion of plasticity. Several occasions of plastic's mut(e)ability are studied, and their aggregation reveals an unfolding story of sociomaterial mutation, immutability, and muting. Some mut(e)abilities link together ever so routinely, some remain separate officially, but inextricably linked in the shadows of mundane reality. Through this coming together of multiple plastic processes, or in their distantiation, in collective opening up, or closing down of possibilities, we find the means and languages to study a situated occasioning of ontological politics, one that gestures to inter-relations and co-enactment of multiple realities.

Through occasions of plastic mut(e)ability, we find instances of mutuality. Remember the female kin networks of co-operation, solidarity whisper networks, and shared work of foraging, or the multiple clusters that come together from dissatisfied members of the public and diverse communities and networks of

practice to occasion remaindered recyclabilities of plastic in the aftermath of the new SWM reforms. These point towards processes of sympathetic network-building beyond, and despite the state (sometimes even including co-operative state representatives, silently approving managers, and municipality infrastructures). We also tap into agonism, revealed, for instance, through the morning hustle by foragers to access plastic waste hotspots – like the Sabarmati Riverfront, or the Ashram Road commercial complexes, before the municipally-authorized street-sweepers and waste-collectors would arrive and clear the space of its (recyclable) plastic debris (for incineration). We locate agonism within policy-making circles, again, where deliberations were on how to reduce plastic waste ‘extraction’ by informal recycling practitioners, to occasion their careful ‘management’, if not outright exclusion through techniques of plastic collection and containment. Through these mutations and mutings, a complex public life unfolds in the active presence of plastics.

In attuning to specific plastic processes, and realities, plastic’s mut(e)ability is contextual and multiple. It enables different sociomaterial tales to be told (e.g., (Dey, 2021) offers a situated elaboration of plastic’s plasticities and rural Indian realities encountered during an engineering project in Rajasthan). More situated stories, and specific formulations of plastic processes, will lead to new links, trajectories, configurations, comparisons, and contestations between multiple plastic realities being occasioned, and studied as these are continually enacted. Given the need to engage plastic realities as a global phenomenon (see (McKay, et al., 2020) for a defence of the ‘global’ in the study and politics of plastics)), plastic mut(e)ability could potentially be used to map multiple plastic processes and process ontologies across boundaries, scales, and domains. Given plastic’s

ubiquity, more situated stories, from more scholars and scholarly perspectives, will lead to more grounded enactments of a 'global' material.

Limitations, What-Mores, Alternatives, Regrets:

The studying of large places, and infrastructures is always already limited (Star, 1999). This is because patterned arrangements are so densely networked and distributed, that it is impossible for an ethnographer – an embodied individual limited by their own positionality and technique – to access, map, and study all of its diverse, and changing relationalities. Through the study policy documents, state deliberations, central laws, state, municipal bye-laws, analysis of local and national media, besides the more participative aspects of long-term fieldwork, like practical learning, and snowballing societies, I attempted to access different sites, and events, across scales, where decisions were being made, planned, and where these were implemented, or met with localised interpretations, and mediations. These are not at all exhaustive, far from it. Eventually, I ended up focusing on the more easily accessible supply side of different plastic processes, which took place mostly in the public domain – say, on streets, in neighbourhoods, at public bins, and waste accumulation sites. But also, of course, within more insular *peethas*, and carefully guarded circuits of practice, and knowledge. Focusing on the aspect of sourcing, segregation, securing, etc. for the preparation of heterogeneous plastics as suitable raw materials, allowed me to study only some parts of the processes. However, these are also notably those that are prominently political, reciprocally enacting overlapping occasions of collaboration, competition, and co-option between multiple plastic networks. In other words, I ended up studying sites, and occasions, where plastics are 'out there', leaking and moving more easily between bins, hands, domains, networks,

technical processes, and political trajectories. Would a more localised and more stringently protected facility, say, a WTE processing plant, or a plastic manufacturing unit, where plastics might perhaps occur in more stabilised, or at least more securely contained forms, have enabled me to empirically substantiate and shape plastic mut(e)ability as I have in the present form of the thesis? What forms of political possibilities might such a situated analysis have helped study, and story? How would my storying of plasticity change if I was able to study incineration practices within such a plant, as constituting a key component in the WTE process?

Again, I focused on plastic processes situated in a large place – Ahmedabad city, which in its specificity, also constitutes a key site within broader political and economic projects, including Hindutva and the techno-cultural ambitions for ‘Clean India’. However, while Ahmedabad is a prominent site, and the practices of plastic waste disposal, collection, and (re-) circulation, are also quite public, and visible, occasions, plastic’s mutability and ongoing sociomaterial transformation might also have been studied in other sites, and political economic contexts. From rural and more remote locations, where plastic retail is nevertheless present, but where infrastructures have not developed, might have provided me with different imaginations and enactments of plastic accumulation. Perhaps such less talked-about sites where plastics are also ubiquitous, and involved in the emergence of strange sociomaterialities might have been a better use of this platform? I am also thinking about gendered practices, and techniques of domestic use, re-use, and re-purposing of plastics as additional areas for empirical-conceptual elaboration.

In terms of conceptual development, at present, I have studied ‘infrastructuring’ as enacting ongoing and compounded plastic mut(e)abilities, and vice versa. However, the SWM infrastructure, and its various relational aspects, and mundane emergence, could also have been studied conceptually in a number of different ways. For example, I could have studied the multiple situated expectations of/from infrastructures (say, that of different publics – citizens from various neighbourhoods, plastic foragers, *peethawalas*, recyclers, municipality waste workers, contractors, bureaucrats, politicians, and so on), their overlaps, differences, management (politics), and how multiple networks assemble to enact and mediate these expectations.

This echoes questions of time and temporality, as occasioned by plastic, also on modes of futuring (Brown & Michael, 2003; Salazar, Pink, Irving, & Sjoberg, 2017) plastic circulation infrastructures. Time came up very briefly in Chapter 7 with regard to infrastructural delays and irregularity, but these questions could merit more substantial cross-sited study, and conceptual addressing. This is not least as a means to comment on the points of accumulation, persistence, and flow of mutable plastics (but also capital, and commodity), and the temporal enactment of consumption patterns, waste streams, space, public life, and ecology. This would also interest an emerging anthropological discussion on infrastructure and time (see (Barry, 2015; Appel, 2018; Matson, 2021)), as plastics may be studied as linking, enacting multiple infrastructures and rhythms. Some of these reflections will constitute future publications, some already in progress.

This thesis was written during the COVID-19 pandemic, which is ongoing, persisting with a mutating virus and complex sociomaterial repercussions. I would be keen on studying specific elaborations and inventions of plastics during the

pandemic – as it manifests as a critical event (Das, 1995) with far-reaching consequences; and a ‘binding crisis’ which is ubiquitous in its impact, albeit unevenly (Doron & Jeffrey, 2018; Dey, 2020). How the pandemic may have enacted (or become enacted by) plastic materialities, (commercial) patterns of object use (Dey & Michael, 2020), (in)visibilities, processes, practices, networks, people, infrastructures, and political economies, would be a timely empirical engagement, one that has remained beyond the scope of the present work.

How to present the density and quality of social relations within the study of a material? I have grappled with this stylistic but also more ontological question within my ethnographic practice, and have, in response, presented much more empirical detail about places, processes, etc. than necessary to make a conceptual point. I have considered these crucial representational work to situate actors, materials, and processes within the thickness of their context. I would be keen to explore more narrative styles in the future, an exercise in more concise, more-than-human story-telling, that I had very less time to cultivate within the time pressures of a PhD during a pandemic, and the multifarious personal disruptions, care-work, and challenges that it presented. However, much more stories remain unsaid, unwritten, from my time in Ahmedabad; the end of this thesis presents me with the chance to re-envision and enact new empirical beginnings.

Policy Takeaways:

The thesis abundantly illustrates the situated social compositions of plastic, and plastic processes. More importantly, the cultural, economic, and political, besides the more obviously environmental, possibilities that plastics might engender and enact. Taking seriously the sociomateriality of plastic and its unfolding capacities will have far-reaching consequences for a just and more equitable public life,

which includes and accords socio-economic opportunities to its poor and the already marginalised. Governments must treat the personnel and the self-organised dense entrepreneurial networks of plastic waste localisation and mediation as key civic partners – not opponents. Partners, whose embodied social knowledge, expertise, technical skills, and capacities are valuable assets in mitigating the complex, and compounded crises raised by plastics. Policies and programs should seek to support these networks as they work towards building processual capacity, developing knowledge, networks, and technical acumen. Promotion of pre-existing practical communities, and devising locally attuned bye-rules, programs (including of education, of apprenticeships, financing) must constitute the mainstay in state and civic philosophies in waste management.

Second, while the problems raised by plastic demand responses across scale (municipality, state, central government, international co-operation and agencies), technical processes and infrastructures must be adapted or attuned to local specificities of plastic waste materiality, volume, besides socio-economic, political, infrastructural, and ecological dispositions – stakes, demands, affordances, and opportunities. One size, and technique, does not fit all. As we have seen, in some cases, large-scale (and difficult to control) techniques like incineration might prove impracticable in certain regards. Not least because of environmental threats posed by emissions, effluents, and other potentially toxic releases, but also because the local solid waste composition and quantities might not suit the process, and its requirements. Local infrastructures (like roads, sewage, etc.) might not be adapted for such kinds of demands at scale. We have seen how a smaller scale techno-practical organisation around plastic recycling, but also organic food-waste composting, etc. proved more adapted to the local specificities of the Cantonment Board. Taking plastic's mutability – especially, its

potential amenability to not one but several processes – seriously might offer better working solutions. Perhaps a mixed approach might be more adapted to a given context. A range of techniques adopted to include plastic re-use, re-purposing, recycling, etc. besides controlled incineration – as per local techno-material affordances might offer possibilities to address local socio-economic needs more widely (say, by offering livelihood to the poor and the unemployed, or through the production of objects of local need). The involvement of multiple communities of practical interest will offer a chance at removing plastic waste more thoroughly. In other words, practice waste hierarchies with due diligence, be open to new technical processes, and possibilities. As one of my interlocutors would say about plastic objects in the house, ‘these are all useful objects, why must they be thrown away or burnt?’ While centralisation is useful for coordination, funding, and for addressing issues of accountability, decentralisation of local plastic waste mediation programs would aid composite, contextually-attuned techno-practical arrangements.

A necessary caveat here; a mixed method approach might also tend to become political and contentious, especially with regards to how different processual (and value) networks might want to lay their claims on specific plastic materials and objects. This is where the state must play a mediatory and supportive role. As my analysis in Ahmedabad reveals, plastic recycling and incineration networks end up co-existing in a more hybrid and connected manner – and not as disjoint and separate as planned in policy, complementing and drawing from each other in various ways instead. In this case, the recycling networks and practitioners address the failures, gaps in coverage, and shadows left behind by the formal system, but without any kind of public subsidy. These networks must be

supported, and subsidised at least at par with the corporate firms managing incineration operations.

Furthermore, local communities must be consulted, supported and enabled to be involved in these processes. They already are, as we have seen in Ahmedabad. There are pre-existing, but new circulatory links being formed continually, where 'waste generators' liaise directly with *peethawalas* in various ways to pass on recyclable materials. In some cases, households practice material sorting themselves before these are sold to the recycling network. Communities might also collaborate locally over plastic re-use and re-purposing. There could be local workshops (especially, if all residents might not be able to afford a personal garage), where objects might be brought in for repair (say, with 3D printing, and a range of other techniques), and where local experts (not least *peethawalas* and recyclers) could be involved in key roles. New sites, societies, and networks of work, co-operation, mutuality, but also competition, etc. might emerge. To re-iterate the above point, plastic mutability offers a chance at social mutability too; taking these possibilities seriously (which also means being attuned to new forms of muting!) might lead to alternative possibilities in civic and public life.

Lastly, I emphasize the above strategies are mitigatory. They will not 'solve' the plastic waste crisis. Instead, they suggest socio-economically, politically, and infrastructurally viable arrangements that might reduce plastic accumulation to an extent. Phasing out fresh plastic production – whether from petrochemical or agro-bio-based sources, or reducing the same, i.e., 'closing the tap', is the only way to stop plastics (and their derivatives) from accumulating in environments, and bodies. However, the questions of plastic substitution and replacement must also continue to trouble us.

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