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Why Delhi cannot plan its 'new towns': The case of solid waste management in Noida

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Abstract: Indian metropolises have witnessed the growth of 'new towns' on their peripheries over the past two decades, which have attracted investment as well as affluent residents. Most research on new towns examines the contentious politics of land acquisition and development, but less is known about urban governance and everyday life. This article focuses on solid waste management in Noida, a new town on the periphery of Delhi that has been unable to develop a large-scale waste management system, and we have two main foci. First, we show that the municipal government has sought to regulate waste *collection*, while waste *processing* and *disposal* have remained unregulated and this has discouraged the entry of medium and large-scale private enterprises. Second, we explore the contentious politics surrounding actually existing waste management practices that have emerged in the absence of significant public or private investment. Most waste is managed by small- and medium-sized enterprises in the informal sector, associations that represent the so-called 'new' middle class must interact with informal-sector waste workers. These interactions result in moderately high levels of waste collection but waste disposal remains haphazard and this exposes the limits of the new middle class' control over urban space. Ultimately, we show how municipal governance and the actually existing politics and practices of waste management contribute to the production of Noida's socio-spatial landscape.

Key Words

urban planning
informality
waste management
peri-urban growth
India

Introduction

The title of this article is a reference to Ananya Roy's (2009) article entitled *Why India Cannot Plan Its Cities*, in which she argues that informality is itself a planning paradigm that offers municipal authorities flexibility to alter land-use. This insight serves to disrupt essentialized notions of 'formal' and 'informal' that may serve as useful reference points in European or American cities but are of little use in Indian metropolises. More recent research has focused on how the notions of 'formal' and 'informal' are produced, become institutionalized and are contested (author). In the case of Delhi, authorities have encouraged arterial growth of the metropolitan region in an effort to channel growth away from the congested urban core. This has resulted in unprecedented growth of 'new towns' on Delhi's periphery. Many multinational firms have located offices in India's new towns, and middle class residents who relocate to new towns are driven by the desire to escape the congestion of centrally located areas and/or to bypass the urban poor (Bhattacharya and Sanyal, 2011; Glover, 2012). Rather than a smooth transition to a 'bourgeois utopia' replete with open space and urban amenities (Fishman, 1989), however, existing scholarship has demonstrated that the politics surrounding land acquisition and urban planning in peri-urban areas is highly contentious (Roy, 2003; Goldman, 2011; Arabindoo, 2009). While the violent nature of confrontations between municipal authorities and local communities who are dispossessed of land and resources has attracted interest from scholars and the popular media, much less research has been conducted on issues of urban governance and everyday life in India's new towns. This article seeks to contribute to scholarship on India's new towns by focusing on the practices and politics of solid waste management (SWM) in Noida, a new town on Delhi's periphery.

Noida's population numbers over one million, and its rapid growth has outpaced the municipal government's ability to develop public services and infrastructure to handle the concomitant increase in solid waste. While the latest master plan stresses the importance of effective SWM the city lacks waste disposal facilities, most waste is collected by small- and medium-sized firms that operate informally. Residents and enterprises such as restaurants, hotels, shopping malls, and hospitals are forced to seek market solutions to waste management, and although this system allows for relatively effective waste *collection*, waste *processing* and *disposal* remain haphazard. Informal waste processing/disposal facilities have proliferated (i.e. small-scale collection depots for recyclable waste and unauthorized dumping sites), and this has precipitated a crisis in public health which has aroused widespread alarm and sparked demand among middle class residents for government intervention.

Our goal in this article is twofold. First, we seek to explain why formal SWM has lagged behind the rapid increase of generated waste in recent years. We examine SWM in Noida from collection to disposal, and we show that an adequate understanding of Noida's dismal SWM system must move beyond simplistic explanations of 'state failure' or 'market failure.' We demonstrate that municipal authorities have sought to regulate the 'beginning' of the SWM system (i.e. collection), but their efforts have foundered due to an absence of regulation at the

'end' of the system (i.e. disposal). Second, we explore the actually existing practices and politics of waste management on an everyday basis among middle class residents, government officials, private sector firms and laborers in the informal sector. The management and control – or lack thereof – of solid waste is a contentious political topic that is incessantly discussed and debated among these interest groups. Since waste collection services in Noida are purchased on the open market, conventional wisdom would predict that affluent residents would be able to insulate themselves from the waste crisis by bringing their substantial financial resources to bear. We demonstrate that the reality is not this straightforward because in the absence of an effective public SWM system affluent residents must negotiate directly with waste collectors. These interactions call into question the extent to which the poor are 'bypassed', and serve to account for the extreme socio-spatial differentiation and splintered landscape characteristic of India's new towns. Thus, this paper seeks to contribute to scholarship on urbanization in India by demonstrating how negotiations and struggles surrounding service delivery must be included in any discussion of urban planning.

This paper is organized into five sections. In the following section we introduce scholarly literature on urban governance and India's new towns. We show that this literature commonly overlooks the provision of urban services such as waste management. In the third section we examine the state of waste management in Noida, and explain why the municipal government and large-scale private firms have failed to develop an effective SWM system. In the fourth section we examine the everyday politics – the negotiations and struggles – surrounding the actually existing practices of waste collection and disposal. Finally, we conclude by theorizing the implications of our findings for urban governance.

Growth and governance in India's 'new towns'

Cities in post-Independence India served as manifestations of the Nehruvian state's efforts to transform economy and society. According to McFarlane (2008: 486) cities represented the Nehruvian "vision of nationalist modernism," and "were to be the loci of progress, opportunity and social justice." In addition to managing orderly growth in metropolitan areas, urban planners were meant to implement this modernist vision by creating new towns in sparsely populated areas. In one example the city of Bhilai was built around a steel plant – itself a symbol of modernity – in a 'backward' area of Madhya Pradesh, and its cosmopolitan labor force of 50,000 workers came to represent a "mini-India" (Parry, 2003). Glover (2012: 126) argues persuasively that the impetus for constructing new towns was oftentimes conservative, supposedly driven by a desire to "recuperate key features of an older imagined village milieu" that had been lost in the anonymity of India's metropolises. Thus, urban planning in India – and particularly the construction of new towns – has been overtly utopian, with planners alternatively pursuing cosmopolitan and conservative agendas.

In recent years new towns have proliferated on the peripheries of India's metropolises. Many municipal governments have pursued policies that encourage the growth of new towns in order to decongest urban cores and encourage arterial regional development (Kundu, 2012;

Arabindoo, 2009). To this end governments at multiple levels have made substantial investments in urban infrastructure, while simultaneously encouraging investment through public-private partnerships, and the result has been "the development of economically dynamic urban corridors of growth in some parts of the country and new urban clusters elsewhere" (Shaw, 2012: 49).The relationship between India's metropolises and their peripheral urban settlements is ambiguous. On the one hand, the metropolis provides a reserve army of skilled laborers who can power growth of the 'new' economy (e.g. call centers and producer services). On the other hand, much of the recent growth of new towns cannot necessarily be explained by their proximity to a metropolis (Denis et al., 2012).

New towns not only attract inward capital investment, but their exclusive gated communities also attract affluent city residents, who, according to Bhattacharya and Sanyal (2011: 42), are eager to develop:

> [a] new economy and a new class of producers and consumers, who carve out an economic space different from both the traditional activities of the population displaced to make way for the new towns and the mosaic of economic activities that characterize the older metropolitan centers.

This portrayal of singular middle class risks homogenizing a range of groups, each of which exhibit particular subjectivities and vie to influence urban processes. According to Leela Fernandes India's 'new' middle class has disproportionately captured the gains of economic growth in the post-reform era, yet a significant portion of urban India's established middle class has struggled to adapt to the new economy based on information technology enabled services and business process outsourcing (Ganguly-Scrase and Scrase, 2008). These people are part of a large group of 'ordinary' urban residents that, as Lemanski and Lama-Rewal (2013) point out, are often overlooked in scholarship on the middle class but are also not poor. Similarly, Emma Mawdsley (2004: 81) argues that "the middle classes exert a disproportionate influence in shaping the terms of public debate on environmental issues" in urban India – including waste mangement – yet she notes that a range of viewpoints are expressed by middle-class residents. We are sympathetic to this scholarship that highlights the heterogeneity of urban India's middle class, yet we make a number of generalizations based on the findings of our research. First, while respondents did not express a uniform desire to 'bypass' the poor, there was a general consensus that the poor should be kept at arm's length. Second, Noida residents were generally supportive of the city's idealized model of urbanization (i.e. attracting private capital for the improvement of infrastructure and construction of large-scale planned developments including office complexes, gated communities and shopping centers). Finally, there was a pervasive feeling that municipal authorities were unable to manage urban growth effectively. This desire to keep the poor at arm's length has parallels with earlier utopian planning schemes, while the reliance on private investment to foster post-industrial subjectivities and spaces is a clear departure. Furthermore, state and municipal governments eager to attract investment facilitate the displacement of villages and farmers in peri-urban areas (see Goldman, 2011), and as a result of

violent dispossessions there has been considerable controversy over the control, use and ownership of land. In one example, farmers in Noida were notified that their land would be appropriated to make way for an expressway and gun battles erupted with police during ensuing protests (Das, 2011; see Aradhak, 2013).

While contestation over land acquisition and dispossession certainly deserve attention, these events have often overshadowed the politics of everyday urban management and the provision of basic services in new towns. A steady stream of media reports confirm that new towns suffer from infrastructural shortcomings, but it is unclear how services are actually provided in the absence of reliable public delivery systems. Dubash and Morgan (2012; see Zimmer and Sakdapolrak, 2012) have argued that although there has been intense pressure on governments in the global South to transplant 'good governance' institutions from the global North, the implementation of these initiatives is often hindered by a lack of capacity. Thus, they conclude that "regulatory agencies in the South are more likely to begin as relatively hollow institutional shells, which are populated by expectations, norms of institutional practice, and operational rules and cultures over time" (ibid.: 267). Similarly, Pritchett et al. (2012) suggest that in spite of modern appearances, many states lack the capacity to administer service delivery programs. These authors expose a disjuncture between websites celebrating the implementation of international best practices, and municipal governments' inability to implement programs on an everyday basis.

Alternatively, other scholars have argued that the term 'failed state' is applied selectively and does not signify an objective condition (Call, 2008; Boas and Jennings, 2007; Gruffydd Jones, 2008). Furthermore, the city is increasingly understood by scholars as a vibrant site of policy experimentation (Bulkeley and Castan Broto, 2013; McFarlane, 2011). For example, while national governments remain relatively impervious to the risks of climate change, Bulkeley and Castan Broto (2013) show that there is considerable diversity in cities' responses to environmental hazards and municipal governments experiment with a mix of locally adapted policies. To return to Ananya Roy's (2009: 81) research on planning in Indian cities, it is clear that urban informality does not necessarily represent the state's inability to project power, and instead informality itself can be an "idiom of urbanization" that affords local authorities with flexibility to alter land-use and thereby augment municipal control over space. According to Roy (2009: 81) this planning regime is a double-edged sword for planners because "the Indian city is made possible through an idiom of planning whose key feature is informality, and yet this idiom creates a certain territorial impossibility of governance, justice, and development." Thus, municipal officials are undoubtedly agentic as they utilize legal mechanisms and also freely declare a state of exception to determine land-use in the context of prevailing deregulation. However, this freedom to move between legal and informal regimes of land-use planning can, according to Roy (2009: 81), "paralyze the developmentalism of the state in myriad Lilliputian negotiations."

In summary, these two portrayals of urban governance stand in stark contrast. The first is characterized by failure and ineptitude, while the latter emphasizes the agency of municipal

authorities and their propensity to innovate in a fluid and complex urban environment. Admittedly we have set up a dichotomy that fails to capture the complexity of actually existing urban governance, but it has heuristic value because it demonstrates just how difficult it can be to distinguish bureaucratic ineptitude from innovative governance. Roy (2009) navigates this dichotomy by portraying the state as agentic, but its power is occasionally checked by a myriad of competing land-use claims, and this has led to a popular perception that urban planners struggle to "future-proof" Indian cities. In this article we broaden the focus from land-use planning to service delivery. India's new towns are illustrative of urbanization without extensive *formal* service-delivery systems, yet it remains unclear whether they are petri dishes of market-oriented urbanization, or haphazard urban sprawl with 'Potemkin' municipal governments. Thus, the first question we seek to answer in this article is:

Is the absence of effective solid waste management in Noida due to the ineptitude of municipal authorities, or does it represent a commitment to market fundamentalism and/or informality?

We approach this question by examining the everyday practices of waste management, which have emerged in the absence of significant public or private investment. Scholars focused on urban India have noted the ways in which the middle class has been able to secure privileged access to overburdened municipal service systems as its members increasingly flex their political muscle at the urban scale (Ghertner, 2011; Srivastava, 2009; Chatterjee, 2004; 2011; Ranganathan, 2012; Graham et al. 2013). Scholarship on peri-urban areas has focused on conflicts over land-use as long-term residents are displaced by more affluent newcomers (Arabindoo, 2009; Roy, 2003; Goldman, 2011), and it remains unclear how some groups manage to secure services such as waste removal – and exclude others in the process – in the absence of extensive public systems. This leads to our second question:

While interest groups may engage in zero-sum conflict over the control of existing infrastructure and services in metropolises, how do they relate in peri-urban areas that lack infrastructure and services?

This is a significant question because as Mathew Gandy (2004) reminds us, contemporary urbanism in many parts of the world is characterized by the absence of comprehensive services and infrastructure – the piped water systems that were developed in industrial cities in the nineteenth-century are exceptional rather than the norm. Solid waste management provides an entry point for understanding inter-class relations because unlike services such as water and electricity which can be developed within gated residential colonies, waste must be sent elsewhere. As a result, elites and middle class residents must negotiate with waste collectors who typically hail from marginalized communities (see Gill, 2010). Through these interactions the limits of the utopian vision of urbanization without 'squalor' become apparent. This gives rise to the third and final question that we seek to answer:

How do middle class residents manage their relationship with waste workers in ways that inscribe their dominant class position in the city's socio-spatial order?

Taken together, the institutional and everyday aspects of the practices and politics surrounding Noida's SWM system serve to explain that the reason 'why Delhi cannot plan its new towns' defies a single explanation such as state or market failure. Instead, the current regulatory regime inhibits private investment, and as a result residents must engage small- and medium-sized enterprises that operate informally, and these interactions produce the city's particular socio-spatial landscape.

Solid Waste Management in Noida

The Delhi metropolitan area has attracted significant investment in recent years, which has flowed disproportionately into the satellite cities of Faridabad, Gurgaon, Ghaziabad and Noida (Shaw, 2012). The growth of these cities is encouraged by various municipal and state-level governments, whose regional development plan aims to foster a spatial division of labor in which Delhi becomes a 'world-class' post-industrial city, surrounded by industrialized nodes along major transportation routes (Ministry of Urban Development 2006). Meanwhile, affluent and middle class Delhi residents have eagerly moved to these new towns in an effort to escape congestion within the city, and many multinational firms have chosen to locate in greenfield science parks and office complexes (see Chatterji, 2013; Battacharya and Sanyal, 2011; author; Gururani, 2013). Delhi's new towns suffer from a similar infrastructural deficit as many other new towns, although they have attracted more investment than most of their counterparts surrounding other Indian metropolises (Shaw, 2012). Furthermore, they lie across state boundaries, which makes it difficult for any single bureaucratic entity to implement a coherent vision of metropolitan development.

Noida stands for 'New Okhla Industrial Development Authority,' and it lies in neighboring state Uttar Pradesh. It was formally established in 1976 during India's tryst with authoritarianism now known as the *Emergency,* and as the name implies the area was meant to become a center of industry facilitated by top-down bureaucratic management. It was envisaged that Noida would comprise 10,000 small-scale industrial plots which would collectively employ 45,000 laborers, but as the most recent master plan notes, 'even before the implementation of the Plan could commence, the basic assumptions on which the Plan was based had to be drastically recast' (Noida Authority, 2011: 2). The Master Plan narrates a scenario in which actual urbanization and population growth (see Table 1) consistently outpace projections while planners scrambled to check unauthorized land-use.

Table 1: Population growth in Noida

	Noida Population
1981	36,972
1991	181,003
2001	305,058
2011	642,381

Source: *Master Plan 2031*, 2011 figure from Census of India 2011

While officials in the Noida Authority have struggled to regulate urban growth, they have also sought to assert their independence from the Delhi Metropolitan region and thereby reject the city's role in the regional division of labor as an industrial hub (ibid.: 30). Instead, the master plan and the municipality's website (see: www.http://noidaauthorityonline.com/) pro-actively market the city as a center of India's emergent economic geography of information technology enabled services, media and film production, and its burgeoning high-tech R&D sector (see Aoyama and Parthasarathy, 2012). As a result Noida has become a mixture of high-end corporate facilities, exclusive gated communities and commercial areas, industrial clusters, and unauthorized low-end residential and commercial spaces.

In Delhi extensive formal and informal waste management systems coexist. The informal system comprises as many as 200,000 laborers (Chaturvedi and Gidwani, 2011), and it exhibits a complex division of labor (Gill, 2010). In recent years large-scale private-sector enterprises have invested in SWM and conflicts have erupted between formal and informal-sector enterprises over the ownership of waste (author's article). In contrast, for all intents and purposes Noida lacks a solid waste management strategy. Municipal authorities have identified waste management as a priority, but their efforts to implement a SWM system have been piecemeal and ad hoc. While municipal authorities have sought to encourage private enterprises to enter the SWM sector, investors have not been forthcoming for reasons we describe below. The result is that SWM in Noida is a patchwork of formal and informal operators, but it would be a mistake to characterize it as a singular system. While a small portion of Noida's waste is collected by municipal employees, most waste is collected by small- and medium-sized informal enterprises. In both cases recyclable materials are often sold to informal-sector recyclers, and the remaining waste is either dumped haphazardly in open spaces or in a non-sanitary landfill.

The Master Plan (ibid.: 22) describes the situation as such:

> [M]ore than 400 tonnes of solid waste, including biomedical and industrial waste, is generated everyday in Noida. At present solid waste is disposed of in the low-density undeveloped area without any systematic and scientific way of collection, segregation, storage and processing.

In an unusually candid admission, the Master Plan reports that waste is currently disposed in an informal – albeit state-sanctioned – non-sanitary landfill that lacks provisions to prevent leachate from seeping into ground water or waste from blowing into the immediate vicinity (ibid.: 47).[1] Waste is not only interred in this informal landfill, however, but it is also dumped indiscriminately throughout the city in unauthorized dumping grounds, and this disposal system

[1] Although municipal authorities encourage the growth of this non-sanitary landfill, we refer to it here as 'informal' given its ambiguous legal standing. This is in contrast to what we call 'unauthorized dumping grounds' which are neither sanitary nor sanctioned by officials, and emerge throughout the city as waste is disposed of surreptitiously for reasons we explain below.

has precipitated a health crisis (Arvind, 2011). Predictably, Noida has been gripped by dengue fever outbreaks as waste that remains uncollected or is haphazardly dumped clogs drains which become breeding grounds for mosquitoes (Ghosal, 2011; Datta, 2010). Noida's Master Plan acknowledges that the haphazard dumping of waste 'needs to be abandoned,' and announces that authorities have 'earmarked the landat two sites for solid waste management. These sites will be developed with latest technology for the purpose of solid waste processing and disposal' (ibid.: 22& 47). However, plans to construct the first sanitary landfill have stalled due to legal challenges from middle-class residents who seek to have it relocated (*Times of India*, 2012). The lengthy legal battle that is likely to ensue promises to exacerbate Noida's waste crisis, and as waste piles up in empty lots and along roadsides, residents demand that municipal authorities take action. One municipal official working in the area of waste management stated that 'citizens are only paying lip service. They are saying one thing and doing another' (personal communication, February 2013). By this he meant that there is an impasse as residents demand action but resist plans that would locate waste facilities in their environs and the result is the continued absence of a formal disposal system.

The absence of a public SWM system could theoretically facilitate the growth of a private waste management sector, as entrepreneurs would presumably attempt to meet demand from residents and firms who have the resources to pay for waste management services. However, the absence of legal disposal facilities has discouraged large-scale private firms from entering the waste collection sector. The director of a waste management firm that operates in cities throughout India explained that he opted not to submit a bid for a tender to collect waste in Noida because the city lacks processing and disposal facilities.

> They came up with a tender on immediate, urgent basis, but then we realized that they had located the land [for disposal] just next to the highway and there are a lot of buildings and schools nearby. See in the Master Plan they did not have a landfill site, very unfortunate… [So] they located the land somewhere, then there was public agitation so they found another land. What is happening is the importance of this topic given by the government is very less. They want, okay, there should be a multiplex here, there should be a mall here, but you are just completely neglecting the fact that after five years, ten years, your garbage will stay in your house. You can't take it anywhere there will just not be anywhere. So there has to be a dumping ground. But there has to be land for it. Now there is no land. Once there is no land privatizing collection work is an absolute waste, because if I'm a bidder first thing I will ask is where will I dispose of garbage? (personal communication, February 2013)

He explained that for firms engaged in large-scale waste management, secure access to a legal channel for waste disposal is a primary concern. The ambiguous legal standing of Noida's informal landfill poses a risk because it could conceivably be closed suddenly, for legal or environmental reasons. In this eventuality whoever is responsible for waste collection would be saddled with massive amounts of waste, and left with the unenviable choice of discontinuing

waste collection and defaulting on outstanding contracts with municipal authorities for waste collection, or finding another illegal dumping site and possibly incurring fines from state-level officials. As he explained, the result will almost inevitably lead to lengthy and expensive litigation:

> The disposal can stop at any moment. If the disposal stops, my work stops. When my work stops, they don't pay me. They will continuously say, you know, what happens is that I will end up in arbitration with them. (personal communication, Februrary 2013)

Furthermore, without engineers and investment to ensure long-term viability, operating in informal landfills poses logistical challenges to large-scale firms. The director of this waste management firm explained that in another city he once agreed to dispose of waste in a state-sanctioned informal landfill, but his investment was subject to decreasing returns after a few years:

> Initially when I got it was ok, but it becomes bad in the rainy season. So one two three years we kind of managed to dispose the garbage...[but profits] started reducing, [and] the reason is very simple. Now, my truck takes garbage, it has to dispose somewhere. When it goes to the dumping ground it doesn't have a place to dispose, so it has to stand in the queue to find a place…They have one vehicle, a dozer waiting. Now that dumping ground is like a leachate pond. So my truck goes inside, the dozer will come from behind it will push the truck in the dumping ground…and it will reach a place inside where there is little bit of space to dump the garbage. There it will stop, it will dump the garbage, then the truck has to come back. So when I'm having 35 to 40 trucks waiting there, every truck has to be pushed like that. I was targeting to dispose 250 tons per day but it started getting reduced…finally I reached a stage where I am giving salary from my pocket. (personal communication, February 2013)

Thus, in order to make waste collection profitable for large-scale private firms and avoid bottlenecks, municipalities must begin by arranging facilities at the 'end' of the chain (i.e. waste processing and disposal) rather than simply offer financial incentives to firms entering the 'beginning' of the chain (i.e. door-to-door collection). In the case of Noida, the municipal government has not allocated space for a landfill so large-scale private firms are unwilling to take responsibility for waste collection. In other words, state inaction has discouraged private-sector growth, and the result is indeed a waste crisis, with the proliferation of unauthorized dumping grounds throughout the city and frequent outbreaks of dengue fever.

Everyday practices and politics of waste management

In this section we examine the politics surrounding the actually existing everyday practices of waste managementthat have emerged at the micro-scale in the absence of a formal public or privately managed waste management system. We focus on a market and an adjacent upscale colony (i.e. neighborhood) located near the metro line that connects Noida with central

Delhi. The market has approximately 200 shops, some of which sell high-end consumer durables, but most offer everyday goods and services (e.g. dry goods, pharmaceuticals, basic restaurants, photocopying, film developing and portrait photography). Most residents of the colony were either professionals who worked in Delhi or were retired government officials. The shopkeepers had established a market traders' association (MTA) and the colony residents had organized into a resident welfare association (RWA). We draw on a focus group discussion with five shopkeepers, and three semi-structured interviews with members of the colony's resident welfare association. Furthermore, we attended a meeting of the RWA. Once we had gained an understanding of the politics of waste management in this area we conducted ten semi-structured interviews with workers and entrepreneurs in the informal waste sector and a security guard employed by the RWA.

The politics of waste management in Noida is a constant topic of discussion among residents and shopkeepers, perhaps because waste itself is ubiquitous. The RWA and MTA must constantly (1) seek outlets for their waste and (2) remain vigilant that other peoples' waste is not being dumped nearby. As a result a perpetual politics of struggle and negotiation has emerged over the location and relocation of dumping grounds as waste is constantly (re)moved and dumped throughout the area.

The shopkeepers in the market described a never-ending struggle to maintain order and cleanliness. They blamed both the municipal authorities and residents. One resident explained that "the problem with government is they don't have any public accountability. You can't hold them responsible for anything. They just shrug off all kind of responsibility. They have kind of immunity." In one example, a shopkeeper considered the futility of trying to hold municipal officials accountable for fixing a clogged drain in front of his shop:

> The drain in front of my shop is choked since ages…It was never got connected to the main drains and it got filled up and the drain water stays there only, it doesn't drain out. The simple thing is to talk to those authorities to get it cleared so that the water doesn't get stagnated there. But still I don't have that kind of faith in them. Even if I go they will just give me a show, 'ok we'll come and see,' and they will never come. (personal communication, February 2013)

We suggested that any municipal government in the world whose city was growing as rapidly as Noida would struggle to provide waste management services, and one respondent countered that managing waste was particularly difficult in India because people dispose of waste haphazardly. He exclaimed that "if you send Indians to Zurich, they'll ruin Zurich." Another resident elaborated:

> Neither the government is handling properly, nor we citizens. People are still not sensitive, they would still throw waste on the road. We are not throwing our waste properly, we are not segregating it. (personal communication, February 2013)

The shopkeepers pay private firms in the informal sector to remove their waste, but even this arrangement poses certain challenges. They explained that it is difficult to find anyone willing to collect non-recyclable waste.

> Valuable garbage nobody wants to leave, everybody's ready to pick that up and take it away. But then you're left with the things which are lying there and getting rotten and spoiling the atmosphere. That thing nobody is willing to pick up…You employ private people, they will just see the value of the garbage which a particular society [ie neighborhood] can produce.(personal communication, February 2013)

The colony where this research was conducted has been relatively successful at controlling space within its boundaries. The RWA has hired a private security firm to regulate who enters the colony, and workers in the informal service sector require authorization from the RWA to operate. Furthermore, the RWA has been able to ensure the outflow of its waste and prevent empty space within the colony from being converted into unauthorized dumping grounds. Nevertheless, it is not uncommon for piles of waste to suddenly appear along nearby roadsides and in parks. One RWA member sought to launch a beautification campaign whose primary objective was to address shortcomings of solid waste management. According to her part of the blame for poor SWM falls on 'citizens' who have a 'duty' to maintain order within the colony: 'It is difficult to work through [the state], by saying "my waste should be picked up." What's my duty? Whatever best I can do, I must do as a citizen.'

We attended a resident welfare association meeting where she proposed a beautification drive. The meeting was held on a Sunday morning on a side-street in front of a gate that residents had erected in order to limit through traffic. Approximately thirty people attended, and they were seated in rows of plastic chairs. Guards from a private security firm who normally maintain a presence at the entrances of the colony were present and served cola to the residents. The four elected members of the RWA sat in front of the assembled residents and introduced the two main items on the agenda, both of which concerned the regulation of space within and around the colony. First, residents of the adjacent colony had protested the gate because it restricted their access to a main road, and forced them to make a lengthy journey around the colony. Residents agreed that through traffic is a nuisance and that the gate should remain closed. Second, residents whose houses were located on the border of one side of the colony complained that the land directly behind their houses was being used as an unauthorized dumping ground. When the activist proposed a beautification drive a number of residents expressed skepticism. In particular, the activist's plan included placing garbage cans throughout the colony, but other residents countered that this would only serve to attract more waste which would pose a challenge of disposal.

In both the market and the colony, middle class residents struggled to impose their vision of an orderly urban environment. Residents were constantly reminded of the fragility of their control over space, however, and in a poignant example that occurred during the resident welfare association's meeting, a shepherd herded approximately fifty goats through the newly erected

gate. The security guards who were responsible for maintaining a presence at the gate dropped the trays of cola they were serving to residents and sprinted to the gate, but not before the herd of goats had entered the colony.

The strip of land adjacent to the colony that has become an unauthorized dumping ground illustrates that whatever modicum of order residents are able to impose within the colony does not extend beyond its borders. In contrast with central Delhi where most urban space is subject to competing claims and formal or informal institutions determine how and by whom urban space is used, a significant amount of urban space in Noida remains uncontrolled by both municipal officials and non-state actors. In this case, land that was essentially unaccounted for became an unauthorized dumping ground. Residents planned to appeal to local officials to impose order on this adjacent strip of land and prevent unlawful dumping, but they remained pessimistic that anything would change. Thus, in comparison with Delhi, Noida has abundant open space which attracts affluent residents with utopian visions of an orderly environment, but realizing this vision proves tremendously challenging. Events such as the unexpected arrival of a shepherd and his flock give rise to a perceptible fear among residents that the 'chaos' and 'disorder' that is visible beyond the colony gates – manifested in the unauthorized dumping ground – threaten to engulf the entire colony.

The unauthorized dumping ground was effectively a *cordon (non-)sanitaire* that separated the colony from an unauthorized housing settlement (i.e. 'slum') that was home to many workers in the informal sector, including waste collectors (Photo 2). By contaminating the space between these communities, waste workers have rendered this space useless and valueless to the colony's affluent residents. The extent to which the contamination of this space was a deliberate strategy of claims-making was unclear, but it nevertheless attests to the ways in which 'social power relationships are played out in the production of urban nature' (Zerah and Landy, 2013: 26). Ultimately, this unauthorized dumping ground prevents – perhaps only temporarily – affluent residents from encroaching on the neighboring unauthorized settlement whose access to land is tenuous.

Most waste in Noida is collected by informal-sector workers – i.e. 'wastepickers' or 'rag pickers' (Arvind, 2011) – and the proliferation of unauthorized dumping grounds throughout Noida can be explained by the competing pressures on informal-sector waste management firms. These firms typically employ between five and fifty workers and establish site-specific agreements regarding waste collection with institutions (e.g. shopping malls, corporate offices, hospitals, restaurants and hotels). Institutions that tend to produce a high-volume of recyclable waste charge collectors a fee for the privilege of collecting it, while residential colonies and local markets that commonly produce more non-recyclable waste (e.g. organic or inert waste) must remunerate waste collectors.

The waste collectors who worked in the colony whose RWA meeting we attended operated on a daily basis, and were hired by an intermediary that had successfully won a tender for street sweeping from the municipal government. Waste collectors' monopoly over the colony's waste was guaranteed by the private security guards posted at the gates of the colony

who ensured that non-authorized wastepickers would not enter the colony. A security guard explained that:

> [Service sector] workers[2] have been given an entry pass to enter into the colony. No other person is allowed. All those people who want to sell their stuff in the colony have to get permission from the RWA… Stealing and other such incidents are rare in the area. The security is serving for last 5 years in the area and there is no complaint.

Thus, it is important to recognize that the deployment of private security is not necessarily meant to exclude marginalized groups' access to space, but rather it regulates how these groups use and circulate within the colony. In this case, particular waste workers were granted access to the colony on the conditions that they swept streets on a daily basis, collected waste from the ground floor free of charge, and collected waste from the first or second floors in exchange for Rs. 100 and 200 per residence per month. Since the waste workers were paid to collect rather than dispose of waste, they dumped the non-recyclable waste at the earliest opportunity. They dumped waste surreptitiously because they claimed that guards at the state-sanctioned informal landfill demand bribes to actually use the landfill. This was confirmed by other waste workers who added that these guards also exact bribes from waste workers who scavenge there for recyclable material.

Another common model of waste collection is for small- and medium-sized waste management firms to pay institutions a fee for the privilege of collecting their waste. While some of these waste management firms employ as many as fifty workers, the system is informal and verbal agreements are preferred over written contracts. We interviewed three entrepreneurs who operate small- and medium-sized waste collection firms and collect waste primarily from hotels and restaurants, hospitals, corporate offices, and shopping centers. The amount that informal waste management firms have to pay for the right to collect waste depends on the volume and composition of waste. All three of the respondents operated facilities where waste that was collected throughout the city was brought, segregated and stored until it was ultimately sold to recyclers. One of these collection depots was little more than a tin shed, approximately nine square meters, while another was a vast space that was divided into a labyrinthine network of courtyards where different types of waste was stored. These depots were staffed by full-time employees who sorted waste; in one example these workers were almost exclusively women whose husbands worked as wastepickers throughout the city. In addition to segregating paper, plastic and metal waste, these firms handled such large amounts of waste that it was financially viable to sell organic waste to pig farms. While large-scale waste management firms that operate in the formal sector worry about maintaining access to waste disposal facilities, the primary concern of these small- and medium-sized firms in the informal sector was to maintain secure

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[2] Colony residents depend on a large number of service workers, including domestic servants, drivers, nannies, gardeners, clothes washers, vegetable vendors and waste collectors.

access to waste itself since their profitability depended on supplying waste to recyclers and farmers.

Given the informal nature of the agreements governing waste collection, one entrepreneur said he must constantly approach managers of hotels and restaurants and offer his company's services. He stated that he collects waste from hotels and restaurants whose waste is approximately 90% organic or recyclable, which means he is only forced to dispose of the remaining 10%. Another entrepreneur stated that he will not agree to collect waste if he must dispose of more than 25% of the total. Their concern with disposal is due to the cost incurred at the city's informal landfill – they both confirmed that in order to dispose of waste they had to bribe officials at the landfill. Furthermore, they had no choice but to dispose of waste at the informal landfill because unlike waste collectors in colonies and markets who handle comparatively small amounts of waste, their operations handled tons of waste which were difficult to dispose of along roadsides unnoticed. For this reason they sought access to waste with a high percentage of recyclable material.

In summary, the proliferation of unauthorized dumping grounds and Noida's waste crisis can be explained by the city's regulatory structure in which municipal authorities have failed to provide disposal facilities. In other words, by floating tenders the municipal government is essentially 'pushing' waste into a value chain that lacks clearly defined forward linkages. This regulatory framework inhibits both large-scale formal firms and medium-sized informal firms from collecting waste. The former are hesitant to commit to waste collection in a dynamic regulatory environment, while the latter cannot afford to collect waste if a high percentage of it must be disposed in the informal landfill. Finally, waste collectors that operate within colonies simply dump waste haphazardly as soon as possible in order to avoid both opportunity and financial costs that would be incurred if they transported it to the informal landfill. The practices and politics surrounding waste management in Noida have given rise to a particular urban geography in which affluent and middle class residents are forced to (1) intearct with informal-sector waste workers and (2) struggle to insulate themselves from waste. Meanwhile, the haphazard dumping of waste in open spaces and along roadsides continues unabated. While this is a focal point of struggle, it is not a straightforward contestation of communities in a zero-sum contestation in which they seek to avoid exposure to waste. Contaminated spaces represent disorder to affluent and middle-class residents, while haphazardly dumped waste can 'future-proof' cityspace for marginalized communities – albeit only temporarily – because it discourages property development.

Conclusion

We have sought to demonstrate how the absence of a comprehensive regulatory regime in Noida has precluded the development of a SWM system even though there is widespread agreement among officials and residents that improving waste management is a priority. Indeed, the absence of large-scale public or private SWM in Noida can be attributed to a combination of lackadaisical officialdom as well as intransigent NIMBYism of residents. This demonstrates the

limits of Noida's municipal government's power, as it cannot simply fiat the development of a comprehensive SWM system. Ananya Roy (2009) claims that "urban planning in India has to be understood as the management of resources, particularly land," and from this standpoint Noida's municipal government appears agentic. After all, it simply designated an unused strip of land as a temporary landfill without going through bureaucratic motions such as an environmental impact assessment. However, if the conceptualization of urban planning is broadened to include services such as SWM, then the very same act – the creation of an informal landfill – represents the failure of municipal authorities to roll out services.

The failure to secure land for a formal sanitary landfill has made it impossible to attract private-sector waste-management enterprises, as firms are hesitant to agree to collect waste that they may find difficult to dispose of in the future. In place of a large-scale SWM system, many RWAs, MTAs and other institutions (e.g. hospitals, private educational institutions, restaurants, etc.) solicit waste collection services from small or medium-sized firms that operate informally. Institutions that produce predominately recyclable waste, such as hospitals, typically charge waste collectors a fee to remove it. In these cases it is taken to a nearby storage facility where it is segregated, stored, and ultimately sold in bulk to recyclers. In colonies and markets where waste is predominately non-recyclable and hence non-valuable, collection services must be remunerated. The actually existing micro-politics surrounding the practices of waste management in a colony and a market demonstrated that waste collection services are solicited from small-scale firms in the informal sector, but waste disposal remains beyond the terms of agreements. If waste collectors transport non-recyclable waste to Noida's informal landfill they not only incur an opportunity cost, but also a financial cost because they must bribe local officials to dump waste. As a result, they oftentimes dispose of non-recyclable waste at the earliest opportunity, which in the case of the colony where we conducted research happens to be in the open space directly behind it. This exposes the limitations of the RWA's control over urban space. On the one hand the RWA can ensure that waste is collected and removed from the colony. Furthermore, through the deployment of private security, the RWA can more or less control who/what enters and circulates within the colony. On the other hand, this control is constantly threatened by the perceived chaos that lies beyond the colony's gates.

Importantly, neither private-sector enterprises nor residents have imposed a competing regulatory regime in the absence of leadership from municipal authorities. Instead, formal-sector firms hesitate to operate given the comparatively high level of risk, while the limits to utopian vision embraced by many middle class residents of an orderly city is evidenced by the proliferation of unauthorized dumping grounds throughout the city. In the case we examined an unauthorized dumping ground amounted to a *cordon (non-)sanitaire* between the colony and an informal housing settlement, and to middle-class residents this serves as a poignant visual and olfactory reminder of the disorder that threatens to engulf the colony. However, it is more than symbolic because it serves as an actual bulwark against the imposition of the order that prevails within the colony. In other words, by contaminating this space adjacent to the colony, waste workers have rendered it less valuable and less likely to be used – for the time being – by

property developers. Thus, this space is a manifestation of the discordant relations among numerous groups with 'conflicting rationalities' (Watson, 2003). While scholars have shown that contamination is commonly an integral part of regimes of accumulation (Demaria and D'Alisa, 2013) and that marginalized communities often bear the brunt of environmental hazards (Auyero and Swistun, 2009), Noida's socio-spatial landscape forces us to recognize that marginalized communities can 'future-proof' urban space by contaminating it.

Ultimately this research demonstrates the importance of incorporating the development of service systems in analyses of urban planning regimes in India. This is particularly the case in new towns where the fluid regimes of deregulated land-use identified by Roy (2009) condition the emergence of actually existing service systems. In the case of SWM, regulation is required throughout the system, from the point of collection to processing and ultimately disposal. This requires governmental action and the allocation of space for each phase – collecting, segregating, storing, and interring/recycling. In Noida the mix of land-use – i.e. residential, commercial, industrial, and unauthorized (both residential and commercial) – requires the development of a complex strategy that is overseen by the municipality, and integrates the expertise of large-scale private firms adept at handling large volumes of medical and industrial waste, with the extensive informal sector that already collects waste in neighborhoods and markets. Thus, a successful SWM strategy in Noida would require municipal authorities to carefully orchestrate the integration of large-scale enterprises with small- and medium-sized enterprises, throughout the waste management chain from collection to disposal.

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