

Mapping Landscapes in Transformation

Multidisciplinary Methods for Historical Analysis

Edited by

Thomas Coomans, Bieke Cattoor, and Krista De Jonge

PREFACE

Mapping Landscapes in Transformation: Multidisciplinary Methods for Historical Analysis
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PART ONE: PROJECTION

1. Cartographic Grounds: The Temporal Cases
Jill Desimini
 2. **Data Friction: Mapping Strategies on a (Peri)urban Frontier, Chennai, India**
Karl Beelen
 3. Mapping and Design as Interrelated Processes: Constructing Space-Time Narratives
Bieke Cattoor
 4. Mapping the Evolution of Designed Landscapes with GIS: Stourhead Landscape Garden as an Example
Steffen Nijhuis
 5. Unfolding Wasteland: A Thick Mapping Approach to the Transformation of Charleroi's Industrial Landscape
Cecilia Furlan
 6. Photography, Railways and Landscape in Transylvania, Romania: Case Studies in Digital Humanities
Cristina Purcar
- ### PART TWO: FOCUS
7. Mapping Archaeological Landscapes in Transformation: A Chaîne-Opératoire Approach
Piraye Hacıgüzeller, Jeroen Poblome, Devi Taelman, Ralf Vandam, Frank Vermeulen

8. A High-Resolution Multi-Scalar Approach for Micro-Mapping Historical Landscapes in Transition: A Case Study in Texas, USA
Arlo McKee, May Yuan
9. Pixels or Parcels? Parcel-Based Historical GIS and Digital Thematic Deconstruction as Tools for Studying Urban Development
Bram Vannieuwenhuyze
10. The Secularisation of Urban Space: Mapping the Afterlife of Religious Houses in Brussels, Antwerp and Bruges
Reinout Klaarenbeek
11. Mapping Through Space and Time: The Itinerary of Charles of Croÿ
Sanne Maekelberg
12. Landscape Appreciation in the English Lake District: A GIS Approach
Ian Gregory, Christopher Donaldson, Joanna E. Taylor
13. Digital Humanities and GIS for Chinese Architecture: A Methodological Experiment
Chang-Xue Shu

POSTFACE

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Data Friction

Mapping Strategies on a (Peri)urban Frontier – Chennai, India

Karl Beelen (Karlsruhe Institute of Technology)

I am meeting Satheesh and Krishnan in a small room on the first floor above a dental clinic off Nungambakkam High Road, Chennai. It is late November and the dark rain-laden sky promises imminent relief of the leaden heat that has pushed on far beyond summer. Monsoon rains will start any day now, or so everyone seems to hope. In mixed Tamil-English lingo Satheesh and Krishnan are getting engrossed in a technical issue on QGIS — how to close a complex multi-edge polygon and measure its surface. Satheesh is an uneducated fisherman from Vaithikuppam, a fishing village in the centre of Chennai's urbanised coastline. Over the past few years he has been taking training classes with Krishnan to operate a hand-held GIS device, and he has been passing on that same knowledge ever since to other fishermen from his village and beyond.

Satheesh has been 'mapping' fishing villages in and around Chennai, and he is instructing fellow fishermen how to map features within their own settlements. Krishnan tells me how Satheesh is trying to scale up that effort now. Throughout the hottest months of summer, Satheesh travels down the southern Bengal Bay coast, hopping from one fishing village to another, offering anyone who is interested teachings in the fine arts of geo-tracing, GIS, and self-mapping. As I sit in that office, I see data flying by that appear to exist only in the eye and the imagination of these fishermen and their handheld devices: sites and structures, edifices, and practices that, if not left out intentionally from most government-approved maps, certainly cast a different eye on what it means to occupy and dwell on those sites.

This field note describes the rather contested and chaotic landscape of (geo)spatial data in cities in South India. The case of Satheesh not only shows that there are gaps and holes in the acts of translation by which we constitute our maps — liable as they are to acts of power, bias, and subjectivity. But more than that, the case also hints at the fact that these gaps, restrictions, and obstructions in access to data and information are themselves a crucial point around which the physical reality ‘out there’ is being organised and taking shape.

Historically speaking map-making, surveys, and spatial data have always had a rather contorted relationship with governmentality in India (Edney 1997). India has known a long history of mapping: it has been deeply implicated right from colonial times in the production and reproduction of fault-lines within society, reflecting long-lasting oppositions of the coloniser vs. the colonised, elite vs. subaltern, or civil society vs. political society (as sparked by Ranajit Guha, Gayatri Spivak, or Partha Chatterjee). With recent shifts in technology these conflicts have moved on as well. As the access to spatial and other forms of data is changing, and the distinctions between who produces it and who consumes it have become increasingly blurred, data are themselves becoming a major feature of the current fast-urbanising landscape. Data are contested and fought over, obfuscated and shielded, counter mapped and un-mapped.

In the field note above Satheesh and his companion fishermen essentially double up as counter-mappers: they map things that had been left off the map — intently or not. Absent as they may be, these missing features are of crucial importance to the fishermen. They include sites as diverse as vernacular shrines, collectively stretches of the beach, areas for knotting and repairing fishing nets, or areas simply to store boats overnight away from the ocean’s surf. Any such features may obstruct and jeopardize public-private planning efforts, particularly when an area is ‘slated for redevelopment’ (*kuppams*) or cleared legally for industrial development (Sriperumbudur). So, one rather effective way to by-pass these obstructions, it seems, is to actively ‘unmap’ them and eradicate them from the maps that are required for legal planning sanction. Countermappers like Satheesh make use of the proliferated access to mapping technologies through GPS devices and smartphones. They record the contours of the features that are important to them and then process those data in such a way that they are admissible at local state courts. Dressed up in the same style and fashion as official maps, these maps mimic the eye and imagination of the state to reclaim legal control over areas which had been rightfully ‘theirs’ in the first place.

This text seeks to analyse how this fault-line — I call it a frontier — is not only rallied over and appropriated as it re-emerges in the digital urban landscape, but

also seeks to show how this frontier is being adapted, transformed, or repurposed/hacked for conventional land development as well as for more activist, grassroots purposes, including forms of design. As data tools and their access disperse across a multitude of users, data become a means of engagement, not only in a political or commercial sense, but also in terms of their (designerly) imagination. To quote the anthropologist Anna Lowenhaupt Tsing, 'A frontier is a zone of unmapping: even in its planning, it is imagined as unplanned' (Tsing 2005b: 51). While Tsing speaks about the frontiers of predatory resource extraction in Borneo, the text's focus will come to bear on the use and imagination of data as a resource in the context of Indian urbanisation, and the struggles that go with it.

This chapter is based on fieldwork that I conducted in Chennai, the state capital of Tamil Nadu, India's southernmost state, from November 2015 to June 2016. Most of it occurred in preparation of a lab that I organised at IITM aiming to bring researchers and designers together to explore alternative techniques and methodologies of data collection in the context of India's massive wave of urbanisation (Bypasslab & IGCS 2016). While I shuttled between Chennai and Bangalore, I got to meet repeatedly with a motley group of coders, hackers, geospatial analysts, and designers, some of which eventually volunteered to take part in the ensuing lab. In this chapter fieldwork observations are split out into two different vignettes, both of them centred on Chennai, India's fourth largest metropolitan region. These vignettes are labelled 'the *kuppams*' and 'Sriperumbudur'. Whereas in the textual section *kuppams* (fishing hamlets) serve to frame the context of data and urbanisation in South India, the visual section about Sriperumbudur then applies that analytical framework to the outcome of the lab, finally to come up with a number of observations and questions about the methodologies and techniques used.

Sriperumbudur serves a double purpose here. It is the practical testing site and occasion where some of the tools and strategies, discussed more broadly in the first vignette, are tried out and applied. But it is also a metonym for the rescaling of the frontier of data and urbanisation that is currently taking place. Sriperumbudur is a panchayat town and taluk currently within the Chennai (Madras) metropolitan area and some fifty kilometres from Madras' original core. Currently transforming from a largely agrarian area into an industrial and residential zone, the town stands for a vast swath of peri-urban transformations (in land use, construction, migration, or environmental degradation) that will define 'urban India' in the coming decade or more.

In this text I want to bring those questions of 'translation' that we meet as urban researchers or designers to bear on the case of Sriperumbudur as a case in point of

the entangled issues with map-making in (peri-)urbanisation. But first, let us turn back to the site of Krishnan and Satheesh: Vaithikuppam.

Cartographic f(r)ictions

Walking along Chennai's thirty-odd kilometre coastline it is hard to notice what is being qualified as *kuppams* or fishing villages. Fishing 'village' proves a rather misleading translation both linguistically and cartographically. *Kuppam* (கூப்பம்) is a Tamil word that roughly translates into English as a 'coastal settlement' or 'hamlet', but it carries strong undertones of low social cast and standing (Fabricius 1972: 95). In the city *kuppam* has come to designate merely a 'slum [area] typical of fishing communities along the coast' (Ramakrishnan 2006).

In origin *kuppams* are makeshift settlements or hamlets whose logic is premised on having direct access to the sea, but as they became absorbed into the city they also became areas of prime real property, and therefore rather contentious political concerns to deal with, from the side of public administration and that of the 'public' at large in or outside the *kuppams*.

From the outside, however, apart from a narrowing of the roads or the absence of a finished pavement, there is little in the way of the *kuppam's* appearance that would betray it as being a village. Buildings rise up to four stories or more, and are built with the same reinforced concrete cement that is used throughout India; street shops crop up on the corners of the roads, as they do elsewhere in town, and the *kolams* that one finds on the thresholds of houses dissolve and wear off just as easily as they do elsewhere in this state.

What gives the *kuppam* away is its conflicted relationship with the map. More than its physical presence it is the *kuppam's* 'absence' that explains its existence. A *kuppam* is an ossified anomaly, a settlement that is not being acknowledged on official maps. Like many 'informal' settlements in India, or indeed the Global South, its very existence is based on the precariourness and ambivalence of access to housing, typically strung between formal recognition on the one hand and informal redistribution (Appadurai 2003) on the other. Without going too much into detail here, to map a *kuppam* would be to acknowledge and honour the same types of (land) entitlements as the rest of the city.

More importantly, a *kuppam* is a fault-line where two systems meet: on the one hand urbanisation, with its set of rules and regulations to order and regiment

construction, ownership, and occupation; on the other hand, the less formalised rules and regulations that stem from leading urban lives in close (economic) proximity to the sea. While it is possible to describe the development of a *kuppam* as an informal or subaltern kind of settlement (governed by the rules of political society rather than those of civil society), the production of the *kuppam* is so much entangled with the overbearing forces of urbanisation, politically and physically speaking, that it might make more sense to see it as a dynamic encounter.

To explain this, Anna Tsing's metaphor of 'friction' (2005) might be helpful. Friction — the force that resists relative motion between two bodies in contact — gives 'grip to the encounter' of the *kuppam* and the groundswell of surrounding urbanisation (Tsing 2005: 1). My point is that the *kuppam*'s seeming absence from maps is a result of this friction. Rather than this just being a case where the map chooses to remain 'silent' (Harley 2001), the case of the *kuppam* is a case in point that urbanisation in India knows many friction zones that develop around, and that are intrinsically *produced* by, restrictions in access to (geographic) data.

All along Chennai's entire coastline construction juts out and pulls back beyond the buildable area limit at many points and locations. Different policies and instruments govern the extent of that seaside urbanisation. The National Coastal Zone Regulation (CRZ) for one prescribes a 200 to 500 metre setback from a hypothesised High Tide Line, 'the line on the land up to which the highest waterline reaches during the spring tide' (Ministry of Environment and Forests 2011). But even when this line seems rather hard and solid from a policy point of view, it is also, simultaneously, very ethereal and unreal, like a perpetual shadow that will not allow itself to be pinned down. Coastline data are notoriously difficult to obtain or verify — even in view of the larger public interest, and in spite of legal procedures like Right To Information appeals (RTIs) which were specially drawn up for this purpose. The *kuppams* offer one of those locations, though certainly not the only one.

What this example illustrates here is that these restrictions to data (mapping data in particular) are generative of a kind of urbanisation that leads to distinct patterns like that of the *kuppams*. These patterns are both physical and social, without any neat division line between the two; if not directly resulting from the map, then mapping data, and the restrictions that govern access to them, certainly offer an important trope in their production.

Mapping data constitute friction zones across the Indian urban landscape that mobilise a multitude of groups, initiatives, and collective actions. These zones

of dynamic encounter — or ‘entanglements’, as Tsing would call them — pose methodological issues: how does one map such areas when the very act of translating or transposing alone is so terribly co-opted in the continuous production and reproduction of frictions? Can one avoid perpetuating a status of deprivation such as the one in a *kuppam*? Accepting that data, much like maps, can never be objective, is there any emic standpoint left to take as a designer when the partiality of data is so much ingrained into the production of the territory as it is in the case of the Indian urban landscape?

However, apart from raising methodology in the designerly use of maps, the friction that surrounds the usage of data and maps also offers distinct opportunities, particularly now that geospatial data and information have started to circulate so differently, in ‘Digital India’ as much as elsewhere. Let us turn to one more example here.

India’s new old geospatial bill

On 4 May 2016, the Indian Government released its draft Geospatial Information Regulation Bill (Ministry of Home Affairs 2016). Its publication caused alarm among the country’s data activists, start-up GIS industries, and the geospatial community at large, most of which are operating from the South Indian city of Bangalore, 350 kilometres west of Chennai.

This Geospatial Bill seeks ‘to regulate the acquisition, dissemination, publication and distribution of geospatial information of India which is likely to affect the security, sovereignty and integrity of India’ (Ministry of Home Affairs 2016: 1). Part of the Indian government’s motivation was old-fashionedly territorial: to fight the misrepresentation of India’s international state boundaries, and to reclaim legal sovereignty over the use and publication of spatial information, mostly through harsh penalties. Google Maps’ representation of India for instance, and its depiction of the Jammu and Kashmir borders with Pakistan and China in particular, had been a thorn in the side of the Indian government on more than one occasion. The draft bill now sought to make such offences effectively prosecutable by extending the national arm of justice up to the level of the offending companies’ (Indian born) CEOs. But the impact of the bill was much larger, and its vast scope implied that almost any computational application requiring its users’ geolocations would be within the purview of the bill.

This rather broad definition of ‘spatial information’ caused immediate concern among activists, hackers, and think tanks, especially within Bangalore’s geospatial

startup community. From the moment the bill was drafted up to the Indian Parliament's monsoon session where it was to be discussed, there was a sudden flurry of initiatives. The most visible of these was the save-the-map campaign (2016), which maintained that the bill 'disregards the actual feature of digital geospatial data and how it forms a fundamental basis (and asset) for today's digital economy' (Chattapadhyay and Garg 2016). What save-the-map's critique hinted at is that the production of geospatial data had become intrinsically dispersed and that the old boundaries between those who create and those who acquire map data — typical of a pre-digital map-making age — had become inextricably blurred, especially with the arrival of big geospatial data in India and with networked georeferenced apps taking off as hugely as they did in most of the country's cities.

As mentioned already, India's contorted relationship with spatial data is not a recent one but dates back to the origins of modern cartography. India has been home to one of the most far-reaching and boldest efforts in the history of map-making. A little over two hundred years ago, one William Lambton persuaded the Madras Government to fund a triangulation right across the Indian peninsula, south of the river Krishna. Lambton was a crown officer and surveyor in the English East India Company at the time, but his request in Madras would lay the foundation of the Grand Trigonometrical Survey (GTS) of India — the fulfilment of a 'scientific gaze' that took close to seventy years to accomplish.

Here, 'imperialism and mapmaking intersect in the most basic manner,' as Mathew H. Edney writes at the start of his monograph on the GTS (Edney 1997). It is a generally accepted feature in the history of cartography that imperialism and mapmaking were 'both ... fundamentally concerned with territory and knowledge' (Ibid). In the eye of the surveyor (and here I am paraphrasing Tsing) India was a 'frontier', 'a zone of unmapping: even in its planning, it [was] imagined as unplanned' (Tsing 2005b: 51). What is generally less emphasised is the fact that the GTS's project of 'unmapping' and that of early (colonial) suburbanisation intersected geographically and ontologically in the case of Chennai, or Madras as it was known at the time.

In 1802, Lambton set out to measure the base of the GTS's starting triangle, from Fort St. George's Wallajah Gate in the heart of colonial Madras to St. Thomas Mount in the outskirts of the town. As his measuring chain recorded the distance, Mount Road — Madras' future backbone and its main commercial point of orientation to this day — would become permanently enshrined as the survey's starting reference, the eponymous Madras *baseline*. For every distance recorded and for

the duration of the Grand Trigonometrical Survey, Mount Road, measuring 12.1 kilometres in length, would serve as the entire subcontinent's geographical point of reference. If, in the predominant cartographic illusion of the time, the survey's resulting territorial archive was believed to be India itself (rather than just representing India), then Mount Road was essentially the yardstick for that particular way of looking and *constructing* empirical, on-the-ground information.

From a historical point of view, there seems to be a rather pragmatic overlap in imagination and a remarkable degree of conjuncture between the physical emergence of the city's main armature, Mount Road, and the construction of those empirical survey data. In Lambton's time, the end of the Carnatic wars had heralded the end of Madras' fortifications and the emergence of a wide-open hinterland waiting to be appropriated and absorbed into the contours of the unleashed colonial city. It would be fascinating to learn how the act of tracing out Mount Road got to be systematised and upscaled to eventually produce a gaze on the scale of an entire subcontinent. Even if survey and Mount Road were not linked formally, survey and urbanisation certainly seem to have walked closely hand in hand. From the moment of its inception, spatial data were so innately intertwined with, and engrained in, the imagination of the territory and the way that it was physically constructed that it makes sense to consider both data and urbanisation as part of the same 'frontier'.

That data/urbanisation frontier has reproduced itself up to this day, including its frictions over access. But the recent shift in technology has also brought on a more fundamental change in the frontier's line-up of actors. All sorts of data — from pollution measurements to smart-phone data to information scraped right off the net — have been pushing the map's gaze to shift from that of the State to that of a fledgling group of app developers, counter-mappers, environmental activists, and regular phone users, who (unwittingly or wittingly) build a new map with every picture and movement that they make. This kind of technological shift, this new 'Digital India', does not occur in a spatial vacuum, however. It plays out on a massive canvas of territorial transformation, a vast landscape of predatory development, land speculation, migration, and industrialisation that rewires and recolonises the South Indian 'hinterland', like a torrential outburst of monsoon (peri-)urbanisation.

It is this kind of frontier of data and urbanisation — this active reimagining of something as being unmapped and unplanned in the service of mapping and urbanisation — that the text has sought to bring up and render visible. In this

first part it invoked the notion of friction to show how everyday encounters over spatial data have invited strategies and counterstrategies in the everyday shaping of this frontier; how potholes, hiatuses, and restricted forms of access to spatial data are more than merely ‘blanks’, gaps, or bottlenecks in the landscape of spatial data that are being produced; instead, this new frontier presents radically different practices, agencies, and imaginations whose frictions are fought out and coalesce in the ‘unplanned’ landscape that is out there: land is erased, obstructions are bypassed, and gaps counter-mapped.

The agency of geospatial data being as diffracted as it is, it leaves the question of what this means for urban design practice. In his essay on the speculative agency of mapping, landscape designer James Corner once famously claimed that the map’s partiality in the production of power and knowledge is also the very trait that grants it traction in a design context (Corner 1999). Precisely because they are so inherently ‘speculative’, he argued, maps help to produce novel design propositions. But this leaves the question unanswered as to how one navigates — let alone translates — a landscape that is already occupied and claimed by many frictional practices of the map. When the map is so bumpy and riddled with potholes and obstructions that it turns into a virtual no-man’s land, then it becomes crucial to ask what sort of position there is left to take in the event of any designerly cartographic ‘translation’.

To investigate those friction strategies and to explore this peri-urbanised data frontier, I have been using the setting of Sriperumbudur in the west of Chennai as a launching point, which is presented cartographically in the following vignette. During my fieldwork of 2016, I ran a design and research lab in the industrial township of Sriperumbudur, home to a growing number of gated communities, migrant shanties, industrial enclaves (SEZs or SIPCOTs), and other highly insular zones of global capital investments. The main purpose of the Bypasslab was to experiment with the potentials in urban research of on-the-ground, empirical observations, using both conventional fieldwork tools as well as other forms of data that have recently come within the ambit of designers, researchers, and activists.

Acknowledgements

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Maps

Data fiction: peri-urban bypasses

Sriperumbudur, in the Kanchipuram district fifty kilometres west of Chennai, is an exemplary place to witness the frictions of urbanisation on the Indian subcontinent. The region is a mutating zone made up of ancient villages, gated townships, fledgling infrastructures, and manufacturing enclaves (SEZs, specialised economic zones), where local laws of labour and taxation are expediently suspended to attract global capital (Foxconn, Saint-Gobain, Hyundai &c), and where speculation and aspirations clash to make a rather unruly mix of reinforced concrete structures, walled-up plots, road-side shrines, and degrading agricultural ecologies.

Sriperumbudur is also at the heart of a sweeping expanse of ephemeral rivers (*āru*) and seasonal monsoon lakes (*ēri*) that slope from the foot of the Eastern Ghats mountain range down to the creeks and backwaters of Bengal Bay and its western Coromandel coast. This coast is not only the source of heavy seasonal rains and cyclones that cut the area off during its annual North-East Monsoon, but it is historically also the frontier from which transnational urbanisation emanated to settle and colonise the entire Indian 'hinterland'.

Finally, Sriperumbudur also represents a condition on the edge, a leap into seemingly 'uncharted' territory, where strategies of speculative land-grabbing and clean-slate industrialisation (unmapping) are met with everyday counterstrategies that bypass, evade, and re-appropriate whatever purpose can be salvaged in the mutual encounter.

This is the 'friction zone' that the Bypasslab sought to map and triangulate as part of its first edition. The bypass road — circumventing the city while at the same time facilitating its expansion — is a paradigm of Indian (peri-)urban development, and of its inherently contradictory nature. But it is also a paradigm of the many vernacular initiatives that, while bypassing restrictions, re-inscribe the subject and try to make sense of place and space.

Challenging the view that the peri-urban always involves an edge, the following two lab contributions develop the notion of the 'bypass' as a double metaphor for peri-urbanisation. Bypass refers both to the tactics that people come up with in everyday 'peri-urban' life, as well as to the methods and data strategies, old or new, that urban researchers will have to develop if they want to circumnavigate the potholes, obstructions, and gaps in information that working in peri-urban India often entails.

Liminality of water

Starting from on-the-ground observations that water tanks within the area (man-made water bodies that store monsoon precipitation, known in Tamil as *ēṟi*) hardly ever align with cartographic representations, this contribution builds on a critique of the representation of water in local maps to suggest that, rather than their extent, the crucial variable to depict in the representation of these tanks should be their liminality and fluctuation. By transposing this notion to practices that take place in the tanks' border zones (licensed or unlicensed, built or unbuilt), the map hints at the fact that water and urbanisation may not be entirely antithetical after all, if only their mutual fluctuations could be aligned better in time.

Map 1: Karl Beelen (2018), *Liminality of Water*.

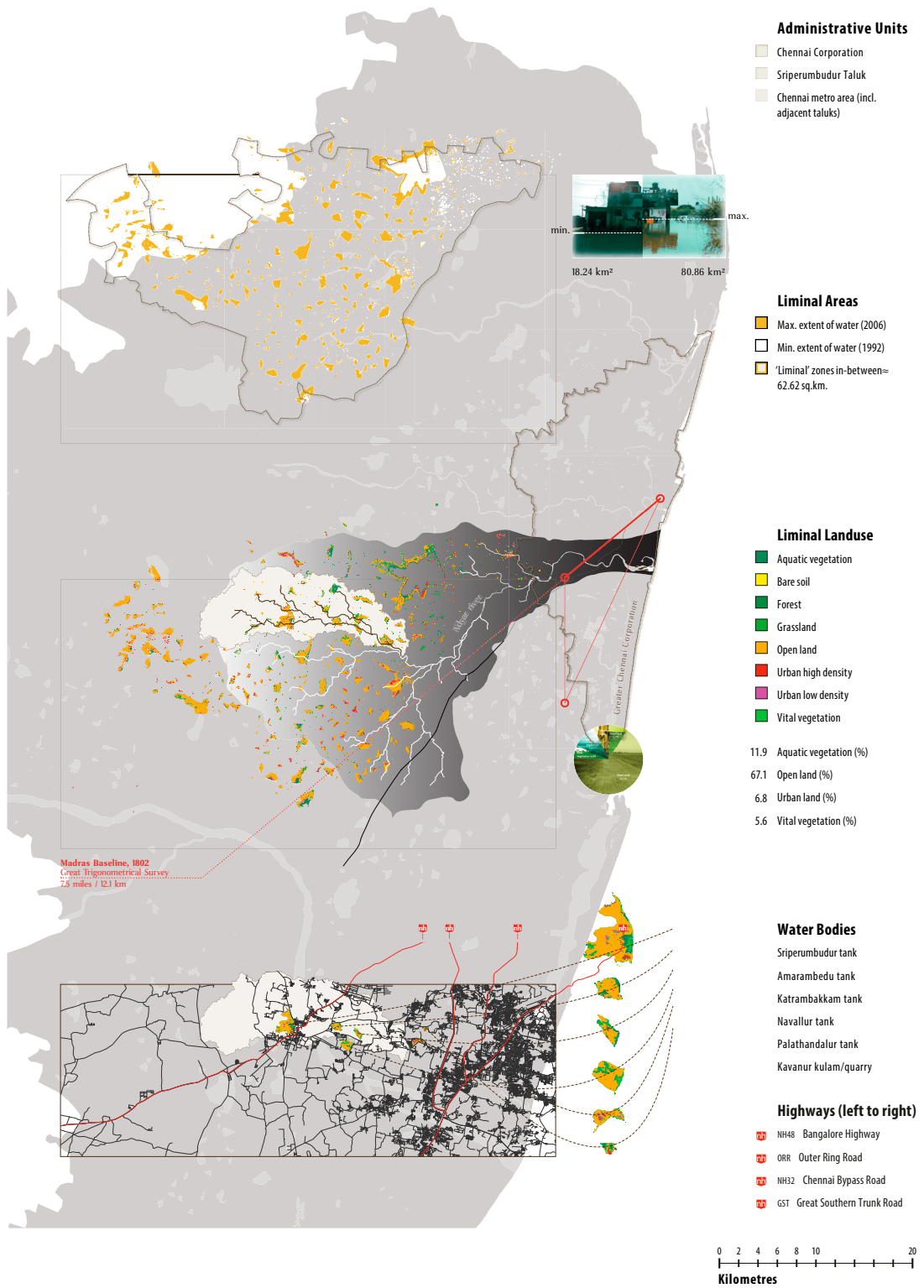
Liminal zones within the peri-urban, administrative unit of Sriperumbudur taluk.

Liminal land use in the Sriperumbudur subbasin of the Adyar river watershed.

Liminal transformations in response to (peri-)urban development pressures – six instances of lakebed 'encroachment'.

Map 2: Anuradha Suryavanshi, Henrik Otte, Paras Tyagi, Vivek Rakotu (2016), *Liminality of Water*.





Cross-sectional views of six water bodies in the Sriperumbudur area, indicating their minimum and maximum boundaries and the land-use patterns within the water bodies' 'liminal' edges.

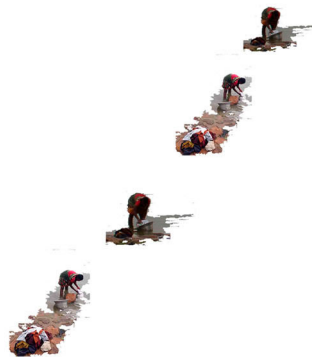
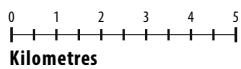


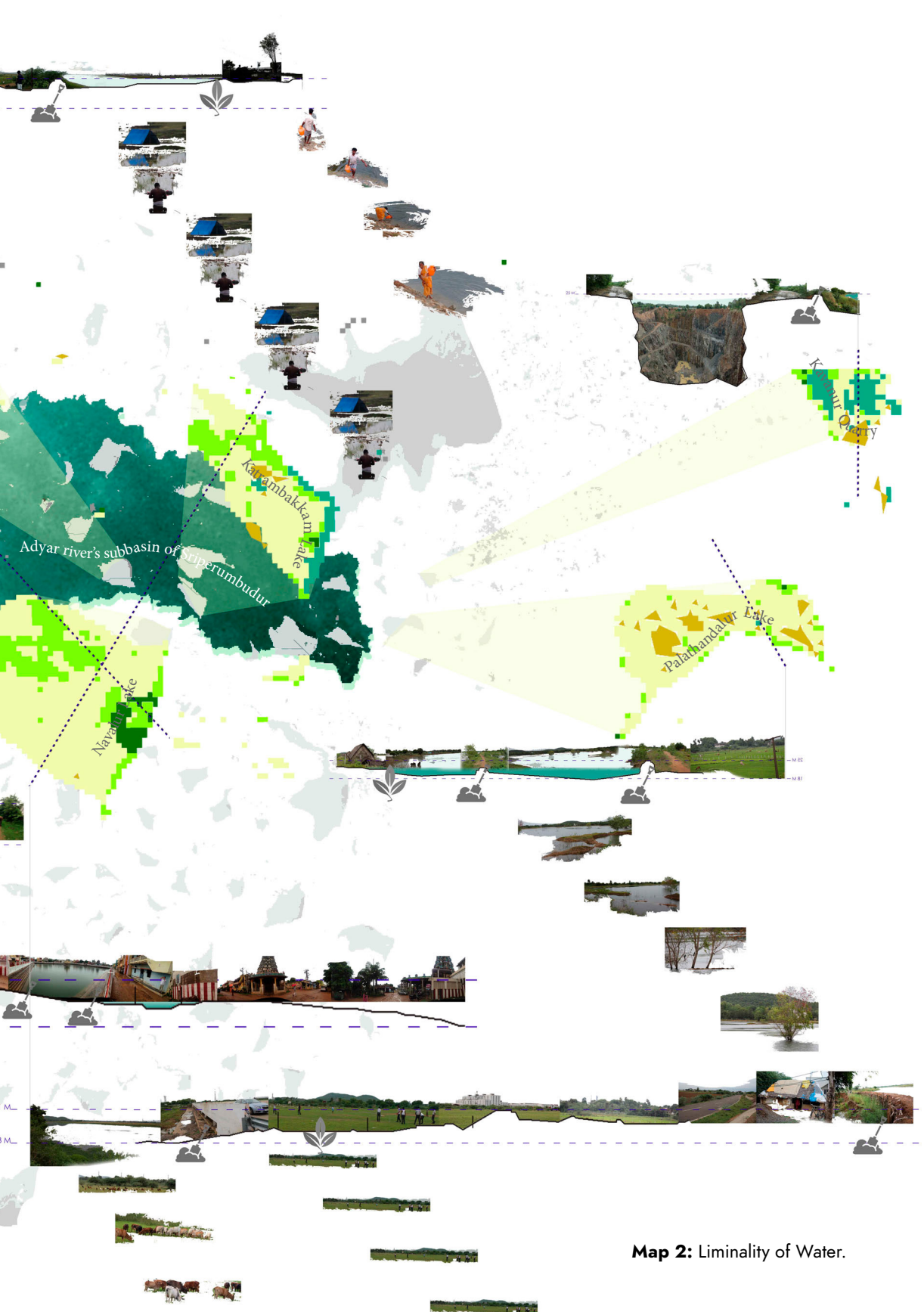
Map 1: Liminality of Water.



Legend

-  Man-made elevation (levee)
-  Natural elevation
-  Min. extent of the water body in a dry year
-  Max. extent of the water body in a wet year





Map 2: Liminality of Water.

Negotiability

This contribution spotlights the very short time span over which urbanisation seems to occur along main access routes and intersections in Sriperumbudur, such as State Highway 13 (SH13) and Melattur Junction. Its visualisation strategy is derived from a glitch in a smartphone video app called Mappilary, and the camera algorithms that it uses to produce panoramic pictures.

Camera Panorama Algorithms are rather versatile for curved 360-degree photos, but they cause distortions when applied to linear photographs, including those taken while driving along SH13. Such distortions slice and repeat the background when movement is slower, and repeat foregrounds when moving at faster paces. This produces stark 'pause points' which can then be taken as an instance of 'mobile negotiability'. Repeating this over a wide variety of places produces temporal events which are (somewhat paradoxically) represented by stationary visuals.

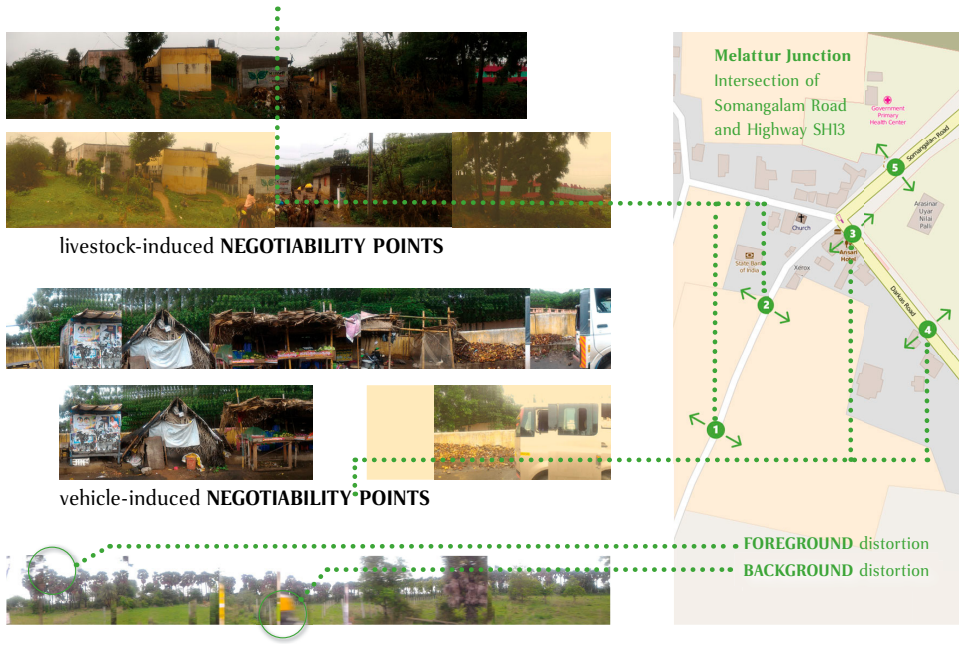
Looking at these static-yet-temporal visuals caused us to realise that most mobile negotiability events in the fringe are due to livestock and vehicles and that local cattle negotiate traffic in ways that allow them to continue plying their old routes — long after the pastures they frequented have given way to plots, walls, and traffic. The maps explore how people and cattle negotiated the structures, buildings, and obstacles that were cropping up at one of the crossroads along their routes.

Map 3: Ashwin Suresh, Iswarya Ramachadran, Nirupama Jayaraman, Parisutha Rajan A. (2018), *Pause Points*.

Negotiability: 'Pause points' resulting from algorithm-based distortions.

Map 4: Ashwin Suresh, Iswarya Ramachadran, Nirupama Jayaraman, Parisutha Rajan A. (2018), *Temporal Shifts*.

Negotiability: Temporal shifts marking out different actors at Melattur Junction.



Map 3: Pause Points.



Map 4: Temporal Shifts.



Map 5: Ashwin Suresh, Iswarya Ramachadran, Nirupama Jayaraman, Parisutha Rajan A. (2018), *Negotiability*.

Top: livestock activity around Melattur Junction / State Highway 13.

Bottom: approximate transformations in land use from 2002 onward (note the overall disappearance of grazing lands along the highway).