Introduction

Almanac of a Tidal Basin

> Here the perennial struggle between earth and ocean goes on, and all the secrets of land-making stand disclosed.
>
> W. W. Hunter, 1876

This is a history of forgetting in the Bengal Delta, a forgetting that enabled human design in the world's largest delta and one of its most vulnerable landscapes. From the eighteenth century on, colonial law, bureaucracy and technology eclipsed and erased the "secrets of land-making" and unmaking in Bengal's seaface, where land dissolved gradually into the vast and turbid waters of the Bay of Bengal, in order to build colonial Calcutta, the second capital of the British Empire. In the postcolonial moment, this amnesia has turned into hubris, where the aqueous and the igneous elements are now being transformed into landed concrete property. Such is the aspiration of "Atmosphere," one of the new high-rises under construction in the world's fourth-most low-lying city, Kolkata (Calcutta's current name).[1] Billed in its promotional literature as "Your Home in the Clouds," Atmosphere is selling the promise of a glistening new apartment building projecting into the sky in eastern Kolkata. The architects of Atmosphere claim that it is the first "residential sky-sculpture" in the world. Architectural design, along with India's emerging aspiration to be part of a global informational economy, manifest themselves as homogenous and smooth spaces of new satellite towns flanking Indian metropolises, often erasing their fluid ecologies.

[1] Calcutta's name was changed to Kolkata in 2001. I use Calcutta to talk about the pre-2001 city and Kolkata to refer to the current city.

In eastern Kolkata skyscrapers sprout up with unimaginable speed, tiling the landscape with uninhabited speculative properties often owned by wealthy absentee landlords. The ambition to reach for the clouds of this ethereal atmosphere is not ironic given that many owners are simply buying up air in hope of future profits. Yet this shining built landscape of glass, steel, concrete and the air waiting to turn solid is also hiding a secret beneath it. These seemingly solid structures are standing on liquid land. Even thirty years ago much of this terrain was wetlands and served as the home to fishermen and farmers. Nineteenth-century colonial officials, but also today's commuters, travelers and inhabitants, are never far from the smell of the salty bogs that flank the deltaic city of Calcutta. Yet the citizens and city's planners too often forget the delta and its salt marshes.

The Hooghly River flanks Calcutta's western banks and the city merges into vast bodies of lakes, wetlands and floodplains to its east. Calcutta is situated in a combined river system comprised of the Ganga, Brahmaputra and Meghna rivers, creating the world's largest delta. Each year these rivers carry about 40 billion cubic feet of silt on their journey to the Bay of Bengal.[2] Moreover, Calcutta is also on the edge of the world's largest mangrove estuary and rimmed by the critical wetlands of eastern India.[3] Beginning in the seventeenth century the Hooghly River appears in history as a central highway of the British Empire when Calcutta was its emporium and the capital through which commodities such as saltpeter, opium, salt, silk, cotton, jute, tea and rice moved from the east to the west. Furthermore, countless migrant laborers followed these goods in their oceanic circuits, making Calcutta a contact zone for the circulation of ideas, resources and knowledge.[4] Beyond this commercial history, the river, its water, silt and tides have shaped the city and its land market in

[2] Iftekhar Iqbal, *The Bengal Delta: Ecology, State and Social Change 1840–1943* (New York, NY: Palgrave Macmillan, 2010), 1. According to Iqbal this river system carries the highest portion of annual sediment of any world river system, amounting to about 25 percent of the world total.

[3] Sundarbans is one of the largest tidal halophytic mangrove forests in the world, about 110 miles from present Kolkata and listed as a UNESCO world heritage site in 1997. The East Kolkata Wetlands that link the city to the mangrove estuary of the Sundarbans were classified as Ramsar protected sites in 2002. However, due to entrenched governmental corruption, all the stipulations about protecting the site are flouted and the wetlands are increasingly becoming what environmentalist Dhrubajyoti Ghosh calls "real-estate-in-waiting."

[4] Kapil Raj, "The Historical Anatomy of a Contact Zone: Calcutta in the 18th Century," *Indian Economic and Social History Review* 48, no. 1 (2011): 55–82.

both implicit and explicit ways. That is the nature of deltaic cities.[5] *Empire and Ecology* conceives of the built environment of Calcutta as sedimentation of historical time, silt and human design in order to write the river and the deltaic ecology into the city's history.

Legend has it that the city was born when the ocean started churning and a tortoise, Kurma, gasped out a deep breath while being pressed by the Mandar Mountains on one side and by Ananta (the infinite) on the other. Kurma's breath spread and created the country of Kilkila, which forms the lower stretches of the Bengal Delta, where the silt-laden river moves sluggishly and the land is flat.[6] Colonial geology documents another beginning. The city, nineteenth-century earth sciences argued, was born as the eastern part of the delta started dying in the sixteenth century. Tectonic movements began silting up the Nadia rivers (consisting of Ganga, and its spill channels Jalangi, Matabhanga, Bhairab and Churni) directly north of the city, creating the vast alluvial depositions and new spaces of habitation.[7] Until the sixteenth century fishermen and falconers lived in the marshes of what is now the built-up parts of Calcutta, leaving behind a small collection of songs and couplets attesting to its long-forgotten watery origins.[8] Coincidentally, recent geological findings are more in tune with the oceanic origins of the Kurma legend and show that lower Bengal was not merely of tectonic origins but is a remnant oceanic basin.[9] Not surprisingly, locals have called this *buruniyar desh*, meaning tidal swamps or lowlands, which often remain

[5] Recent histories of Dhaka are attentive to its watery origins; see Iftekhar Iqbal, "First Master Plan for Dhaka City: An Environmental Exploration," *South Asian Chronicle* 3 (2013): 42–61; see also Sten Nilsson's discussion of Dhaka in *The New Capitals of India, Pakistan and Bangladesh* (London: Malma, 1973).

[6] No one knows the origin of the legend, which was written down by the sixteenth-century poet Kavirama in *Digbijayaprakasa*. Cited in A. K. Ray, "A Short History of Calcutta," in *Census of India 1901*, vol. 7 (Calcutta: Bengal Secretariat Press, 1902), 1.

[7] James Ferguson, "On Recent Changes in the Delta of the Ganges," *Quarterly Journal of the Geological Society* 19 (1863): 321–54. Although not a trained geologist, Ferguson wanted to develop a theory of silt deposition. Apart from Ferguson's theory, there were major debates on the behavior of Indian rivers with two separate lines of geological thinking represented by H. Leonard, Report on River Hooghly (1865) IOR/V/27/732/13 and Frederick Christian Hirst, *Report on the Nadia Rivers 1915* (Calcutta: Bengal Secretariat Press, 1916).

[8] I have explored this myth as a site for new possibilities for spatial histories of the city in Debjani Bhattacharyya, "Geography's Myth: The Many Origins of Calcutta," in *Unarchived Histories: The "Mad" and the "Trifling" in the Colonial and Postcolonial World*, ed. Gyanendra Pandey (New York, NY: Routledge, 2014), 144–58.

[9] Mahmood Alam, M. Mustafa Alam, Joseph R. Curray, M. Lutfar Rahman Chowdhury and M. Royhan Gani, "An Overview of the Sedimentary Geology of the Bengal Basin in

submerged. The ancient Indic astronomer Barahamihir termed the lower Bengal delta *samatata*, meaning land that is level with the sea.[10]

The marshes and bogs that make a patchwork of soil and swamps of Calcutta have left very few traditional records for historians. Urban marshes, floating watery soils and riverine sedimentations were not always property, but instead had to be made into property. From the eighteenth century on these soaking ecologies of land, water and biota entered the colonial archive during moments when they appeared to break down the bureaucratic logic that bounded and defined the idea of land through the legal and spatial parameters of a land grant, which conceived of land as distinct from water. Yet, as is widely known, the slow and constant movements of landmasses are not something new or unique to the area of the Bay of Bengal. Landmasses in bays and coastal areas have a different relation with water. The landmass flows, moves and challenges the fixities of cartography, ownership and territorial sovereignty.[11] However, what is specific to the Bengal Delta is the speed with which some of these geological forces have begun to unfold in the recent past.[12] As this book documents, these soaking ecologies emerged in the

Relation to the Regional Tectonic Framework and Basin-Fill History," *Sedimentary Geology* 155, no. 3 (2003): 179–208.

[10] Dinesh Chandra Sen, *Studies in the Geography of Ancient and Medieval India* (Varanasi: Motilal Banarsidass, 1971), 149–58.

[11] My work is deeply indebted to the radical rethinking of the relation between water, coasts and lands by Anuradha Mathur and Dilip da Cunha, *Soak: Mumbai in an Estuary* (New Delhi: Rupa Publishing, 2009) and *Mississippi Floods: Designing a Shifting Landscape* (New Haven, CT: Yale University Press, 2001). For historical works that explore the contested nature of coastline formation, see Ari Kelman, *A River and Its City: The Nature of Landscape in New Orleans* (Berkeley, CA: University of California Press, 2003); Matthew Morse Booker, *Down by the Bay: San Francisco's History between the Tides* (Berkeley, CA: University of California Press, 2013); Christopher Morris, *The Big Muddy: An Environmental History of the Mississippi and Its Peoples, from Hernando de Soto to Hurricane Katrina* (New York, NY: Oxford University Press, 2012).

[12] For a literary rendering of the rivers that feed the Bengal and Bangladesh area, see Adwaita Mallabarman, *Titas Ekti Nadir Naam* (Kolkata: Punthigar, 1950). This novel was later made into an award-winning film with the same title by Ritwick Ghatak in 1973; see also Amitav Ghosh, *The Hungry Tide* (London: Harper Collins, 2004) and *The Great Derangement: Climate Change and the Unthinkable* (Chicago, IL: University of Chicago Press, 2016). While Rob Nixon's idea of "slow violence" is useful to understand the current subsidence of the Bay of Bengal coast, it nonetheless fails to capture how the mobility of the landscape has changed meanings over the course of time. Some of the movements and changes that my book captures were movements of the delta that were reinterpreted differently by different actors, with far-reaching consequences. Rob Nixon, *Slow Violence and the Environmentalism of the Poor* (Cambridge, MA: Harvard University Press, 2011).

colonial archive entangled in disputes over geographical naming, questions of ownership and economic valuation. The mobility of the landscape became central in forging laws addressing ownership in the deltaic city. The making of the property in marshes meant drying the marshes through hydraulic engineering. But simply drying did not secure tenurial or allodial rights, titles or deeds. How, then, did these temporary landscapes enter the domain of colonial urban land documentation and become part of the burgeoning property market? To answer that question, we must first investigate how property is created in marshes.

Forgetting was central to the creation of property for the extraction of value from the marshes. Technologies of fixing (legal and engineering) orchestrated a collective amnesia about the mobility of this landscape. Yet the mobility that defines the land–water relation in this region has a multifaceted history. This book will explore this history by studying how a Janus-faced legal architecture, increasing economization of space and hydraulic engineering transformed an affect-saturated and mobile delta from the latter half of the eighteenth century into a concrete space of buildings and networks of infrastructure.[13] Human intervention managed and radically transformed the slow movements of land and water in and around Calcutta since the turn of the eighteenth century. The colonial officials harnessed the mobility of the tidal delta, marked by new land formations and subsidence of lands into the river, through what I argue were specific "technologies of property." *Empire and Ecology* analyzes the historical junctures where the dramatic shifts in the river impacted the urban land market over the course of a century and a half from 1760 to 1920. It demonstrates how property law and hydraulic technologies reorganized the mobile landscape of soaking ecologies into a propertied geography through the nineteenth century in search of dried and firm land.

The dried littoral of the twentieth century was marked by economic standardization of market practices, and urban land played a significant role as property speculation catalyzed an economic crisis in colonial

[13] Scholarship on law and the colonial state, especially by Bernard Cohn and David Washbrook, has shown how colonial law was marked by two contradictions. One was the public side of the law, which sought to subordinate the rule of "Indian status" to that of the British contract. The other was the personal side, which was marked by accommodating caste, religious status and familial practices within the codified space of law. See Bernard S. Cohn, "From Indian Status to British Contract," *Journal of Economic History* 21, no. 4 (1961): 613–28; David Washbrook, "Law, State and Agrarian Society in Colonial India," *Modern Asian Studies* 15, no. 3 (1981): 649–721.

Calcutta. Economic crisis had replaced the perceived ecological crisis of the mobile landscape of the earlier century. The emergence of a speculative market in urban land in the twentieth century was intricately linked to the nineteenth-century projects of drainage, land reclamation and the repression and forgetting of these soaking ecologies. Land speculation resulted in the emergence of urban property as fictitious capital and an entity for forms of market governance for a developmental colonial state. My book, therefore, narrates a history of how colonial law and design gradually translated a complex set of human–land–water relations into a recognizable language of fixed property in the tidal swamp that was Calcutta.

The expanding property market continues to shape the current landscape of the city, whose shrinking floodplains and disappearing wetlands are part of this long history of forgetting. Colonial geologists remarked on the unique seasonal stagnation of the river as sheets of water where there was land.[14] Today we read them as urban inundation and waterlogging. Located within a shifting terrain, the history of fortifying a moving watery landscape and transforming Bengal's specific wetland ecology into that of a fixed geography of a colonial Presidency town remains largely unexplored.[15] Therefore, in order to follow the story of land and property-making we need to pay attention to the moods of the river and the movements of the littoral.[16] By making both the presence and the twentieth-century forgetting of the river and its channels in the city central

[14] Fergusson, "Recent Changes in the Delta of the Ganges," 325.

[15] Presidency towns were administrative units of the British East India Company through the nineteenth century. Prior to that they were often known as Factory Towns. Apart from Calcutta, Bombay also met a similar fate since it consisted of wetlands and archipelagos that were fortified into an island and joined with the mainland during colonialism. For a schematic overview of land reclamation in colonial Bombay, see Mariam Dossal, *Theatre of Conflict, City of Hope: Mumbai 1660 to Present Times* (New Delhi: Oxford University Press, 2010). While scholars working on Calcutta attest to the colonial trope of describing the city as a pestilential marsh, none have so far documented the history of the marshes in the colonial towns of British India. Mohit Ray's new book explores the history of the water bodies of Kolkata, but primarily in the postcolonial era. Mohit Ray, *Five Thousand Mirrors: The Water Bodies of Kolkata* (Jadavpur: Jadavpur University Press, 2015).

[16] Recent anthropological scholarship has addressed how riverine flows might affect space-making in riverfront areas. For South Asia, see Anne Rademacher, *Reigning the River: Urban Ecologies and Political Transformation in Kathmandu* (Durham, NC: Duke University Press, 2011). Franz Krause's work on the Finnish Lapland has shown the importance of the term "fluvitory" to understand these spaces of land–water admixture. See Franz Krause, "Making Space along the Kemi River: A Fluvial Geography in Finnish Lapland," *Cultural Geographies* 24, no. 2 (2017): 279–94.

to understanding urban formation in Calcutta, we can begin to view spaces beyond the one-dimensional cartographic register, which fixes spaces in time. The chapters that follow attune us to the temporality of land in this area. They explore the scientific and lived spatial practices to document how the temporality of land in the tidal swamp was repressed in our histories of property, law, cartography and design.

British colonial practices of reclaiming land and draining the city through the nineteenth century created: pockets of dried land, wealth accumulation and sites of speculation within the urban land market. The stories and struggles of the various actors who lived in and transformed the delta, including the fishermen, colonial engineers, speculators, petitioners, lawyers, property owners, municipal officials and tenants, offer material to narrate a thick history of environmental change, transformation of urban property regime and land speculation. Many of these actors used law, cartography and infrastructure in novel ways to produce these spaces as fixed – spaces that could be measured, owned and acquired as properties and thrust into a burgeoning land market.[17] Some resisted or rebuffed these changes and continued to live in these water-soaked landscape as "amphibious autochthons," to use an antiquated term coined by one of the city's early historians.[18] Above all, water, land and river resisted the various technologies of making property that abstracted the watery spaces from the ecologies within which they were located.

My story begins by documenting how infrastructural schemes carried out by private individuals in the eighteenth century and by the various urban bodies such as the Mayor's Court, the Privy Council, the Justices of Peace, Lottery Committee and the various town-planning and municipal bodies in the nineteenth century sought to make riverine water flow without stagnating and dry and thereby fix the land. Yet these projects soon translated into acts of rationalizing landholding, creating a thriving and speculative market in urban land in the ever-expanding city of Calcutta and its hinterlands. This expansion involved hydraulics, on the one hand, and forging tenuous legal legitimacy, on the other hand. By analyzing the realities created by colonial law in articulating private

[17] "Fixed," when it is used to denote property, carries a distinct meaning that I have tried to define above. It will be instructive to see how some of the Germanic languages have the sense of mobility built into the etymology of ownership where *immobilien* means property that cannot be moved (which would translate to private property like houses, buildings, etc.) and *mobilien* is often used to speak about property that can be moved, most commonly used to denote furniture.

[18] Pradip Sinha, *Calcutta in Urban History* (Calcutta: KLM Firma, 1978), 3.

property, state domain and ownership through legal and financial instruments, *Empire and Ecology* demonstrates that the manufacturing of the city's landscape was central to mediating the relation between the market in urban land and colonial statecraft.

The history of designing this particular deltaic landscape is bookended by two incidents of speculation that significantly transformed the legal, infrastructural and economic geography of Calcutta. The first instance of speculation, which would subsequently restructure the geography of the soaking ecologies, took place in the 1760s and can best be described as a venture in exploiting the geographical possibilities of the tidal landscape. Benjamin Lacam's failed venture of building a harbor in a mobile landscape in 1767 ended in a thirty-year long legal battle stretching from the corridors of the Mayor's Court in Calcutta to the halls of the House of Commons in London. The dispute unleashed a whole host of regulatory and infrastructural measures to "fix" the landscape through drying the land and developing legal classifications of its ecological varieties, which held for the next century. These intricate legal measures developed over the nineteenth century to fortify the marshes in turn consolidated Calcutta's property market, vastly transforming the legal geography of the city by the time the British Crown took over in 1857.

By the turn of the nineteenth century the nature of property speculation had clearly shifted from exploiting the geographical fluidity of the landscape to the economic intractability of landowners. Swamps around the municipal fringes of the city emerged as limits that prevented the "natural" expansion of the city, thereby contracting the land and housing markets, while also creating pockets of speculative activity.[19] Land and housing speculation by Indian property-holders and, more importantly, by newly established governmental bodies such as the Calcutta Improvement Trust, rescripted urban politics and the social and economic values of land in significant ways. This book documents the transformations in colonial laws by focusing on the environmental consolidations and legal maneuvers against the backdrop of the shifting terrain of capital accumulation.

These large shifts in colonial power and global economic concerns intersected in small plots of urban lands on the edge of the Bengal Delta.

[19] C. H. Bompas, a member of the legislative council of Bengal in 1913 and the first president of the Calcutta Improvement Trust, linked the ecological condition to the economic geography of the city C. H. Bompas, "The Work of the Calcutta Improvement Trust," *Journal of Royal Society of Arts* 75, no. 7 (1927): 199–219.

These intersections emerge in the historical archive as concerns that morphed from the perceived geographical vagaries of the delta in the early years to the so-called economic criminality of "profiteering" property owners by the twentieth century. The chapters document the everyday enactments and displays of power under the rubric of property that transferred land from the indigenous population to the state through legal fictions and condensed forms of living with mobile landscape into fixed plots and deeds. These processes continue to bolster the developmental agendas in twenty-first-century South Asian cities, reminding us that "property is a process (of making and unmaking certain kinds of relationships): that its end point is not known."[20]

Unlike previous histories of Calcutta, which treated the terrain as an inert background to explore the colonial disciplinary power and acts of resistance and negotiation, this book uncovers a different method to read urban space-making by remaining attuned to the dynamic and shifting riverine space.[21] I foreground the temporality of the landscape by locating it within the overlapping sites of their bureaucratic and legal histories. At the same time my work remains attentive to the cosmological dimensions and the affective memories that saturate these sites, whether a harbor, dock, riverbank or the silty space between land and water. Reading these sites as dense spaces of habitation subjected to scientific and legal management helps us understand how and why colonial officials read the geography of the littoral as an intractable landscape. They tried and failed to render some of these sites administratively legible in spite of an expansive

[20] Katherine Verdery, *The Vanishing Hectare: Property and Value in Postsocialist Transylvania* (Ithaca, NY: Cornell University Press, 2003), 13.

[21] Swati Chattopadhyay, *Representing Calcutta: Modernity, Nationalism, and the Colonial Uncanny* (London: Routledge, 2005) and *Unlearning the City: Infrastructure in a New Optical Field* (Minneapolis, MN: University of Minnesota Press, 2012); Partho Datta, *Planning the City: Urbanization and Reform in Calcutta, c. 1800–c. 1940* (New Delhi: Tulika Books, 2012); Pradip Sinha, *The Urban Experience, Calcutta: Essays in Honour of Professor Nisith R. Ray* (Calcutta: Riddhi-India, 1987); *Calcutta in Urban History* (Calcutta: Firma KLM Private Ltd., 1978); P. Thankappan Nair, *Calcutta: Tercentenary Bibliography* (Calcutta: Asiatic Society, 1993); *Calcutta in the 19th Century: Company's Days* (Calcutta: Firma KLM, 1989); *A History of Calcutta's Streets* (Calcutta: Firma KLM, 1987); Bhabanicharan Bandyopadhyaya, *Kalikata Kamalalay* (Calcutta: Firma KLM, 1990); Radharaman Mitra, *Kalikata Darpan* (Calcutta: Subarnarekha, 1980). This is not an exhaustive list. For an account of fishermen's history of Calcutta redolent with a watery conception of space, see Shankar De (Dnere), *Samajik O Rajnaitik Prekhapete Jele Kaibarta: Adi Kolkatar Jelepara, Jelepara-r Swang* (Kolkata: Offbeat Publishing, 2006); also see my reading of this history in Bhattacharyya, "Geography's Myth."

bureaucratic machinery of surveying, mapping and titling these spaces through property and riverine laws. The process through which a monetized value of land as alienable property replaced a *social* value in land and water as a possession involving a complex system of patronage, gifting practices, ancestral spirits and gods was neither easy nor frictionless.

Studying the processes through which colonial lawyers, surveyors and speculators consolidated and regulated the market in urban land in Calcutta opens up rich genealogies of colonial economy, urban ecology and the environment. By presenting an overlooked archive of colonial urban and environmental history of South Asia, consisting of river surveys, engineering records and court cases, along with the more traditional archive of planning and municipal documents, this book charts three interrelated processes. First, it maps the transformation of what may be called soaking ecologies into a political economy of property from the late eighteenth century onward. This process of transformation happened through a braiding together of two registers of colonial power.[22] One was the legal register, where the ecologically variable entities of silt, marshes and bogs were literally translated into landed property through naming, classifying and arbitrating ownership.[23] The other technological register consisted of the operations of drying and draining the landscape. I argue that the technological interventions into the environment of Bengal's littoral coasts cannot be understood without the attendant legal processes. Second, I document how this act of translation unfolded through the nineteenth century as colonial officials made every effort to produce a juridico-economic notion of property out of various regimes of social, ecological, ancestral and political value systems embedded in the existing ownership practices. Finally, I conclude by demonstrating that,

[22] I use the term "braiding" to imply the patchwork and plural manner through which strands of legal thinking (including common law, codified doctrines and customs) bolstered some forms of hydraulic experiments and technological innovations. I borrow this concept of braiding from Projit Bihari Mukharji, *Doctoring Traditions: Ayurveds, Small Technologies and Braided Sciences* (Chicago, IL: University of Chicago Press, 2016), 20–27.

[23] There is always an uncertainty inherent in naming geographical features, and in Chapter 1 of this book I delve into the limits of geographical taxonomy and how it emerged within law. My thinking about the limits and possibilities of different readings of place names and geography is influenced by Paul Carter, *The Road to Botany Bay: An Essay in Spatial History* (New York, NY: Faber, 1987); *Dark Writing: Geography, Performance, Design* (Honolulu, HI: University of Hawai'i Press, 2009); Greg Denning, *Islands and Beaches: Discourse on a Silent Land Marquesas 1774–1880* (Honolulu, HI: University of Hawai'i Press, 1980).