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– UNCERTAIN GROUNDS: Cartographic Negotiation and Digitized Property on the Urban Frontier

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Abstract

Based on ethnographic research with cadastral land surveyors and revenue bureaucrats in Gurgaon, North India, this article examines how the desire to etch out and impose digitized private property titles on India's urban frontier is mediated by the shifting socio-materiality of bureaucratic work. The article argues that bureaucratic uncertainty structures the commodification of rural land in Gurgaon, and explores how digital technologies, designed to produce clarity, are being wielded by powerful groups to flexibly settle property claims. The bureaucratic office and cadastral survey are sites where competing actors 'work' land's intrinsic pliability, mobilize conflicting documentation, manipulate bureaucratic materials and navigate unmapped property claims in pursuit of territorial claims. In this context, much heralded digital property governance systems, the article argues, are not about producing clarity but rather capturing the conditions of uncertainty. Exploring the practices of surveyors and bureaucrats as they encounter land's shifting materiality and work with its multiple, conflicting representations, reveals the ways in which digitized property systems remain materially bound and always socially mediated, contested and secured.

Introduction

> That's the problem with these maps this one was in such bad condition we couldn't read it … that road could be anywhere, so they had a new one made, of course we have the *mussavi* [original cadastral map] and the GPS map but we have to be certain (Ajay, land surveyor, Gurgaon).

In late 2018 I sat with Ajay, a private land surveyor, and Virinder a senior land revenue bureaucrat in the back of a jeep on the western periphery of the city of Gurgaon in the north Indian state of Haryana. Parked in the corner of a field overshadowed by half-constructed skyscrapers, Ajay balanced a laptop precariously on his knees while we sifted through various cadastral maps, land record documents, hand-drawn sketches and photographs of the area, plugging data into a piece of cadastral mapping software on the laptop. Ajay explained that our attempts to survey and correct a disputed boundary between two land parcels was likely to be difficult. Not only are there frequent inconsistencies between the documents we were sifting through, but the land had already been subjected to two cadastral surveys over the previous 12 months. Each survey had been conducted by a different surveyor, utilizing both digital and analogue methods, and had produced competing accounts on the lie of the

I am forever grateful to the land revenue bureaucrats and surveyors for their time, patience and help in the fields and offices of Haryana. Thanks to the organizers and participants of various workshops across 2019, the RC21 in Delhi, 'Frontlines of Value' workshop in Poznan, 'Urban Limits' session at the RGS-IBG, and UCL's 'At the Frontiers of the Urban' conference, for productive discussion and feedback on earlier versions of this article. In addition I would like to thank Sangeeta Banerji, Tanzil Chowdhury and Nitin Bhatla for their feedback on drafts of this article. I am especially grateful to the anonymous IJURR reviewers for their generous and instructive feedback and comments on the article. This article forms part of the 'Frontlines of Value: Class and Social Transformation in 21st Century Capitalism' project, a collaborative research project hosted by the Department of Social Anthropology at the University of Bergen, and funded by the Bergen Foundation. As always, all mistakes are my own.

boundary line.[1] On top of all this, not all land claims were recorded in the map. While all land in Haryana was gridded and consolidated into 1.1 acre rectangles during the 1950s, giving state cadastral maps the image of geometric precision, here on the ground territorial claims awkwardly shirk the grid's authority; land on the periphery of Gurgaon remains stubbornly resistant to calculation.

As we attempted to map out a copy of the record onto the surveying software, Ajay pointed out some of these resistances from the jeep window: 'Look here on the ground the [grid] is not accurate, this here road is not straight like this, it is coming at an angle, see? These plots are not square—there will always be difference between the maps, the survey [image] and the land itself'. Taking a break from hosting the party of land brokers and landowners assembled in the hot midday sun to witness the day's survey, Virinder the bureaucrat noted: 'What can we do? If we impose the record this whole city would have to shift! We have to find compromises somewhere'.

These struggles to capture uncertain property claims into state records come in the context of over a decade of reforms, backed by the central government's Digital India Land Records Modernisation Programme (DILRMP), to digitize property governance systems and produce 'clear' property titles. The troubled survey we were conducting that day was important insofar as the results would enter into the Government of Haryana's digitized land registry that—it is hoped—will remedy inconsistencies in land records, bypass corruptible bureaucrats, and stimulate real estate development across the state. And yet while carrying ethnographic fieldwork alongside land surveyors and revenue bureaucrats like Ajay and Virinder, charged with constructing the digital record, I was struck by the regularity with which we would be confronted by overhangs and undercuts between the digital survey image, the state record and land's concrete uses. At nearly every digital land survey, these uncertainties would be challenged by competing parties with a litany of conflicting methods of measurement and differing documentation, and settled not by imposition of the record, but through flexibility and quiet 'compromise'. The proliferation of territorial compromises reanimate uncertainties between the record and the ground, that in turn, lead to further calls for bureaucratic correction. As I was quick to learn, state calculations would always beget state calculations. Despite the certainty that digitized state maps and records confer, land is tricky to calculate, rural property claims are difficult to pin down and our attempts to do so often magnified uncertainties that bureaucratic work is intended to remedy.

In this article, drawing on extensive ethnographic fieldwork with land revenue bureaucrats (*Kanungos* and *Patwaris*) and cadastral surveyors in Gurgaon, I argue that the digitized calculation of land claims on India's urban frontier operate through practices of bureaucratic uncertainty. That is, the task of transforming rural land into a calculable and commodifiable resource is not imposed through digital precision nor formal state rule, but rather mediated by accretions of bureaucratic negotiability, unruly and contested bureaucratic materials and the shifting topography of land itself. Each contribute to uncertainties that in turn, allow competing social actors to flexibly settle territorial claims both on the ground and in the record.

By examining the complex labours of bureaucrats and surveyors as they seek to calculate property boundaries, this article seeks to show that digital property technologies remain bound to these conditions of uncertainty. Despite being designed to offer finite precision, 'alleviate uncertainty' (Gupta, 2010), bypass bureaucratic manipulation, and maximize under-commodified rural and peri-urban land (Sinha, 2009), digital surveying and land record software remain dependent upon a host of sociomaterial bureaucratic labours, and as such are just as vulnerable to manipulation, appropriation and 'compromise' as their analogue predecessors. In this article I explore

1 Land that falls under the jurisdiction of numerous government departments will often be surveyed by each department adding complexity to the record.

how these digital technologies are being mobilized by corporate real estate actors not to eradicate but rather remediate uncertainty and co-opt localized property regimes, repurposing negotiable bureaucratic encounters to settle territorial claims.

While much urban scholarship on land enclosure and commodification have tended to focus on the legal and policy-based mechanisms through which the state expropriates land and captures real estate investment, here I interrogate the quieter sociomaterial struggles between the record and the field that facilitates the uncertain fate of land's commodification, and the iterative deployment of digital technologies by global actors to capture these localized processes. Examining these struggles *for uncertainty*, this article seeks to contribute to analyses of the incomplete and compromised character of private property regimes in the majority world (see Benjamin, 2019; Ghertner, 2020).

In the following section I begin by drawing together literature on bureaucratic indeterminacy, private property regimes and the postcolonial state to examine how uncertainty structures land's calculation and commodification in contemporary North India. Next, the article examines how experiments in private property regimes in colonial North India, and resistances to them, generated early uncertainties between state records and land uses that continue to trouble state calculation today. In the fourth section I introduce the land revenue office and explore how real estate actors embed themselves in the office, and exploit uncertainties in the record to find and capture land. In the final three sections, I explore how digitized cadastral surveys are used as spaces where competing real estate actors attempt to manipulate bureaucratic materials to consolidate land and settle property claims.

Uncertain property

At the heart of this push for digitized land governance systems is a quest for land. Since the early 1990s successive Indian governments have adopted an economic strategy that has prioritized the monetization of 'land assets' and capture of private investments to spur urban and infrastructural development (Sankhe *et al*., 2010; Banerjee-Guha, 2013). Gurgaon's notorious private sector-led urban development model that has enclosed and commodified vast tracts of agricultural land is perhaps a shining example of this strategy. Gurgaon, India's so-called 'millennium city' 20 km south-west of New Delhi, is one of the fastest growing cities in India. Driven by 'flexible planning' apparatuses (Gururani, 2013) and speculative forces of urban development (Goldman, 2011), the 'Gurgaon model' of private sector-led real estate development has transformed the former agricultural hinterland into a bustling metropolis of over 1.5 million people today with some of the most highly sought after land and real estate in the country (Cowan, 2018). Nevertheless, over the past decade attempts to open up land to private capital investment, in Gurgaon and across the country, have faltered in the face of uncertainties in the global economy (Searle, 2016), growing opposition to land-based dispossessions (D. Bhattacharya, 2019), and quiet subversions in the land acquisition process commonly attributed to India's notoriously negotiable agrarian land bureaucracy (Sud, 2017; Cowan, 2019). This is particularly true in newly urbanized areas like Gurgaon, where elite civil society, private governance actors and international real estate capital meet the political institutions, actors and spatialities of the agrarian world. As discussed elsewhere, here on the rural-urban frontier, logics of urban expansion articulate with localized agrarian histories of land, territory and social power to produce uneven geographies of urban and rural, commodified and non-commodified lands (Cowan, 2018; 2019). While the country's great metropoles are awash with towering monuments to new global city-building, the peri-urban landscape where the vast majority of India's urbanization is taking place (Denis and Zérah, 2017) is characterized by the patchwork and uneven consolidation of real estate markets, 'ghost towns', half-built developments, highways interrupted by hold-outs and bordered

off areas of land; monuments to the mixed success of land enclosure and conversion on India's urban frontier.

These impasses in real estate development are frequently attributed by government and corporate actors, to unclear property records and a 'corruptible' low-level agrarian bureaucracy in the pocket of local interest groups (Sinha, 2009; Gupta, 2010; Deininger and Goyal, 2012). Digital land governance systems are intended to remedy these blockages, replacing human with automated and algorithmic governance, and establishing transparent, legible and thereby fungible property titles in land. The goal, as described by government officials (Sinha, 2009), is to move from India's *presumptive* titling system, where property ownership must be proved through navigating bureaucratic spaces and acquiring certified documentation, to *conclusive* titling—modelled on the settler colonial *Torrens System*—where a singular agency holds property records, assures proof of ownership and manages property registrations.[2]

Existing scholarship on private property regimes have explored how, as technologies of modern governance, the cadastral survey and title registry have long been deployed to materially and representationally establish the authority of private property. As bureaucratic tools, the survey and registry are seen as vital components to the abstraction of land from its localized peculiarities, and its conversion into a universalized, empirical object that can be easily calculated, exchanged and intervened in by governing actors (Lefebvre, 1991; Mitchell, 2002; Blomley, 2003; Keenan, 2017; Bhandar, 2018). The cadastral survey's explicitly cartographic objective, it's production of material artefacts—maps, records, grids, lists, hedges and walls—enable the demarcation of a stable and rationalized interior intelligible to state authority from an unwieldy and irrational exterior. The registry and map delineate the sensibility and territoriality of modern power. These technologies are equally representational they are involved in ideologically establishing land as a 'naturally' gridded and visualizable resource, and in doing so delineate a specific common-sense to forms of private ownership and possession (Blomley, 2003). These are, in other words, *authoring technologies* that materially and representationally set the terms of land's calculation and establish conditions for land's commodification. Despite their implicit contingency to historical-geographical conjunctures, the deployment of these technologies work to, as Polanyi ([1944] 2001) notes, normalize a set of universal 'fictions' that reify the idea of land as always already private property. As Bhandar (2018) writes, the construction of conclusive title registries 'effectively transform the idea of property (in land) as a socially embedded set of relations premised on use, political hierarchies and exchange, to a commodity vision of land', cleaned of its local impurities and made universally fungible.

To its advocates, the construction of a digital land governance system across India can achieve similar goals (Gupta, 2010). And yet in order to do so, such a system must first fulfil what is termed the 'mirror principle'. For conclusive title registries (digital or otherwise) to function all present interests and claims on property must be instantaneously reflected in the registry. Fulfilling the mirror principle thus requires the real-time surveying of land, and a constant re-harmonization of the gaps, bends, and breaks that Ajay pointed out on the survey. This includes translating records, resurveying land, digging and filling-in ditches, remedying inconsistencies, in ways that transfer authority back to bureaucratic actors in the field and complicate land's capture in the record. In this regard, the registry's 'commodity vision' remains ineluctably tied to historic and material bureaucratic engagements they seek to displace. As we shall see, rather than obstruct the calculation of commodification of land, the earthbound uncertainty of property-making in Gurgaon forms the central plane through which land's calculation takes place. As Blomley (2003) argues, private property in land is not a 'static pre-given

2 The architects of Haryana's land record digitization directly refer to the Torrens System as inspiration for the Haryana programme (see Satyaprakash and Singh, 2017).

entity' but must be constantly socially assembled, performed and secured (see Bruun *et al*., 2017). It is these social and bureaucratic engagements that I follow in this article.

Scholarship on real estate-led urbanization in India has tended to focus on the legal and territorial mechanisms—*eminent domain*, special economic zones, city development plans—deployed by the neoliberal state in order to dispossess communities and clear land for real estate capital investment (Sampat, 2008; Banerjee-Guha, 2013; Levien, 2013). While providing an invaluable analysis of the frequently violent, imposition of state territorial authority and land commodification, less attention has been paid to the complex and uncertain sociomaterial work of measuring and calculating land boundaries, reconciling competing property claims, sifting through contradicting documentation and producing 'legible' property titles. As Matthew Hull's work has shown, bureaucratic materials—paperwork, survey maps, title registries—are seldom 'obedient tools of government', rather, as mobile objects of state authority, they can be captured, remediated and deployed by their possessors for disruptive and alternative means (see Das, 2004; Anjaria, 2011; Hull, 2012) Land expropriation and commodification, while no doubt ubiquitous components of urbanization the world over, do not occur merely by writ of legal instrument, especially in contexts of persistent state negotiability, but are rather wrought through a series of contested social, material and representational engagements with the agrarian world.

Here I draw on Katherine Verdery's (1994; 2003) work on property restitution in post-socialist Romania. In this work, Verdery explores how the reimposition of land boundaries, hedges, walls and ditches in the post-socialist period was socially negotiated and contested, engendering land with a certain 'elasticity' that enabled 'spaces for manoeuvre by the village and commune elites charged with reimposing the grid' (Verdery, 1994: 1073). Through contested bureaucratic work, Verdery shows how open fields stretched, contorted and shrunk their way into private property claims. Land, Verdery notes, 'writhe[d] and stretch[ed] under the weight of so many conflicting claims' (*ibid*.). While conducting ethnographic fieldwork alongside surveyors and bureaucrats in Gurgaon, I found 'digitized' bureaucratic work to ignite similar uncertainties in property. This article argues that an interrogation of the compromised geographies of land calculation, of the contested execution of surveys, pitching of border fences, redrawing of maps, and moving of clods of soil, matter for our understanding of private property regimes and their quiet subversion, obstruction and appropriation.

An interrogation of the socio-material grounds of private property regimes not only illuminates the territorially flexible ways that real estate capital secures and commodifies land, but also contributes to our understanding of the uncertain and patchwork progress of land commodification in peri-urban India, where, despite the presence of bureaucratic weapons sharpened for land expropriation, digitally-enhanced urban futures remain incomplete and rural communities continue to remain otherwise to seemingly universal narratives of capitalist dispossession.

Uncertain states

Scholarship on the postcolonial state has long attended to the ways hegemonic plans and schemes are enacted and subverted by low-level bureaucratic actors within everyday spaces (Benjamin and Raman, 2011; Gupta, 2012). Drawing attention to the fundamentally ideological 'effect' of state uniformity and coherence (Ferguson and Gupta, 2002), anthropologies of the everyday state explore the uncertain social and material processes through which grand state plans are reworked and compromised by bureaucratic actors in contested social terrains. If traditional approaches figure the state as a coherent, abstracted and impersonal entity that enacts policy through a hierarchical division of labour, this body of work explores how state authority is constituted through diffuse and porous bureaucratic networks (Anjaria, 2011; Benjamin and Raman, 2011; Gupta, 2012; Anand, 2015) that flexibly operate in response to competing localized pressures.

Urban scholars working in Indian cities have explored how this bureaucratic indeterminacy—in part a consequence of an incomplete postcolonial settlement (Kaviraj, 1984)—acts as a resource for urban poor residents, otherwise excluded from access to urban service provision, housing and jobs, to make social and spatial claims in the city (Chatterjee, 2004; Anjaria, 2011). Low-level bureaucrats who are said to constitute a 'shadow-state' (Harriss-White, 2003) reconstitute everyday bureaucratic spaces as terrains for competing claims to space and citizenships in urban India. In doing so, this scholarship has drawn out the diverse logics through which spatial claims are legitimated, highlighting the ways in which the disarticulated state constitutes its authority as much through logics of non-implementation, uncertainty and ambiguity as enforcement, code and rule (Chatterjee, 2004; Anand, 2015; Ghertner, 2017). Partha Chatterjee's now infamous work on 'political society', for example, argues that governance of urban poor populations is exercised by appeal to moral rather than the legal claims. While Ananya Roy's work in peripheral Kolkata examines how bureaucratic 'unmapping' of the city affords local bureaucrats the space to flexibly distribute land and settle territorial claims (Roy, 2003). This 'unmapping', far from indicative of state failure, Roy argues, is a defining mode of governance in urban India.

This rich literature on the everyday state in India has thus far, bar a few exceptions (Benjamin and Raman, 2011; Hull, 2012), focused on how bureaucratic negotiability structures forms of state power and the governance of marginalized communities (Benjamin, 2008; Gupta, 2012). In this article I am interested in how real estate actors, distant from the localized machinations of property, get in on the game, exploring how similar kinds of bureaucratic uncertainty play a role in structuring property claims and affording real estate actors—from landowners to developers—resources to flexibly settle territorial claims, despite their incongruence to formal state records. In Gurgaon it is not an absence of maps, but rather an abundance of differing maps, that bestow uncertainty to territorial claims and enable land captures.

Digitized property governance systems have been ostensibly designed to displace these kinds of localized bureaucratic practices (Gupta, 2010), and yet, digital infrastructures seldom constitute a clean break from their analogue predecessors. As media theorists have long argued, the digital more commonly 'remediates' (Bolter and Grusin, 1996) and 'grafts' onto (Hu, 2015) existing analogue systems, repurposing pre-existing geographies of power and calculation for new means. In this article I show how Haryana's digital property system is not only shaped by the built-in silences and biases of its paper predecessors, but is increasingly being deployed by corporate real estate actors to capture and remediate localized practices of uncertainty to secure territorial claims. That is, property digitization in part embodies an attempt by corporate and upper-state actors to capture bureaucratic uncertainty, conjure property claims from silences in the record, shift borders, aggregate parcels and consolidate property.

Just like their analogue predecessors, the negotiability that these technologies engender enable powerful actors to define what counts as property, which property claims are legitimate, when to enforce the record and when to 'compromise'. As Timothy Mitchell's (2002) work on colonial governance in Egypt notes, 'regimes of calculation' that deploy surveys, maps and lists are not primarily about producing more *accurate* knowledge, rather they are intended to consolidate knowledge in ways that secure land as an immutable empirical object, with a singular authority. Counter to advocates of digitization, digital infrastructures are tools wielded to *author*, not *reflect* property claims. The rush to digitize, this article argues, thus primarily represents a tussle for control of uncertainty. It is these bureaucratic tussles *for* uncertainty that are shaping real estate-led urban development in India.

The following section explores how histories of subversion to state-led land rationalization wrote unmapped property claims into state records. These silences in the record frustrate state attempts to digitize the registry and are exploited by real

estate actors to informally re-map land in record books and settle property claims. The article subsequently draws from ethnographic fieldwork on cadastral surveys in peri-urban Gurgaon, to explore how real estate actors manipulate surveying materials and technologies to contest and settle property claims. Finally the article considers the conceptual contribution 'uncertainty' provides for analyses of real estate-led urbanization.

Silences in the record

Contemporary digital property infrastructures in Haryana are grafted onto longer, contested histories of territorial calculation. Over the past one and a half centuries both colonial and independent governments have sought to rationalize and consolidate land in the North Indian countryside. These efforts were set in motion by the refiguring of traditional uses of land and agricultural practices as unproductive and unmodern and positioning of the gridded cadastral map and bounded property holding as modern and efficient (N. Bhattacharya, 2019). According to colonial officers' persistent fragmentation of landholdings was an economic and moral scourge on Indian society. Malcolm Darling, the British colonial officer who campaigned for rural land enclosure in Punjab, argued that persistent customary land tenures that produce a fragmented cartography of landownership, 'block the way [to development] … it cannot be too often repeated that, till landholdings are consolidated, no great advance can be made' (Darling, 1925: 185). Without large-scale land consolidation, bounding and enclosure, the British believed their mission to modernize the 'improvident' Indian peasant, consolidate territorial power and crucially, maximize agricultural revenues would remain forever partial.

In order to make calculable the Punjab countryside, British colonial officers engaged in a variety of territorial and bureaucratic interventions; surveying land, enclosing fields, classifying and re-classifying land tenures and yields, and privatizing the commons (N. Bhattacharya, 2019). Nevertheless, the success of colonial land consolidation was partial, and consistently frustrated by both the contrasting ideologies of competing colonial officers, and the stubbornness of rural landowners to agrarian conquest. The fragmentation of land and practice of owning shares across discontiguous parcels worked well for peasants, enabling them to spread risks, diversify cultivation, lease out fragments for additional income, move landholdings and consolidate land to their own particular needs; fragments formed 'the anchor around which peasant lives often moved' (N. Bhattacharya, 2019: 310). In this context, colonial ambitions to remove the fragment and consolidate landholdings were never fulfilled. While the rural land was mapped and codified by colonial bureaucrats, the *gridding* and *consolidation* of fragmented land plots was largely limited to the 'canal colonies' in districts of Punjab today located in Pakistan.

If colonial rule failed to fully consolidate land into rationalized parcels, the post-Independence government of Punjab took a more aggressive approach. With rhetoric that near mirrored the modernizing ideology of their colonial predecessors,[3] one of the first acts of the newly independent Punjab parliament, passed unanimously, bestowed powers upon a Consolidation officer within the Revenue Department to undertake the compulsory gridding and consolidation of all land.[4] While the total land consolidated under colonial projects amounted to just 700,000 acres up to 1947, between 1948 and 1966 the post-Independence Punjab government had completed the consolidation of over 22 million acres of land, reorganizing the vast majority of the Punjab countryside into rectangular village grids (*murabba*), each composed of 25, one-acre consolidated

3 Speaking in favour of the act in 1948, East Punjab Minister for Development, S.K. Singh argued, 'The prosperity of the peasantry depends chiefly on the [consolidation] of the holdings in this country'.

4 The East Punjab Holdings (Consolidation and Prevention of Fragmentation) Act, 1948.

squares (*kila*). Land consolidation took place in the context of the mass rehabilitation of Partition refugees and preceded the Green Revolution that would transform the state's economic fortunes. This significant reterritorialization of Punjab (which in 1966 split into three separate states: Punjab, Himachal Pradesh and Haryana), worked to establish the modernist authority of private property, obscuring the historic uses and claims on land, and elevating the rectangle to an abstract, empirical category able to be intervened in and disposed of in any number of ways.

The grid is of course the paradigmatic form of modernist urban planning the world over. The grid works to delineate land into rectangles that can be easily seen and exchanged and establishes the material boundaries that form the foundation of modern territorial governance (Blomley, 2003). Yet despite the successful consolidation of scattered landholdings into the *image* of the cadastral grid, efforts to remove actual *practices* of landowners were compromised by ongoing land transfers, undulating landscapes resistant to surveying methods, and an agrarian bureaucracy deeply embedded in local cultural and political economy (N. Bhattacharya, 2019). Crucially practices of joint-holdings, where landowners own shares in a single piece of land, endured throughout the state and continue to form the predominant mode of land ownership in Haryana.

Joint-holdings hold an ambiguous position within modernist bureaucratic records engineered for singular, consolidated landownership. The sheer number of irregular shaped shares in any one rectangle,[5] one Patwari relayed to me, caused 'too much noise' in the map, and so while the property of co-sharers within each rectangle are recorded textually in the state record books (*jamabandi*), these shares are not represented in cadastral maps (*shajra)*. As such there is no record of the precise contours and location of each share within the rectangle; no knowledge of which share holder possesses or cultivates which part of the land. These unmapped shares are written into Haryana's digitized cadastral maps and confound attempts to produce the mirror. In this respect, while land consolidation technologies throughout history have produced an image of rigid certainty, projected through the authoritative rationality of the grid, lurking underneath the grid's powerful glare illegible and contested claims and uses of land endure. Despite their best efforts, the grid itself establishes significant uncertainty in the record.

The persistence of unrecorded land shares ultimately represents a compromise between the state and landowning communities that has informed the way in which land's transfer into real estate has informally taken place across the state. On one hand tens of thousands of unrecorded property claims form a key obstruction the ambitions of corporate real estate and upper-level state actors to fulfil the mirror principle, on the other the ambiguous geography of land ownership affords local real estate actors' space to informally capture and aggregate land, and bureaucrats' space to improvise and flexibly arbitrate property claims. These practices have contributed a certain representational thickness to land; conflicting maps abound across the city's bureaucratic desks and offices. This thickness deepens the division between state records and the field, cracks the mirror, and calls for new rounds of bureaucratic intervention and arbitration.

Conjuring property

At the time of writing, Haryana's digital property registration software (HARIS) and digital land record (HALRIS) are layered onto, and re-mediate pre-existing systems and work-processes, with the analogue system filling in where the digital is yet to consolidate (see Goswami *et al*., 2017). For example, nearly all property registrations take place through the online HARIS portal, but still require a series of physical certifications

5 This can sometimes run into the hundreds.

and the retrieval of documentary evidence from Patwaris in the office. The most recent land record (detailing who owns what land) are partially computerized in HALRIS, yet contain numerous omissions owing to ongoing litigation, thousands of unmapped property claims, and difficulties translating historic paper records. In principle online property registration should automatically update the digital land record, yet in many urban and peri-urban districts like Gurgaon, where land is highly sought after and there are a high number of transactions, this link is not operational, and the system reverts back to the manual process dependent on the work of revenue bureaucrats. While land records and property registration have been, in principle, digitized and integrated, there is currently no operational integration with the state's digitized cadastral maps.[6] Further to this, an array of processes particularly central to large-scale real estate development—from land partitions, to aggregations, boundary-disputes and inheritance claims—still require the physical labours of revenue bureaucrats. This current alchemy of digitized and analogue processes is such that the office of the Patwari, remains an important site wherein small-time brokers and big-time developers come together to 'dig through' records, seek certifications, order plot 're-measurements', and affect the material boundary-lines of property in ways that will ultimately alter the digital record.

Gurgaon's central Patwari office, Patwar Ghar, sits set back from a small road connecting old and new sections of the city. The office is composed of a dusty open courtyard, with a Banyan tree at its centre, surrounded by nine small boxed rooms. Inside the rooms, each corresponding to two to three villages in Gurgaon, old filing cabinets stock the land record books and cloth cadastral maps detail land ownership and use across the city. The offices are managed by one senior revenue bureaucrat like Virinder called a Kanungo who oversee cadastral surveys, land partitions and arbitrate boundary disputes, while each room has one Patwari, and between two to six assistant Patwaris informally hired to carry out the bulk of the laborious paperwork of the office.[7]

Yet Patwaris and their assistants make up a small minority of the occupants of the office. Permanently resident within the office sit a host of private actors, sometimes known as 'company Patwaris' or 'liaisoners' hired by real estate developers to sit in the office and facilitate the payments and persuasions to move files up the chain of clearances.[8] At first it was incredibly difficult for me to discern liaisoners from Patwaris. Liaisoners would frequently describe themselves as Patwaris and would involve themselves in the everyday work of the office: they would help assistant Patwaris write out paperwork, make amendments in the record, signpost visitors to the correct room and join the drinking sessions that went on late into the night. The liaisoner's work isn't simply to negotiate with Patwaris, they are required to deeply embed themselves in the social life of the office. Such is their entanglement in the everyday sociality of the office that any conception of 'the state' as a formally coherent, bounded and impersonal body slips away in the Patwari office. As a senior planner within one of India's largest real estate development firms, who employed fifteen liaisoners to sit in Patwari offices across Gurgaon,[9] relayed to me:

6 At the time of fieldwork the two-way automated integration of digital land records with digitized cadastral maps was only operational in one district of the state. According to central government, as of 2020 93% of Haryana's cadastral maps were digitized, but only 0.7% were operationally linked to the HARIS/HALRIS software (see DILRMP, 2020).

7 Details of the everyday workings of the Patwari office are beyond the reach of this article, nevertheless it is important to recognize that the embeddedness of private actors within the everyday life of the office shape certain kinds of bureaucratic action.

8 Sangeeta Banerji's (forthcoming) work on the work of fixers in the Mumbai Development Corporation provides further detailed analyses of the role 'liaisoners' play in everyday governance.

9 Gurgaon's revenue bureaucracy is organized hierarchically across distinct offices. At the 'top' the District Revenue Officer sits in Gurgaon's Mini Secretariat and is the highest revenue authority in the district. Next is the Gurgaon Tehsildar, responsible for the Gurgaon division, who sits in the same building. Kanungos and Patwaris carry out day to day bureaucratic operations. Kanungos sit alongside Patwaris responsible for villages in central Gurgaon in the central Patwar Ghar office. There are then four sub-divisional Patwari offices in Kadipur, Badshahpur, Wazirabad and Harsaru.

> We need these people as they have a wealth of connections with the revenue system, we professionals don't have this, they are [the Patwari's] family members, village members, they know them very well and have a very deep understanding of the community … so we have them there to carry out all the appropriate work … without them we wouldn't be so successful.

The liaisoner in Gurgaon expresses the relation of dependence between agrarian actors and institutions and incoming private real estate forces that animate forces of land aggregation and conversion across the city. A central component to a liaisoner's work is what they would refer to as 'finding land'. This involves identifying the location of unmapped shares across the grid, becoming shareholders in the property and then using intimate connections to the Patwari's office to sanction a partition of the share and create an alienated plot. This process takes place over tens of hundreds of shares in order to assemble the necessary contiguous plots of land needed for large-scale real estate development. Silences in the record provide liaisoners with wiggle room to move plots of land around the grid, by becoming a share-holder of an unrecorded plot then securing the desired location of the plot during the pliable workings of the cadastral survey that I will discuss in the following sections. This finding work is conducive to (upper) state efforts to commensurate the record and the field, and the desire to make legible all interests in land, but nevertheless requires a concerted re-engagement with the socio-material work of the bureaucracy. The liaisoner's search for land parcels demonstrates how the everyday workings of the bureaucratic office provides precisely that space where property itself is imagined and enacted out of silences. Silences in cadastral maps provide stronger parties space to manoeuvre the record through bureaucratic channels, to conjure up property's boundaries and substantiate property's 'fiction' in the record.

Surveying uncertainty

In order for the spatial location of a land share to become specified in a cadastral map and an exclusive property title allocated in the digital record, however, a GPS survey and partition of the land-share must be undertaken by a Kanungo. That is, a return to the fields is necessary.

In late November 2018, I travelled with Ajay and Virinder—the surveyor and senior Patwari introduced in the opening of the article—to conduct a survey concerning a land-boundary dispute on the northern edge of Gurgaon. The survey had been ordered by the revenue courts in order to establish the location of a road that passed between two rectangles of land, one owned by a group of small landowning families, and the other by a group of small-time brokers.

As we wound our way through village alleyways and up to the disputed piece of land our jeep took a decided zigzag around a construction site at the corner of the land, 'Here is our encroachment!', Ajay, the surveyor remarked wryly as we neared the awaiting party. At the backside of the land, towering over the land, sat a ten storey private residential complex, I will call 'Gurgaon Heights', recently developed by a middle-eastern real estate firm. One of the brokers was cousins with Virinder and greeted us with food as we set up the laptop in the back of the jeep and began sketching up the template cadastral map on the surveying software. The broker explained how Gurgaon Heights had sent land prices rocketing, and the group were lucky to pick up the land before bigger players got involved. Commonly groups of brokers will buy up land on the outskirts of the city, conducting the complex work of negotiating prices with landlords and piecing together land shares into a contiguous plot of land, before selling on to larger developers a year or two down the line (Cowan, 2019).

After drawing out a copy of the cadastral map onto the software, Ajay's assistant set up the GPS[10] receiver on the roof of a nearby abandoned building and Ajay, his

10 Global Positioning System.

assistant and I set out in the jeep on a search for survey stones (*mustil patthar*). These entirely inconspicuous survey stones were initially laid by colonial surveyors during land settlement in the early twentieth century and were updated during land consolidation in the 1950s and 1960s; today they act to anchor the GPS survey image and digitized map to the ground. The location and authenticity of the stones are heavily disputed, some are marked on cadastral maps while others are noted in the Patwari's field book. Yet the vast majority of Gurgaon's stones have either been destroyed by real estate developers and land brokers over the course of rapid real estate development over the past 20 years, or shifted around by landowners, brokers and bureaucrats in an attempt to subvert or disrupt land surveying processes. The survey stones are constant reminders of the vulnerability of the cadastral map to the material and social world.

Today not only do surveyors like Ajay have to contend with an absence of reference stones, they must equally work with and against thousands of acres of real estate development constructed in reference to counterfeit or shifted stones. The territorially flexible manner in which real estate actors captured and consolidated land through the 1990s and 2000s set in stone vast swathes of real estate development that remains incongruous to state records.

As Ajay's assistant noted as we searched in earnest for survey stones, trawling through bushes, trudging through ditches and onto construction sites: 'In many parts of the city, we don't take the [survey stones] … it's difficult, no one wants this, it causes too much litigation, too much of a headache from the landowners and developers'. He listed off some of the most well-known real estate developments across the city that have been constructed without strict reference to state records: 'In these areas, we have to mark boundary walls [of existing developments], we look for areas that match the record and work out a compromise to keep everyone happy'.

For Hull (2012: 178), the pliability of survey stones acts as a key resource of protest and subversion for residents touted for dispossession, enabling them to affect 'the legal discourse of their houses by controlling the artefacts necessary for their production'. In contemporary Gurgaon the pliability of survey stones is not solely a resource for those earmarked for dispossession. Shifting, destroying and casting doubt on survey stones is equally a resource used by real estate actors to consolidate land and secure territorial claims in the digital register. territorial uncertainty can also be a resource for capital.

After recording the location of a number of survey stones and boundary walls, Ajay, his assistant and I returned to the disputed boundary. After inputting the location of the stones and fixing the survey image onto the digital cadastral map, Ajay confirmed his earlier premonition, there was a slight boundary discrepancy of around 1,500 square metres. Walking the disputed boundary we conduct the 'truthing' as one of the broker's assistants marks out the 'correct' boundary by pitching stakes into the ground. The onlooking party were immediately up in arms. Surrounding us they called into question the authenticity of the stones taken and appealed for new points to be found and recorded. The brokers, dressed in smart *kurtas* that marked them out from the casual wear of the assembled villagers, took Virinder aside to discuss a suitable fee to extend the day's work. Virinder soon relented and appealed for us to get back in the van and record more 'accurate' survey stones. After another two hours of searching the discrepancy remained. A rather frustrated Virinder, who was now taking refuge from the party in the back of the jeep, remarked, 'They are the problem', pointing over to Gurgaon Heights, 'they have not used correct points, they are also encroaching on these people's land, just a metre of land is worth *lakhs* here … what can we do? If we correct the encroachment, this whole village will need to shift!'.[11] The luxury development had

11 1 lakh is equal to 100,000 rupees.

secured itself on the ground utilizing similar practices of bureaucratic manipulation that we were trialling all day. After heated discussion between Virinder and the two parties that extended long into the early evening, the parties agreed that Virinder should not write up his report, rather he should recommend a new survey be ordered to take into consideration a broader sample of the village. As I sat with Ajay watching the heated debate, he noted a new survey would only complicate matters, each survey produces slightly distinct results, not to mention reams of conflicting materials that can be mobilized to frustrate and delay a final arbitration of the dispute. Indeed a constant source of frustration to state record is the cadastral survey itself, nearly every survey I conducted in Gurgaon, each purporting to use more precise GPS technology had to contend with pre-existing surveys and the multiple authoritative materials that proliferated from them.

This mobilization of uncertainty is not simply a cynical act of bureaucratic corruption, but rather I argue, speaks to the challenges of imposing the abstract, geometric order of property records within contexts wherein territorial claims are predominately settled through practices of bureaucratic manipulation, negotiation and uncertainty. Both parties were aware the government was unlikely to order the demolition of an existing, operational residential development, not least a luxury development like Gurgaon Heights, nor would it be possible for such a large number of landowners—nearly half the village running up to Gurgaon Heights—to shift and contract their land by fifteen metres each. Both parties were eager to find a compromise on the ground.

In peripheral Gurgaon bureaucratic calculation invites in land a certain 'elasticity' (Verdery, 2003). By shifting, destroying and casting doubt on survey stones corporate and more local real estate actors can contort land's size and location and push whole areas out of kilter. These material practices constitute struggles to author and lay claim to property in land. These struggles in turn compromise the authority of state records, maintain inconsistencies, and reconsolidate territorial authority in local bureaucratic actors and spaces. While, in this case we see how the *de facto* property claims of Gurgaon Heights shifted land across the village, the landowners' successful attempts to secure a delay in the decision over the boundary-line demonstrates the ways smaller actors can equally play with property's earthbound vulnerabilities.

An understanding of the ways different territorial actors manipulate bureaucratic materials, reinterpret state mandates, and manipulate silences and gaps in the state records, at times stubbornly imposing the letter of the law, while at others producing uncertainty and delay, matters for how we understand the uncertain formation of property that forms the basis of real estate-led urbanization, and, reveals how the bureaucracy's flexible authority in peri-urban areas is constituted precisely through competing claims on property.

Capturing uncertainty

The cadastral survey is thus a terrain in which powerful actors are keen to deploy the authority of digital technologies, mobilize uncertainty and remap land. While Ananya Roy's (2009) work powerfully demonstrates the ways 'unmapping' is utilized to redistribute land, here control of digital surveying technology and practice allows bureaucrats and developers opportunities to re-draw the map and conjure up seemingly fixed and universal property claims. During my months spent sat in Patwar Ghar a case on the hilly southern borders of the city would be sporadically discussed between the various actors sat resident in the office. The case was of a 40-storey luxury residential complex constructed on the site of one of Gurgaon's few storm-water drains. The developer had been taken to the National Green Tribunal (NGT) by an environmental civil society group over the development, who had ordered a GPS resurveying of the land to ascertain the extent of any encroachment.

One Saturday morning in the Gurgaon Patwari office, I went with Suresh, the most senior Kanungo in the district, to conduct the court-ordered survey. In the hilly region of south Gurgaon where the development is located, state record maps are covered in shaded spots where mid-twentieth century Patwaris were unable to consolidate the undulating, hilly topography of the landscape into the geometric grid. What's more, opaque tenurial regimes, produced by colonial and post-colonial agrarian reforms, have allowed powerful actors to informally occupy and enclose forest, grazing and common lands in the area over the past two decades.[12] Where the cadastral maps denote forest, marshlands and bodies of water, today sit stretches of cultivated fields and housing developments. Here land's materiality and the shifting geomorphic landscape are stubborn to the demands of state calculation. Such is the incomplete consolidation of the area, interrupted with blanks in the paper and digital maps, and confused by de *facto* territorial claims, there are very few legitimate reference stones and boundary walls for surveyors to rely on. Perhaps unsurprisingly then, since its inclusion into the urbanizable area of the city 10 years ago, this is also an area of rapid, highly contested real estate development.

The disputed residential complex we were sent to survey had already been subject to five land surveys conducted by different private contractors, for different state departments, each showing slightly distinct results—thickening the land's representations and adding to the ambiguity over the development's actual position. We went that day not with Ajay, who tended to work strictly with Virinder and was wary of engaging in what he called a 'high-profile' project, but with Suresh's nephew who had recently trained up in land surveying software and established his own company. There are numerous land surveying contractors operating across Gurgaon, each offering more flexible services to their clients as well as more 'exact' survey reports. Surveyors are highly sought after. Not only does the presence of multiple surveyors facilitate the constant surveying and resurveying of land, surveyors themselves have perhaps the most up to date digitized maps of the city, their offices just like Patwar Ghar, are constantly occupied by liaisoners, brokers, developers and farmers seeking out information on the latest movements in property and land.

As we drove up to the development it was—observationally—clear that the development had been constructed on a water body, the drain flows up to the site and then takes a sharp curve around the development, where builders had dug new banks, before taking its natural path at the backside of the site. With evident embarrassment as we stood in the middle of the construction site, Suresh's assistant shook his head and loudly cursed the terrible corruption that shrouded real estate development in the city. Seeking to redress any intimation of his department's wrongdoing, Suresh explained that the previous surveys were corrupted by politicians in the pocket of different interest groups, we were there that day—he assured us—to remedy the issue: we would he remarked 'find the correct references and fix the survey'. Over the course of the following three hours, I drove around the village with Suresh, his assistant, his nephew, a jeep full of officials from different government departments and a representative of the encroaching developer. Through much disagreement Suresh led the group in experimenting with different combinations of survey stones and reference points. We would find a landmark, input its location into the GPS signal, return to the computer, the group would look exasperated and return to the jeep in search of more reference points. Finally, by the early evening, the group settled on a survey that showed a slight ten metre encroachment. The newly found encroachment altered the boundary wall of the development slightly but not so much as to require extensive demolition, nor shift the development from the water body. At the end of the day Suresh stood triumphant,

12 In forthcoming work I examine the role of complex tenurial regimes in the politics of land conversions in Gurgaon. See also Benjamin (2019) for a discussion on land tenures and 'occupancy urbanism'.

hands on hips on the infringing boundary wall, as two labourers conducted the 'truthing', pitching the newly authenticated boundary line into the mud.

While the previous survey showed how attempts to calculate and survey land boundaries were frustrated by the flexible settlement of property claims elsewhere, here we view the other side of the coin, digital technologies, and their pliable foundations, being put to work by powerful developers and bureaucrats to fix a property claim into the record. If in the previous case the state bureaucrats derived their authority from knowing when to ignore gaps between the record and the ground, in cases like this one, backed by powerful developers, it was incumbent on Suresh to fix the image, utilizing the digital survey to conjure property into the record. Importantly, it is precisely the inability of territorial instruments to reckon with the area's complex landscape alongside the developers' ability to manipulate bureaucratic actors and materials, that structures the form of private property's realization.

The city's uncertain grounds

Digital property governance reforms are often heralded as technological fixes that can unlock the potential of India's rural land, transform rural peasants into propertied entrepreneurs, and profoundly reshape the urban trajectory of the country of the next two decades. Yet aims of Digital India officials to fulfil the 'mirror', wrest control away from low-level bureaucrats and convert customary land uses into transparent resources for capital investment are troubled by a dependence on a whole host of bureaucratic labours that continue to twist and contort territorial claims and authority away from the record. In this article I have sought to explore the ways digital technologies, entangled with their analogue predecessors, are being put to work not as tools of clarity, but rather to capture the reins of uncertainty.

In an article titled 'What is land' from 2014, anthropologist Tania Murray Li argues that land is not like a mat you can roll up and take away, it has precise location, a fixity and can only occupy one spot. To this innate fixity, a host of technologies are deployed to produce land's liquidity. Marxist urban scholarship similarly draws on this fixity to explain the inherent contradictions and limits of capital's accumulation through land (Harvey, 1982). In my work following land surveyors and bureaucrats' attempts to fix in property titles and impose digitized cadastral maps around the peripheries of Gurgaon, I found property in land to be far more elusive than is typically afforded. Through the survey and records land shifted around the grid, its size contorted and in many cases—like the luxury development and the drain—different plots frequently occupied the same spot. Property in land often appeared to live a double life enabled through a bureaucracy that drew its authority from flexibly authorizing uncertain territorial claims. After all, as Polanyi ([1944] 2001) reminds us, the idea of land as a commodity is a 'fiction', one made true through normalized bureaucratic enactments and proclamations that render opaque the deeply contingent and uncertain ways property is realized. These uncertainties constitute the vernacular modes of land commodification in peri-urban India that are increasingly being captured and redeployed by powerful actors utilizing in-vogue digital technologies.

What does an analysis of property's uncertainty offer to our understanding of emerging policy trends toward digitally-enhanced real estate-led urbanization in India? Mainstream scholarship on urban development has tended to frame the rural world, in scripts that presumably follow Europe and North America, as predestined to succumb to the totalizing power of state and capitalist calculation. With their cadastral maps, title registries and new digital surveying instruments in hand, state and capitalist actors appear unstoppable in their quest to capture and convert rural land into private real estate. Narratives of land grabs, expulsions, dispossessions of the most prosaic and violent manner appear to simply unfold from the desires and calculations of state authority. The addition of the 'digital' to this well-run itinerary of territorial instruments,

appears to have only reaffirmed the unrelenting power of the state to render land calculable and dispossess communities. Despite a wealth of empirical scholarship highlighting the contingencies of regimes of dispossession (Adnan, 2013; Cowan, 2018) and the indeterminacies through which postcolonial state power is often expressed (Roy, 2003; Anand, 2015), there remains a broader tendency to accept the formation of property-led urbanization and its attendant forces of dispossession as always already realized by writ of the legal and territorial decrees of the state.

Examining the ways bureaucratic uncertainty structures, and sometimes undermines, processes of digitized land calculation attends to the vernacular ways capital seeks to capture land, and the ongoing ways land outside the metropole remains otherwise to narratives of global land enclosure and urbanization. Centring practices of the survey in the field and bureaucratic office in our reading of land commodification, this article contributes to Ghertner's (2020: 578) recent call for a broadening urban imaginary, where the contingent conditions of property's actualization are investigated rather than lamentably rehearsed. In order to capture property and calculate land, global forces of real estate capital must traverse, and are mediated by, quite other territorial and political logics; it is at these points of the digital's earthbound mediation—of shifting stones in the field, and conjured boundary lines in bureaucratic offices, that commodity visions are both realized and come undone.

These uncertainties sit at the heart of digital urban policy frameworks currently occupying planning documents and investment portfolios across the global South. In India land digitization programmes must confront an awareness that while private property might appear fixed and gridded in state records, things are less certain in the field where competing land interests can mobilize digital tools, negotiate with the bureaucracy, quietly manipulate bureaucratic materials, proliferate conflicting documentation, and draw power away from the digital record. In this article I have examined the complex and uncertain work required to make land calculable and commodifiable, exploring the gamut of social and material manoeuvres that are involved in realizing property's enclosure and calculation. The remediation of these practices through digital technologies, I have argued, provides powerful groups an outlet to intervene in these localized bureaucratic practices while reconsolidating state authority within the low-level bureaucracy. To appreciate the potential for new technologies to radically transform the uses of land, trajectories of urbanization and forms of government, first requires an engagement with the messy sociomaterial uncertainties written into territorial calculation.

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