REIMAGINING A VIOLENT LANDSCAPE:

DISASTER, DEVELOPMENT, AND CARTOGRAPHIC IMAGINATION IN THE BRAHMAPUTRA RIVER VALLEY

by

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ABSTRACT

The physical geography of India's Brahmaputra River, one of the world's largest braided rivers, is characterized by constant shift. Communities along the river experience frequent and intense flooding, and displacement due erosion and flood damage is common. Majuli, the world's largest river island, is experiencing both erosion and creation of 'new' lands along its borders due to high sediment deposition. Having not been surveyed in nearly fifty years, 'new' lands formed from sediment deposition in Majuli are untitled and government-owned, and communities settled on these lands are not entitled to resettlement assistance. The adaptation and migration strategies adopted by residents of these informal settlements are poorly understood. Semi-structured interviews and comprehensive surveys focused on perceptions of risk, efficacy of disaster relief, and migration strategies were conducted with households identified as being at-risk of catastrophic flooding and erosion in Majuli District, Assam. Interviews with policymakers, government workers, and religious leaders were conducted to assess disaster relief efforts in informal settlements. The results suggest that policymakers' static understanding of land shapes flooding patterns and migration regimes. Members of informal settlements at high risk of displacement adapt to the lack of government assistance by altering adaptation and migration strategies, but are largely constrained to repeated informal resettlement on un-surveyed land. More effective and flexible surveying practices, in combination with expanded disaster relief, are essential to minimize displacement and work towards a new understanding of geomorphology, land tenure, and disaster management as dynamic, intertwined processes.

Keywords – India, flooding, displacement, geomorphology, land tenure.

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LIST OF ABBREVIATIONS

SOI –Survey of India

EIC – British East India Company

DC – Deputy Commissioner

DCO – Deputy Commissioner's Office

CRO – Circle Revenue Office

DDMA – District Disaster Management Authority

CM – Chief Minister

ASDMA – Assam State Disaster Management Authority

NDWI – Normalized Difference Water Index

mNDWI – Modified Normalized Difference Water Index

NGO – Non-Governmental Organization

INTRODUCTION

The physical geography of India's Brahmaputra River Valley tends towards motion. A combination of intense seismic activity, high seasonal meltwater in the Himalaya, and a substantial load of very fine sediment have made the Brahmaputra one of the most dynamic braided rivers on the planet. The result is significant erosion, flooding, and bank failure along the edges of the river. The Brahmaputra River Valley is, consequently, characterized by broad floodplains and a massive network of ephemeral, silty river islands known as *chars*, *chaporis*, or *saporis*[1] which are rapidly created and washed away over the course of seasons.

Nowhere along the course of the Brahmaputra is this geophysical dynamism more observable than in the Upper Assamese district of Majuli, ostensibly the world's largest river island. The geophysical dynamism of the Brahmaputra and its tributaries has led to significant erosion of the island. Bounded between the Brahmaputra River in the south and the tributary Kherkutia Xuti and Subansiri Rivers in the northwest and north, respectively, the topography and shape of Majuli has changed drastically over time. Although methodologies and results vary among scholars, Dutta, Barman, and Aggarwal (2010) estimate that the total land area of Majuli in 1975 was 706.14 square kilometers. By 2008 it had been reduced to 484.34 square kilometers.

Although the rate of erosion on Majuli is rapid, it is neither constant nor linear. As old lands are washed away, new lands are created through sediment deposition in the form of saporis and sandbars. These newly-formed and often temporary lands are

[1] These channel islands may be formed through the process of sediment deposition (in the case of small saporis) or channel avulsion (in the case of the largest).

categorized as *state-owned*, although that phrase does not suggest that they are administered for public use. In the absence of cadastral surveying, these state-owned lands are neither titled nor legally distributed to occupants. Settlements on these state lands are, therefore, informal and not legally sanctioned. Communities in these state-owned lands are mostly agrarian, and their proximity to the Brahmaputra has made displacement due to flooding and erosion a common occurrence in these informal settlements. On cadastral lands, occupants who can demonstrate private ownership of eroded land or lost property may seek compensation for their loss.

Land policy and disaster relief are, consequently, deeply entwined on Majuli. The Brahmaputra's geophysical dynamism and state land tenure policy have together created the conditions for widespread informal settlement and subsequent displacement of residents. While cadastral lands are consumed by the Brahmaputra, ephemeral and vulnerable state-owned land is produced. The result is an island which is becoming progressively smaller and which is increasingly composed of state-owned land. As a result, the residents of Majuli have, through a series of displacement and resettlement events, been segregated into two broad spatial categories. The center of the island is largely composed of privately-titled *patta* land[2] and faces little risk from catastrophic flooding and erosion. Many residents in the center of the island are landowners who may seek compensation for lost land and property. Poorer residents must establish informal

[2] Patta titles are issued by the state and confirm private ownership of previously state-owned land. These lands are exempted from revenue collection for a certain period as long as they are cultivated. A farmer who has cultivated state-owned land for a long period may apply for patta title to that land. The necessary length of this period of cultivation varies in practice.

settlements on the flood-prone, state-owned lands near the river. These communities, however, are unable to seek compensation for lost land which they do not have title to.

The consequences of this pattern, in combination with property-based disaster compensation, are troubling. Those at the greatest risk of being displaced receive the fewest benefits and relief options from government policy, while those with private lands entitled to compensation conversely face the least risk of losing them. As the population of Majuli continues to grow and total land area continues to shrink, the number of bighas[3] of agricultural lands worked by each household diminishes rapidly. Each flooding season, then, brings with it a state of precarity for informally-settled residents of state-owned land. When bighas are few and near the water, the intensity of flooding and erosion required to dissolve a household's livelihood becomes less.

In this study, I conducted a series of semi-structured interviews and surveys with a sample of seventy-five households on Majuli identified as being at risk of severe flooding and erosion. Questions were geared towards perceptions of risk and governmental disaster prevention and relief efforts, as well as migration and resettlement preferences and practices. I also conducted a series of elite interviews with public officials, religious leaders, academics, and representatives of non-governmental organizations. The goal of this study is to understand the intersection between the geomorphology of the Brahmaputra and disaster management outcomes in Assam through an ethnographic lens. The results suggest that state understandings of land in the

[3] Agricultural land in much of northern and eastern India is measured in bighas, although the size of the unit varies significantly by state and region. In Upper Assam, a bigha is 1,340 square meters.

Brahmaputra River Valley contrast sharply with traditional understandings as well as geophysical reality, and exacerbate ongoing displacement due to flooding and erosion. The state's land tenure and surveying practices reinforce a divergent set of disaster-management outcomes for groups living near the Brahmaputra.

Disaster management policy itself, I assert, has become intertwined with the policies and logics of market-oriented development. Consequently, policymakers have found themselves unequipped to confront the realities of a dynamic human and physical riverine geography. The centrality of cadastral land tenure in disaster management and a consequent lack of cadastral surveying has bureaucratically framed large parts of the Brahmaputra's shoreline as what I will call *unmapped land*. The relationship of these lands to their inhabitants and the state make the contradictions within Assam's disaster management policies explicit. While lack of cadastral mapping places these lands largely outside the umbrella of government services and benefits, official policy and pragmatism steer many displaced people to informally settle and cultivate them. While informal settlements on these lands often receive no more than tarpaulin and a few days' supply of dry goods after displacement, the fact of their displacement is rhetorically deployed to justify large development projects which may worsen flooding and erosion.

In Chapter 1, I examine the production of unmapped land through the interaction of geomorphological change and the cartographic imagination of the state. I begin by examining the recent geophysical history of the Brahmaputra in general and Majuli in particular, and assert that narratives surrounding the island's disappearance obscure the significance of newly-deposited land and erase the informally-settled residents of these lands from visibility. I then examine the relationship between the state and the crisis of

displacement on Majuli, as well as the history of the state's cartographic imagination of the island. Finally, I describe the methodology of my fieldwork and discuss the results of my study, concluding that the state's cartographic imagination of the Brahmaputra obfuscates understandings of the land's movement and excludes communities from the protection of disaster management according to the taxonomy of the land on which they live.

In Chapter 2, I analyze the rhetoric and practices of disaster management and economic development on the Brahmaputra since India's liberalizing economic reforms in 1991. I begin by reviewing analyzing the relationship between disaster and development. While acknowledging that development and disaster are mutually constitutive, I assert that state development strategies (and not their lack) have exacerbated disaster risk on Majuli. Subsequently, I contend that post-reform disaster management on the Brahmaputra has aimed to deepen capital access by freezing the motion of the river. I analyze and discuss a series of disaster management projects and proposals in the context of the state's market-oriented development and geopolitical goals. I conclude that state development and disaster management strategies are poorly-suited to the geophysical realities of Majuli, which can best be understood as in perpetual motion.

In both chapters of this study, I intend to contrast the disaster management practices of the state with the dynamism of the river and the communities which live along it. I argue that overlapping geomorphic and political processes together produce a category of land subject to the violence of the state and yet outside of its protection. The result is a profound unevenness in disaster management outcomes, and this unevenness

manifests itself in a series of escalating risks for residents of informal settlements on Majuli.

CHAPTER 1: UNEVENNESS IN DISASTER MANAGEMENT

Violent Geomorphologies

An understanding of the disaster management regime on Majuli necessitates an understanding of the geomorphology which governs the course and flow of the Brahmaputra River itself. Disaster management outcomes, although not produced solely by geophysical processes, must nevertheless be constructed around and in reference to these processes. Disaster management in Assam has developed in a direct dialogue with the geomorphology of the river, and is ostensibly designed to counteract its most violent tendencies.

My description of the Brahmaputra as violent is deliberate and not especially contested. Both public officials and community residents on Majuli describe the river using that term, and a representative of the Kamalabari Circle Revenue Office (CRO) suggested to me that it is, perhaps, the "most violent river in the world" (Name Withheld, interview by author, Kamalabari, August 8, 2018). This supposed violence is expressed in the movement of the river, and the damage it inflicts on the island of Majuli and its inhabitants can be traced in the yearly migration of its channels and the intensity of its flooding during summers.

Majuli is located in Upper Assam, where the Brahmaputra and its tributaries show the highest rates of channel avulsion and geophysical dynamism (Sah and Das 2018). The island itself was probably created during an extremely intense flood around 1750, which

diverted part of the Brahmaputra into the upstream channel of the Dihing River, one of its tributaries (Sarma and Phukan 2004). The result was a stretch of land swathed within a river which separates from, and then rejoins, itself. Although largely governed by the seasonal rhythms of the monsoon and Himalayan freeze-thaw cycles, the peculiar dynamism of the Brahmaputra is the result of a series of other factors which intersect within Assam. Perhaps the most important of these factors for understanding disaster management and land tenure is silt. Sediment samples from the Brahmaputra show that a large proportion is classified as fine silt between .05 milometers and .09 milometers, and contains a very low quantity of clay (Goswami 1985). As a result, lands formed by the sediment deposition of the river are themselves sandy, and prone to rapid accumulation and disintegration (Sarma 2005). The teardrop-shaped saporis and sandbars created through this process may appear and disappear within the course of two rainy seasons, or else may exist for long periods of time and become cultivated. Gogoi et al. (2012) describe channel avulsion and bank-line migration leading to the conjoining of the Lohit and Dangori Rivers in Upper Assam. Dibrusaikhowa National Park, consequently, is now a large sapori.

Even lands more commonly thought of as permanent, such as the island of Majuli itself, are exceptionally vulnerable to erosion due to the fine, sandy nature of their soils (Das et al. 2014). Figure 1 shows my research assistant, Pranjit Baruah, standing above a severely-eroded bank near Bhakat Sapori. The narrow livestock path visible to the right of the photograph has emerged to replace the wider, more formal road which has eroded entirely within the last several years. Rapidly eroding banks such as these are prone to sudden collapse during the rainy season. The result is widespread and rapid erosional

avulsion, in which channels of the river may merge or disappear over the course of a single season.

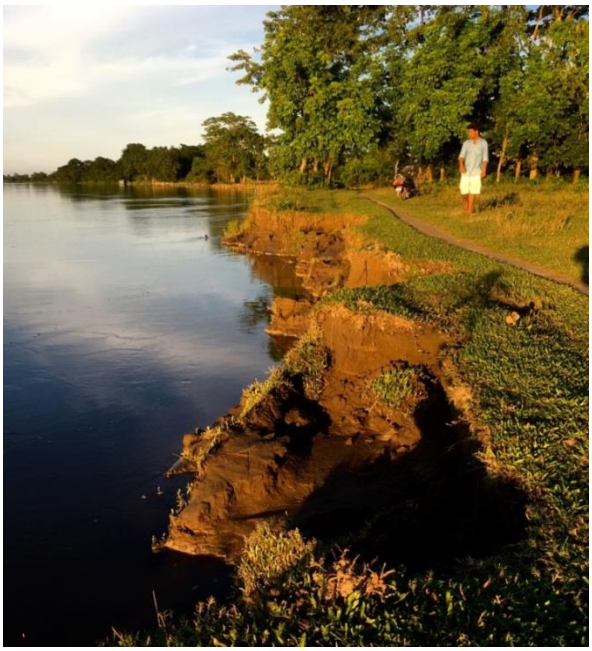

Figure 1: My research assistant Pranjit Boruah standing by a severely-eroded bank near Bhakat Sapori. Image taken August 6, 2018

Although the Brahmaputra is not unique in its fine sediment and high rates of avulsion, a number of other factors contribute to its distinctive dynamism. In the case of Majuli and Upper Assam generally, a history of intense seismic activity has contributed to the geophysical dynamism of the landscape. Intense earthquakes contribute to avulsion through the creation of temporary natural dams formed by landslides in river channels. When these dams break, flash flooding leads to rapid and catastrophic avulsion (Reddy, Nagabhushanam, and Sukhija 2009). The most dramatic recent example of catastrophic

flooding due to seismic activity occurred after the 1950 Assam-Tibet Earthquake.[4] The Great Assam Earthquake, as it is sometimes known, led to widespread landslides in the foothills north of Majuli and a natural stone dam along the course of the Subansiri, which forms the northwest boundary of the island (Goswami, Sarma, and Patgiri 1999). The breaking of this dam, and the subsequent catastrophic flood, caused the channel of the Subansiri to migrate about 6.5 kilometers. A significant portion of western Majuli, as well as a number of villages, were swept away as the Brahmaputra and Subansiri Rivers settled into new channels.

The full effects of the Great Assam Earthquake on Majuli were not understood until years later. Sarker and Thorne (2006) show that the earthquake introduced a vast amount of sediment into the Brahmaputra, the courser portion of which caused radical morphological changes as it slowly moved through the river system towards the Bay of Bengal. The aggradation of sediment in these channels raised the level of the riverbed and widened the river itself. Sediment aggradation continues today, leading to widespread channel braiding and increased flooding and erosion over time (Akhtar, Sharma, and Ojha 2011). Erosion and flooding are especially pressing problems on Majuli.

Media treatments of Majuli have become increasingly enamored with its struggle against erosion, flooding, and displacement, generating coverage of the island both internationally and within India. Discussions of displacement on Majuli are often

[4] The 1950 Assam-Tibet Earthquake was the sixth-largest magnitude earthquake of the 20th century. Although a greater number of deaths were recorded in Tibet than in Assam, the earthquake had a profound morphological effect on the entirety of the Brahmaputra-Jamuna-Meghna river system.

accompanied by dire predictions of its eventual disappearance into the Brahmaputra due to progressive erosion. The island has become a romantic object of reflection for the small number of Western journalists who report on it, not least because of the immense cultural value of the island. The 16th century poet and scholar Sankaradeva, founder of the Neo-Vaishnavite movement, consecrated the area which would become Majuli as the center of his burgeoning religious organization (Goswami 2016). [5] The series of monasteries which he established across the region, known as *Satras*, serve as refuges for traditional Assamese dance and handicrafts (Murthy 2013). In a 2015 Guardian article entitled "Majuli Island, Assam: A Disappearing World," journalist Richard Eilers laments what he frames as the tragic paradox of Majuli: a center of natural and cultural beauty under siege by the river which will gradually consume it. While Majuli undergoes dramatic flooding and erosion nearly every year, Eilers' narrative obscures the complex geophysical processes which are central to the ongoing crisis of displacement on the island. Remote sensing and geomorphological analyses measuring changes in the island's size suggest that Majuli is not so much *disappearing* as it is *in motion*.

Disappearance and Dynamism

A substantial body of literature has also been developed within the disciplines of geography and remote sensing attempting to measure Majuli's progressive dissolution.

[5] Neo-Vaishnavism or *Ekasarana Dharma* is a religious and cultural movement founded by Sankaradeva which remains important within wider Assamese religion and culture. Its centers of worship, Satras and Naamghar, are concentrated on Majuli. Musical and theatrical forms of worship within the religion have contributed to Majuli's reputation as a center of traditional Assamese song and dance.

Sarma and Phukan (2004) cite a 1792-1794 description of the island by East India Company agent J.P. Wade (1800) as the benchmark by which to measure Majuli's gradual disappearance into the Brahmaputra. They calculate that the total area of the "principle islands" described by Wade in his *Account of Assam* could be no less than 5,013 square kilometers, although they doubt the accuracy of some of his estimates. Sankhua et al. (2005) use remote sensing methods to calculate that, in 2002, the total area of the island was only 376.93 square kilometers. That figure is less than eight percent of its area as described in the *Account*, and a reduction from its area of 416.23 square kilometers in 1990.

The erosion of Majuli, however, is neither a smooth nor a constant process, and the uncertainty surrounding its boundaries creates disparities in measurements of its size. While there is a broad consensus in the literature that Majuli is shrinking, there is little agreement on the exact size of the island year to year. Lahiri and Sinha (2014), breaking with Sankhua et al., find that the area of the island was 787.87 square kilometers in 1915, 640.5 square kilometers in 1975, and 508.2 square kilometers in 2005. They estimate that the island has shrunk by an average of 3.1 square kilometers per year during their ninety-year study period. Dutta, Barman and Aggarwal (2010), in contrast, calculate that the island's area was 484.34 square kilometers 2008 and shrank by 8.76 square kilometers per year between 1966 and 2008. The role of new lands formed from sediment deposition is little-discussed within remote sensing and fluvial geomorphology literature, although Dutta, Barman, and Aggarwal estimate it to be 1.87 square kilometers per year.

The geomorphic relationship between Majuli and the Brahmaputra, rather than one of creeping inevitable consumption, is in fact defined by oscillation and catastrophe.

Popular conceptions construct a Majuli which is slowly shrinking, while in reality it grows in some places in some years and shrinks in other places during the same years. The result is an island which should not be understood as disappearing, but rather as existing without any fixed shape or size. Debojyoti (2014) argues that state disaster management in Majuli has developed an ineffective technocratic approach based on the narrative of the island's disappearance. This narrative, however, assumes a linearity in erosion and flooding which is not reflected in the geophysical reality of the river.

Rather than understanding Majuli as a dynamic region without clear boundaries, researchers and policymakers have committed themselves to a conceptual Majuli with exact boundaries which are being continually reduced by erosion. That sediment deposition creates new lands, either attached to mainland Majuli or as independent saporis, is tacitly acknowledged by researchers but is lost in wider discussions of erosion. That these new lands are used and understood by residents as integral parts of the larger Majuli is rarely understood. I assert that it is more appropriate to understand Majuli as a region with indistinct boundaries undergoing a process of constant reordering rather than a single, contiguous island on the verge of disappearance. Rather than exclusively a space of disappearance, Majuli is a space of geophysical dynamism.

It is the residents of these newly-deposited, often ephemeral lands which are at the greatest risk of flooding and erosion. These crises are often attributed to the intense violence of the Brahmaputra within both mass media and scholarly literature. I assert that this view erases the role of disaster management and land tenure policy in producing displacement. While the crises on Majuli are due, in part, to the particular geomorphology of the Brahmaputra River Valley, they also rely on the intervention of

state power to become manifest. Disaster management outcomes among affected people are uneven over space. These uneven outcomes, I assert, are the result of a disjunction between state understandings of space on Majuli and actually-existing geophysical and land tenure processes. If the geomorphological dynamism of the Brahmaputra River Valley is enough to produce intense flooding and erosion, then it is state disaster management policy which unevenly distributes their consequences among the residents of Majuli.

The Disaster State

Although the geomorphology of the Brahmaputra undoubtedly influences life on all parts of Majuli, this geophysical dynamism is not expressed equally across all parts the island. The Brahmaputra drives the destruction and creation of Majuli's landforms, and these processes are concentrated at the interface between the island and the river. We can conceptualize these fluid, ephemeral lands as separate and distinct from the more stable interior of Majuli. It is vital to note that the boundaries between these conceptual regions (the *ephemeral* and *stable* lands which together constitute Majuli) are the result of both human and non-human processes. The residents of these lands face a greater risk of displacement than residents of Majuli's interior, and are therefore more impacted by the efficacy (or inefficacy) of disaster management policy in Assam. Disaster in these regions, by which I mean flooding and erosion, is not an exceptional occurrence. It is, rather, inevitable in a space of constant flux. These landforms (saporis, sandbars, and large stretches of Majuli's shoreline) exist in a state of geophysical dialogue with the river, alternating between consumption, inundation, and deposition. It is this dialogue,

and its effect on human residents of Majuli, which the state disaster management system seeks to mediate.

Disaster, as a rhetorical device, implies a condition of exceptionality. Disasters are infrequent, catastrophic, and often necessitate state intervention. Disaster, as it is understood by residents of Majuli, is not an exceptional event. Flooding and erosion are yearly occurrences along the Brahmaputra interface. Though disaster may not be infrequent on the island, many residents rely on state intervention in the form of relief and restitution for survival. The disaster management regime which governs responses to flooding and erosion on Majuli, then, is not a set of emergency protocols only rarely deployed. It is, in fact, a primary point of interface between residents of Majuli's riverine communities and the state (Das et al. 2014). How, then, are we to understand a space in which disaster, as framed by the state, is a 'normal' condition?

Scholars such as Sahay and Roy (2017) have framed erosion and flooding on Majuli as a fundamentally Malthusian problem, citing its shrinking surface area in contrast to its expanding population. The crises of disaster and displacement on the island are, for them, the inevitable result of increasingly scarce land. They ignore the complex role of the state in shaping both land tenure policy and disaster management outcomes. Since the 1970s, a large body of scholarship has emerged within political ecology which seeks to reframe 'natural' disasters as socially produced (O'Keefe, Westgate, and Wisner 1976; Hewitt 1983; Comfort et al. 1999; Afroz, Cramb, and Grunbuhel 2018; Sovacool, Tan-Mullins, and Abrahamse 2018). These scholars understand disaster and subsequent recovery as being mediated by political, socioeconomic, and technological factors. Gould, Garcia, and Remes (2016), interrogating this scholarship in the context of the

2010 Chilean earthquake, identify modes by which state effects and ecological hazards are mutually constitutive. They track the development of the Chilean state through the course of the disaster, from a Managerial State which sought to control ecological hazards to a State of Catastrophe which sought to control human subjects in relation to disaster. They write:

> In contrast to the Managerial State, which sought to manage nature and believed it to be conquered, the State of Catastrophe saw nature as fundamentally unconquerable. In this imaginary, nature—seismic nature but especially human nature—remains an ever present danger to civilization and an excuse for internal repression. The imagined state and imagined nature remain, in this pairing, mutually constituted: nature as forever threatening to impinge on safe society, and state as the armed savior of that society, defending people from 'natural' disaster and from their own 'naturally' animalistic instincts.

Assam has, since independence, been widely-understood as a borderland on the margins of wider India. That disaster management policy has been used to deepen state control over this perceived borderland is well understood. Guyot-Réchard (2015) argues that state disaster recovery efforts following the calamitous 1950 Assam earthquake accomplished just this. While many residents of Majuli at risk of flooding, erosion, and displacement undoubtedly benefit from some elements of disaster management policy, I assert that the omnipresence of disaster as an organizing force within life on the island makes this policy inseparable from wider understandings of state control. To borrow a phrase from Gould, Garcia, and Remes, disaster management on Majuli operates as a State of Catastrophe. Land tenure and resettlement, especially, are mediated through the apparatus of the state, and are shaped in a variety of ways by disaster management policy.

Residents of these ephemeral, unmapped lands are often not administered to by state disaster management policy. Although displacement is a widely-discussed issue for communities on these lands, the strategies by which these communities navigate resettlement, risk management, and land tenure policy in relation to state disaster management are not well-understood. Informal communities are able to exercise agency in their relationship to disaster, and develop complex strategies to adapt to flooding and erosion. The vulnerability of communities, however, is chiefly determined by biophysical factors (Chaliha et al. 2012). Consequently, adaptation strategies may be limited when displaced people are forced, either by direct state action or circumstance, to resettle on vulnerable unmapped lands. Community outcomes after disaster are tied inextricably to the taxonomy of the land which they inhabit.

Uneven outcomes within disaster management on Majuli, then, flow directly from the cartographic imagination of the state. Disaster management, as well as the land tenure system which it relies upon and reproduces, is the product of a series of contestations and tensions between two Majulis: the geomorphological Majuli, the boundaries and dimensions of which are unfixed in space and subject to frequent reshaping and reordering by the force of the Brahmaputra, and the state's imagined Majuli, constructed through the accumulated residue of centuries of cartographic representations and bureaucratic precedents. Unlike the geomorphological Majuli, the cartographic Majuli cannot abide categorical ambiguities in space and time. As I will show in this study, these ambiguities and their representation (and lack of representation) by the state are central to uneven disaster management outcomes on island. Although an understanding of the physical dynamism of the Brahmaputra is necessary for explaining these outcomes, it is

not sufficient in and of itself. We must also trace the evolution of cartographic representations of the island through time, as well as how and when these representations diverge from the geomorphological realities of Majuli and the rivers which surround it.

Imaginary Islands

Majuli would remain unrepresented by geographers until the end of the 18th century, when the East India Company (EIC) launched its first major military expedition into Assam at the invitation of King Gaurinath Singha. The Ahom King hoped to enlist the company's help in suppressing the Maomoria Rebellion, which had greatly weakened the political and military power of the Ahom monarchy in the hills beyond the Brahmaputra River Valley. Arupjyoti Saikia (2019) writes that the EIC's decision to enter Assam was motivated by fear of civil unrest disrupting English trade interests inside the Kingdom. This military incursion, argues Saikia, came at a moment in which geography and cartography were beginning to emerge as chief sciences of empire:

> While description was the aim of geography before the nineteenth century, descriptive knowledge was increasingly demanding greater precision in the eighteenth century. An important factor that contributed to the reduction of fantasy was the ability of travelers to visit unknown places, explore alien territories… By the mid-nineteenth century, travelers and amateur geographers were followed by professional surveyors under the auspices of the Survey of India. With these surveys, geographical knowledge began to claim a new authenticity; it aspired to be science. On the other hand, despite extensive references to and descriptions of Assam in the Persian accounts of the Mughal court they were still limited in circulation. The land beyond Goalpara, which had fast emerged as a promising trade and economic center, remained mysterious (Saikia 2019, 112).

It was in this context in which the EIC commissioned the physician-cum-geographer J.P. Wade to catalogue the landscape of Assam during its first military presence there. Wade, as an amateur practitioner of the descriptive and tactile form of geography which was then in its death throes, presents us with a written representation of Majuli which stands in contrast to the scientific surveys which were to follow. In his *An Account of Assam* (1800), Wade describes the physical geography of Majuli as he experienced it between 1792 and 1794:

> The Majuli is intersected, in several places, by channels of communication between the Dehingh [Dihing] and Looicheh [Brahmaputra]; which in reality convert it into a cluster of islands; but in addition to these sub-divisions of the great islands, numerous small islands range its whole length, nearly formed by various branches of the principal streams. These, however, are not included in the general appellation of Majuli, but are indiscriminately called Chapori, or small islands: some of these are always overflowed in the season of inundation, others occasionally only; all possess a stratum of rich soil above a deep layer of sand and often clay. (Wade 1800, 406)

It is important to note that Wade describes Majuli not as a singular island, but as a group of several large and many small islands which are periodically inundated. His description, unlike later cartographic representations of Majuli, emphasizes its variability. For Wade, Majuli's landscape of criss-crossing river channels, wetlands, and periodically-flooded saporis exempts it from the category of the singular *island* in which later geographers would place it. It is, for him, a *region* undergoing a constant process of reconstitution.

Wade's description of Majuli as a collection of separable and dynamic islands did not survive the interventions of later European cartographers. The first European to

represent Majuli and greater Assam in significant detail was the German geographer Heinrich Berghaus, whose *Atlas von Asia,* published in Gotha by Justus Perthes in 1834, offered the earliest commercially available representations of Upper Assam, Bhutan, and Arunachal Pradesh (Lietz 2018, 65). Although only 515 copies were printed, Berghaus' "Map of Assam and its Neighboring Lands" (Figure 2) offers an important representation of the Brahmaputra shortly after British conquest. Unlike Wade's descriptions from 1791, Majuli is represented as a single island rather than a collection of large and small islands. Majuli itself is shown as being significantly larger than it would become on later maps, with the city of Jorhat roughly south of its central point. Only a small number of saporis surround it. Berghaus limits himself to representing only land and water; he creates no category for temporary or frequently inundated lands.

Figure 2: Detail of Majuli from Heinrich Berghaus' "Map of Assam and its Neighboring Lands" in Atlas Von Asia. *Published 1835*

Later cartographers working for the Survey of India (SOI) Offices in British Calcutta, in contrast, attempted to represent the dynamism of the Brahmaputra by coloring "only those portions of rivers, streams, canals, lakes, &c. which generally contain water" in blue, while shading temporary saporis and sandbars in grey. A 1922 map (Figure 3) published by the SOI Offices, itself based on a survey conducted between 1914 and 1916, suggests that a significant portion of Majuli's interface with the Brahmaputra is composed of large saporis, sandbars, and seasonal wetlands. Most importantly for our purposes, the SOI had developed the first European maps of the region which allowed for a category of space which was neither land nor water, but something in-between. Although these cartographers failed to represent the dynamism of these spaces in time, Heinrich Berghaus' contiguous and solid island had begun to fray at the edges in the cartographic imagination of the imperial British state.

Figure 3: Detail of Majuli from "Assam", by Colonel C.H.D. Ryder, Surveyor General of India, based on field surveys between 1914 and 1916. Published 1922

A subsequent map of Assam published by the SOI Offices in 1926 (Figure 4) simplifies the representation of these ephemeral lands through the use of contour lines to distinguish more-or-less permanent saporis from temporary saporis and sandbars. It is less comprehensive than the SOI Office's 1914-1916 map, choosing to emphasize major settlements over other elements of the landscape. These settlements are notable in their conspicuous absence from later maps. Sahay and Roy (2017) note that Ahataguri, once one of the three largest settlements on the island, had become subsumed by 2000. Auniati Satra, an important center of worship prominently marked on the SOI Office's 1926 map, has been forced to relocate three times due to erosion and flooding between 1967 and 2017.

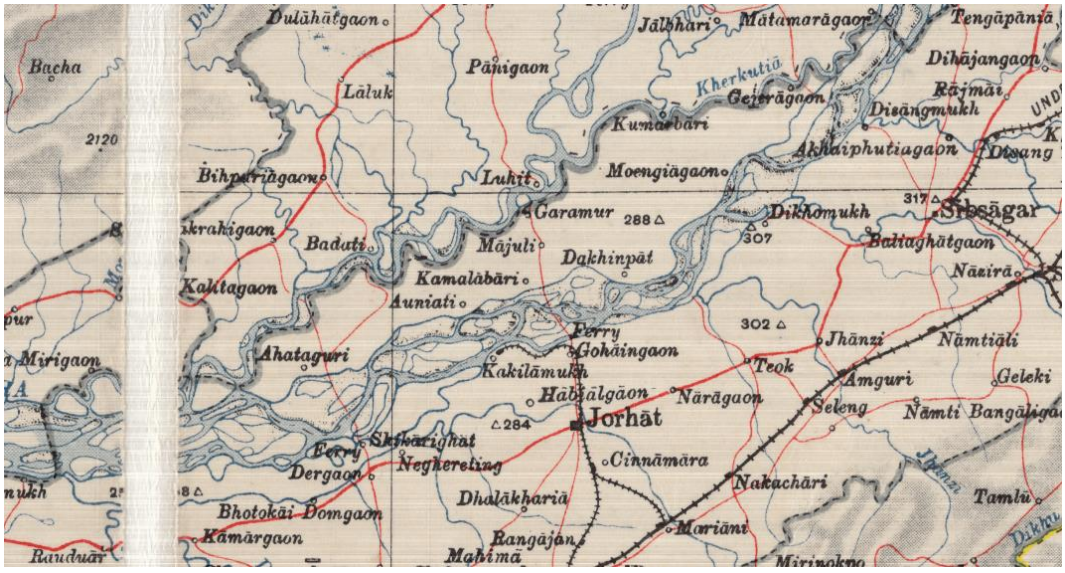

Figure 4: Detail of Assam from "Assam", by Colonel Commandant E.A. Tandy, Surveyor General of India. 1926

As vital centers of life on Majuli are consumed by the river, we must complicate and interrogate our understandings of displacement to accommodate the realities of a physical and social landscape in perpetual shift. While the SOI attempted to represent the ephemeral lands lining Majuli's interface with the Brahmaputra, they managed only to create a separate category for them. These ephemeral lands are, on SOI maps, something which is neither land nor water. They remain static, however, and SOI cartographers failed to represent their dynamism in space and time.

The dynamism of these lands is central to the ongoing crisis of displacement and resettlement on Majuli. As communities and lands, such as those surrounding Ahataguri and Auniati Satra, are consumed by the river, many or most residents resettle in whichever lands are available. Often, the only space for resettlement is on recently-deposited ephemeral lands such as saporis and sandbars. The modern Indian state's cartographic imagination has, like that of cartographers during the British period, failed to represent these ephemeral lands with any degree of rigor. While infrequent cadastral surveys have included these lands and attempted to incorporate them into wider land policy, these surveys are infrequent. The most recent cadastral survey on Majuli occurred in 1969. The river has, since that time, consumed much of the riverine land captured in that survey as well as produced new lands. Lands produced since 1969, consequently, do not appear on any institutional map used by the disaster management bureaucracy to allocate resources.

While the geomorphological dynamism of the Brahmaputra interacts with the state to produce uneven disaster management outcomes, this interaction is negotiated and mediated by the state's cartographic imagination. Spatial divisions exist between lands

which are cartographically represented in this imagination and lands which are not. As a consequence of recently-produced ephemeral lands not being represented on state cadastral survey maps, communities existing on these lands are not eligible for certain programs within state disaster management policy. Previously-displaced families are especially vulnerable, given that these recently-formed ephemeral lands are often the only spaces available for resettlement.

Although the state government is nominally responsible for surveying and land records through the Directorate of Land Requisition, Acquisition, and Reforms (DLRAR), there hasn't be a survey of Majuli since 1969. Public officials I interviewed in the Deputy Commissioner's Office (DCO) cited lack of funding and lack of interest on the part of the state and central governments for this lack of surveying. As a consequence, reclaimed land (that which is deposited and formed by the geomorphology of the Brahmaputra) becomes state-owned by default. As a high-ranking official in the DCO explained, these lands must be surveyed by the state before they can be catalogued for redistribution and resettlement under patta titles. State land, then, falls under two broad categories: *intentional* and *default* state land. The former are lands under the ownership of the government by design, such as those along roadways and containing government offices. The latter are state-owned only because they have not yet been surveyed, titled, and redistributed.

Public officials usually refer to these spaces as *government land*. That terminology, however, obscures the role of the state in these spaces, and does not imply that these lands are administered in the public interest. It is state-owned land only by default; it is un-surveyed and uncatalogued, and therefore is considered part of a general

pool of land which includes roadways and land parcels occupied by public buildings, services, and utilities. To distinguish it from these other forms of government land, I will instead refer to these spaces as *unmapped lands*: those lands which are produced by the deposition of silt and without a subsequent cadastral survey to incorporate them into the state's wider land tenure and disaster management framework. Unmapped lands are unusually dynamic in space and time and unrepresented in state cartographies. I argue that it is the interaction between geomorphological and state processes which produces this category of land, and subsequently produces uneven disaster management outcomes over space.

In the context of a river system as dynamic as the Brahmaputra's, the destruction and creation of lands happens on the scale of months and years instead of centuries and millennia. If the 1969 survey allowed Majuli to be divided into patta and intentional state-owned land, the subsequent five decades of sediment deposition and erosion have destroyed significant amounts of patta land and replaced them with default state-owned land, or unmapped land. The exact amount of this unmapped land created since the last survey is, given the unavailability of adequate records, difficult to measure. The defining boundary in disaster restitution on Majuli, then, isn't between government and patta land. It is between cadastral lands (those captured by the 1969 survey) and unmapped land, the reclaimed spaces produced by sediment deposition in the river. It is, in short, the tension between the mapped and the unmapped which produces profound unevenness in disaster relief for people living along one of the planet's most dynamic rivers.

Cartographies of Unmapped Land

Majuli, with its oscillating boundaries and extensive informal settlements, provides a vivid illustration of the interaction between state-produced cadastral surveys and the actually-existing riverine landscape. The island cannot be understood as a collection of land parcels which can be fractured, titled, and distributed. Land, in the context of a riparian system as temperamental as the Brahmaputra's, is not a static category. It is in perpetual dialogue with the river itself. The river produces the land and the land cedes its territory to the river in a continuous geophysical arabesque. These physical processes interact with similarly-dynamic state policy and power relations.

Surveying, and especially cadastral surveying which seeks to discretize land, is particularly important within this set of politics. In the context of Majuli, cadastral surveying has created an emergent set of categories which taxonomize people in relation to the land which they inhabit. The most important of these categories is unmapped land: un-surveyed and ephemeral spaces which can be found along much of the length of the Brahmaputra and its associated river systems and yet do not exist in the cartographic imagination of the bureaucratic state. As a consequence, their residents often find themselves at the center of political and ecological contestations. Gorky Chakraborty (2011) argues that the ephemeral nature of these lands has made them functionally ungoverned spaces, and that their inhabitants consequently suffer from isolation and lack of representation within the social and political life of Assam. Islam (2018), in a study of sapori inhabitants in Bangladesh, finds that communities on these ephemeral lands suffer from poor socioeconomic conditions and frequent displacement. The fluidities of river geographies clash with a state cartographic imagination which frames land categories as

static. The result is unevenly-distributed disaster management outcomes which reinforce social and class distinctions.

That the social and political resonances of a violent landscape interact with government policy is not a novel observation. Jason De León (2011) explores the impacts of "Prevention Through Deterrence," a U.S. immigration policy which deliberately funnels migrants through the Sonoran Desert to disincentivize border crossing. The violence of the Sonoran landscape, he argues, has been harnessed by the state to achieve a desired policy outcome. Similarly, the geomorphology of riverine lands surrounding Majuli shapes the ability of their residents to exercise and enjoy the full benefits of citizenship in interactions with the state. The absence of comprehensive surveying since 1969 has resulted in a distinction between cadastral lands and unmapped land. The former are largely privately owned, mapped, and within the umbrella of the protection of the state. The latter is understood at the bureaucratic level as being something other than land. The inhabitants of these lands, it follows, may be treated by the state as something other than citizens.

State violence surrounding issues of citizenship in Assam, like the violence of the Brahmaputra, is mediated by understandings of land and its ownership. Unmapped lands inhabit a curiously central position in both of these differential forms of violence. This land, insofar as it can be said to simultaneously exist and not exist, can be either acknowledged or ignored at the discretion of the state. Its residents are not entitled to the same protection from catastrophe as residents of cadastral land, and can be forcibly removed if and when the state decides to enforce its nominal ownership. In 2019, more than 600 Muslim residents of Karbi Anglong were forcibly evicted by police and security

forces who claimed they were illegally occupying state-owned land (Azad 25 March. 2019).

This distinction between private and state-owned land is at the heart of a set of political discourses surrounding ethnicity, religion, and access to government services in the state. Many of the evicted residents in Karbi Anglong were internally displaced, either by environmental catastrophe or by conflict in nearby Bodoland. Their violent eviction from informally-settled state-owned lands reframes victims of displacement as criminal agitators. In contrast, residents of Majuli report being forcibly resettled on state-owned unmapped lands after being displaced by flooding or erosion. Although it does not contain an international border as the Sonora desert does, the Brahmaputra and the contestations it creates, between the protected and the vulnerable, between the stable and the precarious, fulfills the same function: to, in the words of P.K. Rajaram, "demarcate belonging and nonbelonging and authorize a distinction between norm and exception" (Rajaram and Grundy-Warr 2007, ix). We must, therefore, understand the persistent mismanagement of catastrophe on Majuli as a fundamentally cartographic form of state violence.

That cartography can intertwine with and engender state violence is not a new idea. Many scholars have observed that maps are political arguments produced by particular sets of power relations (Bonnett 1989, Harley 1989, Rose 1995, Pinder 1996, Sparke 1998). State mapping projects, including cadastral surveying, serve to reify and calcify spatial power relations as a component of the territorializing impulse of the state. In the context of a physical geography in seasonal flux, territoriality as expressed through

cartography must be adaptive. Zou and Kumar (2011) note the particular importance of state territorializing projects in Assam and the wider Northeast:

> Ultimately, surveyors and mapmakers objectified and enacted the "geo-body" of British Assam pictured by European maps, which reduced India's Northeast borderlands to thin boundary lines… we understand "objectification" here not as a timeless mode of describing colonized objects (people or places), but as a specifically modern process of enumerating, calibrating, or reinventing previously fuzzy ideas of space and culture into consciously rational ends. In this sense, we discuss how survey maps of the Raj "objectified" India's Northeast; the same may be true of the process of objectification in postcolonial India. (Zou and Kumar 2011)

The set of power relations which produce state surveys, then, are central to defining how land is understood, distributed, and used. Recently, a set of scholars (Sparke 1998, Kristoffersen and Young, 2010, Remy 2018) have advocated for a category of *contrapuntal cartography:* an anti-hegemonic reading of maps produced by underlying historical, political, and physical geographies as well as the power relations which frame them. The concept is a reworking of Edward Said's *contrapuntal reading*, which elevates imperialist subtext to the level of the explicit by recognizing the tensions between the imperial narrative and the unspoken histories against which it defines itself. In *Culture and Imperialism* (1993), Said writes:

> In practical terms, 'contrapuntal reading' as I have called it means reading a text with an understanding of what is involved when an author shows, for instance, that a colonial sugar plantation is seen as important to the process of maintaining a particular style of life in England . . . contrapuntal reading must take account of both processes, that of imperialism and that of resistance to it, which can be done by extending

> our reading of the texts to include what was once forcibly excluded. (Said 1993, 62)

Contrapuntal cartography applies the same mode of analysis to large-scale mapping projects. Although produced by a particular set of power relations, they nevertheless contain shadows of multiple, alternative cartographies and ontologies of space and territory. Maps, regardless of origin and purpose, contain suggestions of decisions not made and spaces unrepresented. Contrapuntal cartography aims to tease out these suggestions and make them explicit.

Majuli, and the Brahmaputra River Valley as a whole, is especially well-suited to an analysis using contrapuntal cartography. Multiple ontologies of space are produced through the simultaneous action of the state, the residents, and the geomorphology of the river itself. Cadastral surveying, carried out by the state and central to the politics of disaster management on Majuli, makes a particular claim about the nature of land and land tenure on the island. The constantly shifting geomorphology of the river, as well as the land tenure and migration practices developed by its residents, comes into conflict with this claim. The result is a map of privately-titled land parcels which exists exclusively within the bureaucratic mind of the state. This conceptual map reflects the state's understanding of land and water, or island and river, as separate categories which remain static through time.

The violence of the Brahmaputra relies on a cartographic imagination to become manifest. By taxonomizing the land and its inhabitants according to the morphology of the river, and by allowing the boundaries created in this process to govern the life, movement, and death of residents in reclaimed land, state disaster management

authorities perform a particular kind of *cartographic violence* on the perennially-displaced peoples of the Brahmaputra. Although a variety of scholars have deployed this term (Neocleous 2003, Korf 2009, Peteet 2010 Na'Puti 2019), these analyses have mostly focused on what we might call *positive* cartographic violence: that which is performed explicitly by state power in the pursuit of a territorial goal. For these scholars, cartographic violence emerges out of a positive statement of placeness which erases contestation and geographies contrary to the goals of the state. On Majuli, I assert, the residents of unmapped lands are the victims of *negative* cartographic violence. I define negative violence as that which emerges from the act of being erased from the cartographic imagination, of being excepted from spatial organization of state, and of being left off of the map.

Negative cartographic violence as I conceive of it is not isolated to Assam. Ananya Roy (2003) has noted the conspicuous absence of any overarching survey of Kolkata, and especially of its eastern fringes. Unclear cadastral surveying of Kolkata's east, she argues, has produced a set of ambiguities in which contestations over land are dealt with in a case-by-case basis. These circumstances allow powerful individuals and groups to arbitrarily vest land and arbitrarily displace residents. While engaging with the cities labyrinthine bureaucracy in pursuit of official surveys, she writes:

> In the process [of requesting government maps], I came to focus on how, in the absence or unavailability of such official representations, land is exchanged, acquired, and developed. I set aside my initial questions: How can I find the appropriate map? Who owns this piece of land? How did the government vest this other piece of land? What uses are planned for it? In their place, I asked: What does it mean to have fluid and contested land boundaries? How does this ambiguity regarding status and use shape

> processes of urban development? How does this establish the possibilities and limits of participating in such land games? I thus came to piece together how the absence of a core of bureaucratic and public knowledge about land imparts a specific character to the urban transformation of Calcutta's fringes. This, then, is a story about the politics of an unmapped city. (Roy 2003, 137)

Majuli, no less unmapped than East Kolkata, faces a unique set of circumstances which drive the politics of land tenure. Land acquisition and recording is, on the island, tied inexorably to disaster management. In the littoral boundaries between Majuli proper and the water which cyclically destroys and expands it, unmapped lands must paradoxically exist as two separate spaces: a cadastral representation within the cartographic imagination of the state, and a space of fluidities between land and water on which people live and reproduce livelihoods.

My contrapuntal cartography of the Brahmaputra reads the cadastral survey of Majuli as an argument which seeks to silence and marginalize alternative cartographies and alternative land claims. I intend for this analysis to run against the grain of state-produced cartographies, feeling for fault lines and fissures in which unrepresented cartographies may be implicit. Any full accounting of Majuli's unmapped lands must address the cartographic logic of the state which relies on cadastral surveying and undergirds disaster management on the island. It must also, however, incorporate divergent cartographic logics in spaces left unadministered and settlements unsanctioned by the state. As in Kolkata, the actually-existing systems of land tenure and disaster management on Majuli emerge from the interaction of these ambiguities: the unfulfilled technocratic agenda of the state on the one hand, and the inexplicit system of informal land tenures on the other.

Study Methodology

The goal of this study is to analyze the interaction between geomorphology, land tenure, and disaster management in an ethnographic framework. It seemed appropriate, therefore, to gather most of the data used here through surveys and semi-structured ethnographic interviews. Research participants on Majuli were selected using both snowball sampling and purposeful convenience sampling. Participants were selected for their residence in communities at risk of flooding, erosion, and displacement. Many participants either recruited subsequent participants or identified other communities on the island as being at risk of flooding or erosion. Survey responses were given on a five-point Likert scale, with answers ranging from 'strongly disagree' to 'strongly agree.' It included fifteen questions split into three sections of five questions each. These sections focused on perceptions of risk from flooding and erosion, perceptions of government efficacy in disaster management, and perceptions of resettlement opportunities and strategies, respectively. In total, seventy-five households completed the survey. After completing the survey, I asked participants whether they would like to continue with a semi-structured interview focused on the same topics. These interviews took place in the home of the participant, and were conducted in English, Assamese, or Mising at the discretion of the interviewee. Mr. Pranjit Boruah and Mr. (now Professor) Manash Jyoti Regon, both of Majuli College, served as interpreters for interviews given in Assamese and Mising, respectively.

I also conducted a number of elite interviews with public officials, religious leaders, and non-governmental organization (NGO) personnel involved in disaster and land management. While most of these officials and community leaders were interviewed

on Majuli or Guwahati, the state's capital, several were conducted in Lakhimpur and Dhemaji districts. These districts, which neighbor Majuli to the north and northeast and border the river, are similar to Majuli in disaster risk and relief policy, and have a significant non-governmental organizations (NGO) presence. While in Dhemaji district, I conducted an impromptu focus group with residents of a community nearby the northern bank of the Brahmaputra River. While participants in the focus group offered a consensus much in line with the perspective of similarly flood-affected residents on Majuli, the community is linguistically, religiously, and demographically distinct from most communities on Majuli. The community in Dhemaji is, according to focus group participants, majority Bengali and Bodo Shaktu Hindu.[6] Most communities on Majuli are, in contrast, either Assamese or Mising and practice Neo-Vaishnavite Hinduism or *Dobur,* a form of animism and lifestyle embraced by some Mising. These distinctions do not appear to have any bearing on differences of opinion between focus group participants and interviewees on Majuli. Focus group participants spoke Assamese and Bodo; Mr. David Kujur and Mr. Luit Goswami acted as interpreters during the duration of the focus group.

I conducted my fieldwork in Assam during a politically tumultuous period. An updated version of the National Register of Citizens of India (NRC), a document designed to identify undocumented immigrants and their descendants in Assam, was released on July 30, 2018. About four million residents of the state were left off of the

[6] Very few ethnic Bengalis and Bodos live on Majuli. Shaktu Hindus, although well-represented throughout most of the state, are less populous on Majuli than members of the Neo-Vaishnavite movement.

register, calling their legal status into question (Gani 30 July. 2018). On August 9, a little over a week after the release of the updated NRC, Assam Chief Minister (CM) Sarbananda Sonowal visited Majuli to christen the first modern ferries to service the island. Both the release of the updated NRC and the CM's visit led to an increase in security forces and police stops on Majuli. Given the tense political situation, as well as the sensitive nature of disaster management and land tenure in Assam, many public officials whom I interviewed during the course of my fieldwork requested I not refer to them by name in my written research. I will, consequently, refer to them only in reference to the government body with which they're affiliated. Many survey and interview participants also requested that they not be identified by name, given the highly-sensitive nature of my research.

Given the highly dynamic nature of the Brahmaputra, and the unavailability of records describing the relative areas of government and patta land, I have employed remote sensing methods in an attempt to create a rough visual representation of these lands based on the changing geomorphology of the river. These images, along with maps displaying some data gathered through surveying, will be given later in this paper.

This Place is Not Good for Cultivation: Landscapes of Risk

Nearly every interviewee and respondent to the survey expressed the highest possible concern about flooding and erosion. This is not surprising, given that participants were selected from communities perceived by local people to be at the greatest risk. The consistency in the language and affect among these respondents, however, is startling. Many interviewees guided me outside their home to show me the

high-water mark from the flood the year before, which ranged from three feet above the ground to two meters up the side of a stilt home. One resident of Sumoimari Ghat explains:

> We want permanent land for settlement and living of life, because we are in a very dangerous condition… In times of flood we have no food or any sort of shelter or place to live. The central government has increased the price of basic goods like rice, potatoes. [We] get less amount of relief every year. If erosion continues, we will leave. I think [our house] will not be here later this year. (Name Withheld, interview by author, Sumoimari Ghat, August 10, 2018)

The tone of this language reflects a sense of inevitability in disaster and displacement, and was consistent across both ethnographic interviews and survey responses. Table 1 displays summary responses to five questions from the survey focused on perceptions of risk from flooding and erosion. 97.33% of participants strongly agreed that erosion and catastrophic flooding have had a significant impact on their lives, while nearly half strongly disagreed that they had the money, skills, or other resources to repair subsequent damage. Interestingly, participants were, on average, less likely to strongly agree that their neighbors were prepared than that they were themselves.

Question	1. Erosion and catastrophic flooding have had a signifigant impact on my life.	2. I feel prepared for soil erosion or catastrophic flooding in the future.	3. I have the resources (like money or special skills) to repair any damage or replace any lost property caused by flooding or erosion.	4. If I had to leave my village because of flooding and erosion, I know where I would go and what I would do.	5. I believe others in my village are well-prepared for flooding and erosion.
Strongly Agree (5)	97.33%	58.67%	14.67%	21.33%	53.33%
Somewhat Agree (4)	1.33%	13.33%	16.00%	5.33%	6.67%
Neither (3)	1.33%	2.67%	9.33%	17.33%	5.33%
Somewhat Disagree (2)	0.00%	4.00%	13.33%	22.67%	9.33%
Strongly Disagree (1)	0.00%	21.33%	46.67%	33.33%	25.33%
Mean	4.96	3.84	2.39	2.59	3.53
Standard Deviation	0.26	1.63	1.54	1.52	1.74

Table 1: Summary statistics of survey questions 1-5, "Perceptions of Risk"; n=75

Notably, while nearly every respondent strongly agreed that erosion and flooding have a significant impact on their lives, responses to the question of preparedness were bimodal. A majority of at-risk Majuli residents surveyed (54 of 75) either strongly or somewhat agreed that they were prepared for flooding and erosion in the future. Semi-structured interviews suggested that this seeming preparedness was, in fact, mental preparedness: that is, resignation to the reality of the situation. In interviews, respondents made it clear that this was based on a perception of *preparedness* as including both physical and emotional dimensions. That is, one can be emotionally prepared for catastrophic flooding without necessarily having a disaster plan in place. A resident of Salmora succinctly illustrates this disjunction in meaning as he gestured towards his house, which he purposefully built on high ground:

> The flood comes every year and makes a huge loss. We built our house at a high level, but the water reaches even this level. We have [re]constructed our home six times. [The] flood deposited sediment, which has raised the ground level, so we are prepared. [Our] economic condition is not good. We don't have money to keep doing repairs. (Name Withheld, interview by author, Salmora, August 8, 2018)

Responses to several other questions (such as Question 3) are also bimodal, although more weakly. This is, in part, attributable to differences in response between ethnic groups. Many Mising respondents, who were more likely to build flood-resistant houses from bamboo, consider their construction ability to be a special skill which allows for post-flood resiliency. While 21.33% of respondents strongly agreed that they knew where they would go and what they would do if they were displaced from their community, this number is not necessarily reflective of robust disaster preparedness. One laborer who had worked three bighas of land before being displaced elaborated on his family's struggle to maintain the quality of their home as they plan for future displacement:

> [We] need to work very hard when the flood arrives. It is a very hard time for us. Last year the water level was three feet up the house. We used bamboo to make a roof and feel protected, but the wall has been broken. [We] fixed it with our own money; the government did not give any support… We would stay in the roadside [if we were displaced again] – no other plan. We have already lost our land. Now we are laborers. This place is not good for cultivation. (Name Withheld, interview by author, Kharjanpar, August 6, 2018)

Many interviewees expressed despair at the perceived inevitability of their displacement, as well as anger and frustration at disaster management authorities which are seen as aloof, irresponsible, and full of empty promises. One previously-displaced resident near Pomua "[The] central and state government have made many promises, but we have received and expected nothing" (Name Withheld, interview by author, Pomua, August 12, 2018). The tone of this interviewee was one of both cynicism and frustration. His choice of words is meaningful: "expected nothing". For him, the architecture of

disaster management in Assam is based on broken promises and an illusion of efficacy which is not shared by the people most at risk. This perception is widespread. Many residents of Majuli express frustration with disaster management policy on all levels, and their understandings of risk are mediated by the protection offered, or not offered, through government services. To understand the decision-making of at-risk residents, as well as the bifurcation of disaster management outcomes on unmapped lands and patta land, we must first address the avenues by which the state produces those outcomes.

Sleeping for Nine Months: Perceptions of Government Efficacy

The highly chaotic geomorphology of the Brahmaputra has made disaster management an important function of state and local governments in Assam. Government disaster management efforts are, however, deeply unpopular among residents of Majuli at risk of displacement. Table 2 shows responses to five survey questions focused on perceptions of disaster management and government efficacy. Opinions are low for all levels of government involved in the process, but are lowest for the state government and relatively high for the local government.

Opinions of short-term disaster relief were generally high, as were perceptions of equitability between ethnic groups in disaster management outcomes. Of 75 respondents to the survey, 63 (84%) expressed the lowest possible approval of state-level disaster management efforts. Majorities of respondents had similar low estimation of national and local government efforts. In the case of local government, however, a significant minority (21.33%) marked the highest approval possible. This disjunction in popularity between state and local governments demands a more nuanced examination of the various organs

of disaster management and their applications, as well as their impact on displaced and at-risk people. Among the most vulnerable are those communities on lands which have emerged from the river since the last survey in 1969. These spaces, which I refer to as unmapped lands, untitled and un-surveyed, and are therefore ineligible for many forms of disaster relief.

Question	6. I feel the Assam state government has done a good job protecting people from catastrophic flooding and erosion.	7. I feel the Central Government in New Delhi has done a good job protecting people from catastrophic flooding and erosion.	8. I feel that my local Deputy Commissioner's Office has done a good job protecting people from catastrophic flooding and erosion.	9. I feel that the government, in general, does a good job of providing temporary relief to victims during the flood.	10. I feel that all political and ethnic groups on the island are treated equally and fairly by the government when it comes to erosion and flooding relief and prevention.
Strongly Agree (5)	2.67%	2.67%	21.33%	54.67%	84.00%
Somewhat Agree (4)	5.33%	4.00%	10.67%	22.67%	6.67%
Neither (3)	2.67%	4.00%	8.00%	1.33%	4.00%
Somewhat Disagree (2)	5.33%	12.00%	9.33%	10.67%	2.67%
Strongly Disagree (1)	84.00%	77.33%	50.67%	10.67%	2.67%
Mean	1.37	1.43	2.43	4.00	4.67
Standard Deviation	0.96	0.94	1.66	1.40	0.88

Table 2: Summary statistics for survey questions 6-10, "Government Efficacy"; n=75

Disaster management in the Brahmaputra River Valley falls under three broad categories: prevention/mitigation, immediate relief, and restitution. Prevention and mitigation strategies focus on limiting or eliminating flooding and erosion in both frequency and scope. Immediate relief efforts offer a stopgap for disaster-affected communities in the form of shelter, food, and other essentials. Restitution, in contrast, functions as a form of government insurance. Families who lose lives or property in disasters may receive financial restitution through government programs in compensation. However, government restitution efforts are unevenly distributed over space. Although much of this paper will focus on restitution, none of these strategies can be considered in isolation. They form a gestalt approach largely organized by the Assam

State Disaster Management Authority (ASDMA), and are themselves the result of a number of contestations and incentives. Immediate relief, by which the state seeks to provide short-term food and shelter to communities impacted by flooding, has perhaps been the most successful form of disaster management employed by the state government. This is, in part, because it employs a bottom-up approach in which the role of the state government is largely limited to providing resources requested by communities.

Figure 5 illustrates the flow of information among disaster managers during a disaster. Flood events are assessed through 24-hour operational control. In the event of disaster, village heads communicate local needs to Lot Mandals,[7] who then pass that information to the CRO. This ground-level information is collated and passed up to the district and state level. The CRO functions as the main point of contact between communities and the wider bureaucracy both for the purposes of disaster relief and revenue collection. Guidelines for disaster relief are set by the central government in New Delhi and only minor variations, such as the addition of baby formula or pre-cooked food, can be requested. Supplies are acquired through set contracts between the government and the Food Corporation of India, and are then distributed to communities through the DCO. In Assam, where flooding is a perennial concern, the Deputy Commissioner (DC) of each district receives, in the words of a high-ranking employee of the ASDMA, "disaster relief funding *in situ*" (Name Withheld, interview by author, Guwahati, August 17, 2018). In districts like Majuli, the DCO wields a substantial

[7] Employees of the Revenue Department who serve a particular small group of villages

district-level relief budget and is expected to guide relief efforts with some independence from the state government.

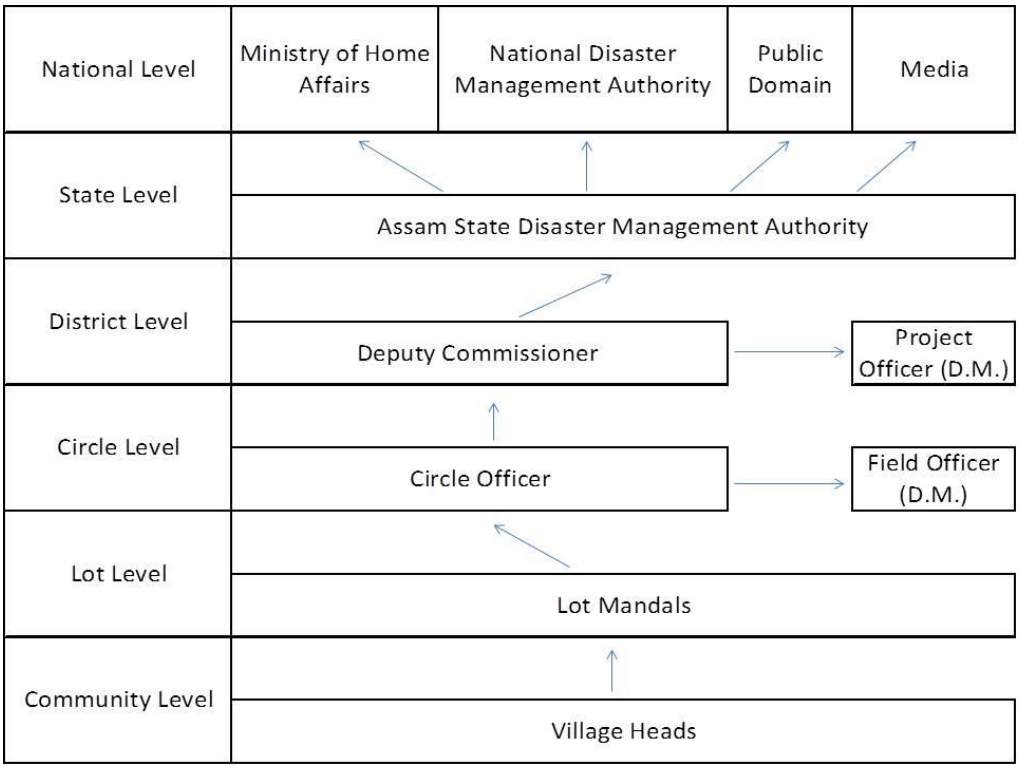

Figure. 5: Flow of information within the disaster management bureaucracy during a disaster event

The supplies provided through this system are usually limited to basic necessities. Previously displaced people on Majuli reported receiving some combination of dal, rice, salt, mustard oil, and tarpaulin, although government representatives of the CRO, DCO, and ASDMA described relief packages which included hygienic supplies and baby formula. Immediate relief is guided towards ad-hoc camps constructed on high ground near the affected communities, often along roadsides. Tarpaulin provided through the disaster relief program is used by the displaced to construct temporary shelter in these

camps, and the DCO nominally manages temporary toilets and sanitation. Domestic activities continue in these roadside camps, and an employee of the Majuli CRO reported that pre-prepared food is very rarely requested by displaced people.

Residents of Majuli at risk of flooding are divided over the efficacy of the immediate relief system. While 58 out of 75 respondents to the survey (77.33%) either strongly or somewhat agreed that temporary relief was effective, a common grievance expressed in interviews was the disjunction between the permanence of relief efforts and the flooding itself. The length of time in which relief is provided to displaced people is highly variable, and in some cases lasts only a few days. Periods of flooding, on the other hand, often last several months.

Residents of a village on the banks of the Brahmaputra in Dhemaji, a district northeast of Majuli, experienced three separate catastrophic floods during the summer of 2017. They were provided temporary relief for "one or two" days during the first incident, and received no relief during the subsequent two floods. During those periods, residents of the village relied on the relief efforts of the Rural Volunteers Center, an NGO operating throughout the state. Even supplemented relief, however, is insufficient for protecting homes destroyed by flooding. Thirty-one of the community's seventy-one total households were forced to relocate due to flooding and erosion in the five year period between 2013-2018. Many respondents on Majuli reported similar experiences of the disaster relief system within their own communities. As one resident of Khorahala, whose ten bighas had been reduced to two by erosion, explained:

> [The] flood is only for three months, July-September. The government only comes during big flood[s], but are sleeping the other nine months. [The government] only gives small food, only enough to save [your] life. They should be thinking the other nine months. They'll come the three days [the] house is underwater, [when] people are falling in the water. They don't do anything previously. When the people are in full flood, they take the people to safe place for one or two days, and back to the village when the flood leaves. We lost work. People can't communicate with DC, [and they are] only little help. Sometimes they don't give and sometimes [they give] late, little help. (Name Withheld, interview by author, Khorahala, August 1, 2018)

Failures of state disaster management have led residents of unmapped lands to develop their own preparedness and adaptation strategies. Many farmers have modified their agricultural practices in anticipation of disaster. Cultivation of several rice varietals indigenous to Assam, as well as legumes and vegetables, is a primary source of both food and income for residents of Majuli's unmapped lands. Participants in this study with some amount of land for rice cultivation universally grew some combination of *ahu,*[8] *sali,*[9] *boro,*[10] and *bao*[11] . In response to the threat of flooding, a number of respondents have turned to the production of deep-water bao rice, which is more resilient to inundation than the sali, boro, or ahu varieties (Catling 1992, 236-8). Of the 47 respondents to the survey who had some amount of land dedicated to rice cultivation, 36 grew bao. While only two respondents grew exclusively sali and only one grew

[8] An upland varietal of Autumn rice, planted in February or March and harvested in June or July.

[9] A lowland varietal of winter rice, planted in June or July and harvested in November or December.

[10] A rice varietal planted in November or December and harvested in May or June.

[11] A deepwater or floating rice varietal, planted in April or May and harvested in December or January, which is more resilient to inundation than other common varietals.

exclusively ahu, ten respondents grew exclusively bao. Farmers have also diversified their non-rice cultivation in response to risk, with many small fields dedicated to pumpkin, potato, green and black gram, mustard, red daal, peas, and wheat. In unmapped lands at extreme risk, such as Bhakat Sapori, sugarcane has proven to be an extremely profitable crop for farmers with only small plots of informally settled land. One Bhakat Sapori farmer described how he has struggled to find suitable land in the face of disrupted agriculture and government inefficacy:

> [The] cultivation I want to do can't grow in fields that are inundated. I personally invested in higher place, higher ground, but even this land is affected by flooding. First of August to last of September, rabi crops are late, so the product doesn't sell as much. Value is higher during beginning of season… [The] government plan well, but the work has not started. State government has given the work to political parties but the work never gets started. (Name Withheld, Interview by author, Bhakat Sapori, August 5, 2018)

Residents of Majuli have also altered their construction strategies. Figure 6 displays a flood-resistant storehouse which a farmer in Bhakat Sapori constructed to prevent loss of seed. Unusually for an ethnic Assamese person, the storehouse is constructed on stilts. This strategy for flood-resistant construction was borrowed from ethnic Mising traditional practices, but has yet to become widespread outside of that community. One farmer, after a flood in which he had to cling to floating driftwood to avoid drowning, constructed a small bamboo loft in his home high off the ground. He and his family, he told me, will retreat to the loft during floods which are not severe enough to wash their home away entirely.

Figure 6: A flood-resistant storehouse for seed constructed on stilts about five feet off the ground. Image taken August 5, 2018

Geophysical, socioeconomic, and political circumstances limit the extent to which residents can fully exercise agency in the face of flooding and erosion, however. While restitution for lost lands or homes may be put towards resettlement, disaster restitution is, on Majuli as in other districts, tied explicitly to land tenure. Residents of informal settlements who are denied the ability to seek restitution, therefore, must seek new land for settlement with little or no liquid capital available to them. While many residents of unmapped lands plan to temporarily stay on high ground by roadsides if they are displaced, they hope to find safe land for resettlement in the long term. There is, however, very little land on Majuli which is both safe and available for settlement and cultivation. How and why displaced people exercise agency over their resettlement is vital to understanding the failures of disaster management on Majuli

This Place Will Be Swept Away: Resettlement and Outcomes

Table 3 displays responses to questions addressing outcomes of disaster management and perceptions of resettlement opportunity. A majority (73.33%) strongly or somewhat disagreed with the suggestion that their family would be able to live in their current home for a long time. Notably, respondents had a strong preference for resettlement within a community composed of their own ethnic group, and had very little confidence that resettlement would result in increased safety. While some had a preference for remaining on Majuli, many had no preference for resettlement location. A clear majority of respondents doubted that their family would be able to reside in their current home for a long time. A focus group conducted with residents of the village reached a unanimous assessment that, while insufficient temporary relief was a concern, the damage caused by erosion was more impactful to the wellbeing of the community overall.

Question	11. If I were to lose my land for cultivation, I have a plan for how I would make a living.	12. If I had to leave my village because of flooding and erosion, I would be likely to be resettled in Majuli as opposed to another district.	13. If I had to leave my village because of flooding and erosion, I'd want my new neighbors to be mostly people from my own ethnic group.	14. If I was resettled elsewhere in Majuli by the government, I'm confident I would be safer from flooding and erosion in my new home.	15. My family is likely to continue living in this home for a long time.
Strongly Agree (5)	14.67%	30.67%	84.00%	13.33%	8.00%
Somewhat Agree (4)	28.00%	12.00%	4.00%	8.00%	5.33%
Neither (3)	36.00%	33.33%	12.00%	8.00%	13.33%
Somewhat Disagree (2)	13.33%	10.67%	0.00%	5.33%	12.00%
Strongly Disagree (1)	8.00%	13.33%	0.00%	65.33%	61.33%
Mean	3.28	3.36	4.72	1.99	1.87
Standard Deviation	1.11	1.36	0.66	1.50	1.29

Table 3: Summary statistics for survey questions 11-15, "Resettlement Preferences and Strategies"; n=75

This sentiment is widespread on Majuli. Although many residents of temporary relief camps return to their homes when the floodwaters recede, others, especially those

lacking permanent and sturdily-built (*pucca)* residences, may lose their homes due to erosion or intense flooding. A public official with ASDMA conceded that the state is "still lacking a clear-cut policy" on rehabilitation and resettlement (Name Withheld, interview by author, Guwahati, August 17, 2018). Many Majuli residents at risk of displacement doubt whether any safe land for resettlement exists on the island.

A majority of respondents to the survey (65.33%) expressed strong disagreement with the suggestion that, were they to be displaced and resettled, they would be safe in their new home. Some displaced people, having lost land and shelter to the river and having no safe options for resettlement, may consequently house their families in tarpaulin shelters along the roadside for months. Some of these camps survive even after the end of the rainy season, and become permanent communities of displaced people residing on unmapped land.

One previously-displaced resident of a riverside community near Kamalabari Satra recalled being visited by the DC, who provided him with a kilo of rice and material for building temporary shelter. He had previously worked twelve bighas, cultivating ahu, bao, and green gram, until erosion and flooding gave his nearly all of his land to the river. He now works as a laborer in Kamalabari."What is tarpaulin and a kilo of rice," he asked, "when you have lost your home?" He cited inadequate disaster relief as an existential question for all levels of government in Assam. "If the government will not protect me," he said to close our interview, "then how will [the government] be safe? If they cannot protect, they will not exist" (Name Withheld, interview by author, Kamalabari, August 7, 2018).

This grievance drives at a central point of contention within disaster management in the Brahmaputra River Valley. While the mechanisms for providing temporary relief are operational, if inefficient, there is little or no effective restitution for land and homes destroyed by erosion and flooding. This isn't due to lack of policy. Nominally, the state government provides financial assistance to residents of homes and agricultural lands destroyed by flooding and erosion. A high-ranking employee of the Majuli CRO explained to me that, after a home is destroyed and a request for assistance is made, CRO staff investigate the claim and make a financial assessment (Name Withheld, interview by author, Kamalabari, August 8, 2018). Once requests are collated, the DC convenes a meeting of the District Disaster Management Authority (DDMA), which then dispenses funds to accepted applications for restitution. Owners of a destroyed pucca house can, in theory, expect to receive 95,000 rupees in restitution. This is often enough to begin construction on a new house, if not enough to replace the destroyed home completely.

The restitution process, however, is limited to privately owned and titled patta land. That is, restitution is only given to displaced people who both own their land and can prove their ownership by producing a title. These are both considerable barriers to adequate relief for many people on Majuli. According to a high-ranking employee of the Majuli CRO, many residents do not know whether the land they live on and work is privately owned or state-owned, and are therefore ineligible for restitution. Land records which contain ownership information at the parcel level are stored within the CRO, and it is these records which the DDMA reference when allocating funds for destroyed homes and agricultural lands. My request to see these records was immediately denied, as was my request for data relating to the relative areas of patta and state-owned land on the

island. The records I was requesting, the CRO official told me, were neither digitized nor organized in any wider index, and any attempt to develop a district-wide analysis of patta and state-owned lands was therefore impossible. He subsequently warned me to not to ask residents whether they lived on patta or state-owned land. This question, he said, would inevitably lead to confusion among residents.

Interviewees were, as it happened, eager to talk about the unevenness in restitution funding. A sugarcane farmer residing on a Brahmaputra sapori described the experience of his village after being displaced:

> People next to this village got 95,000 rupees because they had proof for their land. The people of this village have no proof. We have applied for proof, but have heard nothing. Not any government from local to central is working for us. The flood comes and our lives are in danger. We are sure when the flood comes, this place will be swept away. (Name Withheld, interview by author, Bhakat Sapori, August 11, 2018)

Another previously-displaced sapori resident lost 12.5 bighas of sugarcane land to erosion, but was unable to seek restitution because his home and crop were located on informally settled and state-owned unmapped land.

> If the water will come, the flood will come, and we must leave this place. The government will shift us to a school on high ground, but when we lose this house we must lose all of our possessions. [We] lost many cows and goats [to flooding], which could give us income. But due to improper settlement, we have lost them. We just want land. (Name Withheld, interview by author, Bhakat Sapori, August 11, 2018)

He and his family, like many displaced people on Majuli, had settled on state-owned not because they had chosen to, but rather because the state and district

governments had moved them there when their previous home was lost to the river. Unevenness between residents of government and patta land is a perennial and growing issue on Majuli, and the practice of resettling displaced people on ephemeral and disaster-prone unmapped lands has compounded its severity. The boundaries between government and patta land are murky and complex, and many residents are unsure of which parcels of land fall under each category. The distinction, however, is central to both restitution and the resettlement of displaced people. The records which govern these processes, inaccessibly housed within the CRO, are themselves an artefact of government surveying policy. As one farmer in Bhakat Sapori told me:

> Safe places in Majuli are already occupied, so it is difficult to resettle there. The unsafe places are the only places where you can find room. I wouldn't be able to get the same income in Jorhat or another district, so I don't want to leave Majuli. If the government continues to act this way, I – I'm not even talking about my children – will not be able to exist in this place for the next twenty years. (Name Withheld, Interview by author, Bhakat Sapori, August 5, 2018)

Many previously-displaced interviewees reported being resettled on reclaimed land by government representatives. These reclaimed lands tend, by their very nature, to be much more vulnerable to flooding and erosion than the more stable lands in the interior of Majuli. Government resettlement and disaster management practices, which are mostly limited to forceful relocation to vulnerable land and temporary relief for flood affected people, have the effect of reinforcing and perpetuating uneven disaster outcomes. One household in southern Majuli had been moved by the government from Auniati Satra to their current residence on state-owned unmapped land. They anticipate

being displaced within a year, and have requested some way of obtaining a permanent residence with no result. “"We are expecting a normal lifestyle,” a member of this household told me. “I request that the government provide permanent land, [so] that my children will not have any disturbances" (Name Withheld, interview by author, Hunari Bari, August 7, 2018).

This form of resettlement is not uncommon. One interviewee reported being moved by police forces to his family’s current residence on unmapped land due to soil erosion. His family “got [an] ID number, got informed we were getting a home, [and] have heard nothing” (Name Withheld, interview by author, Bekuli Mari, August 8, 2018). Another resident of a nearby sapori echoed these frustrations. “Every five years the government makes [a] promise to give houses to these homeless because of soil erosion, and to prevent erosion,” he told me. “But this is just talk” (Name Withheld, interview by author, Bhakat Sapori, August 5, 2018).

Given that the displaced are usually made to resettle in state-owned unmapped lands by either state coercion or socioeconomic circumstance, a full understanding of resettlement on Majuli is impossible without first analyzing the distribution of unmapped lands over space. While an official with the CRO told me that there is no government records of unmapped lands (given that they, by definition, have never been surveyed), there are nonetheless paper records of surviving cadastral lands which have been extent since the last survey in 1969. Given these records, one could construct a map of unmapped land by comparing satellite images of the island to a fully-reconstructed map of all cadastral lands currently recorded. Access to these records, however, was immediately denied to me. Given that constructing a map of unmapped land using official

documents is impossible, we must turn to other sources of information if we are to visualize the size and extent of unmapped lands on Majuli.

Representing Unmapped Land

The unavailability of government records describing parcels of state-owned and cadastral land makes them difficult to map. However, given that existing policy and a lack of surveying have essentially outsourced the production of land categories to the geomorphology of the Brahmaputra, remote sensing techniques may give us a relatively accurate glimpse into the extent and location of unmapped lands. By creating an index which can extract the course and extent of the Brahmaputra and its tributaries around Majuli since 1973 (the earliest year for which data is available), we may identify which currently-extant lands were deposited by the river and are, likely, unmapped lands.

The modified normalized difference water index (mNDWI) has been shown to decrease the reflectance of land and increase the reflectance of water by taking advantage of both green and shortwave infrared wavelengths (Xu 2006). The result is an image in which vegetation pixels have very low values and water pixels have very high values. The mNDWI was applied to a series of 36 Landsat images taken during a selection of dry seasons between 1973 and the winter of 2018-2019. The images were corrected for reflectance before the application of the index, and water was selected by applying a high threshold to the values. One of the disadvantages of the mNDWI is that the images it produces have variable pixel values depending on a number of factors. As a consequence, separate thresholds must be chosen by the analyst for each image. The mNDWI,

however, tends to radically bifurcate the pixel values of land and water. Selecting a threshold is, therefore, a simple task.

Figure 7 displays the result of applying the mNDWI to a selection of Landsat images of the Brahmaputra and its tributaries taken during dry seasons between 1973 and 2019. Each image displays the course of the river during the year it was taken in a bright color. By using these images to evaluate change in the river from year to year, we can identify which lands have been eroded and which have been deposited between each period. Due to the lack of surveying since 1969, and the policy of any newly-created land becoming state-owned by default, we can identify current unmapped land by combining all currently-existing areas which were once covered by the course of the river. The result, to the bottom-right of the image in blue and red, is an image comparing the 2018/2019 extent (blue) with the historical extents of the river (red). The red area, we can conclude, is a roughly accurate map of unmapped lands produced since 1969. A final map, shown in in Figure 8, displays water cover during the winter of 2018 in blue and lands which were inundated during some dry season since 1973 in grey. Other forms of land, either patta or intentional state-owned land created through the action of the state (such as roads), are displayed in white. Figure 9 displays the same 2018 and historical water extents, as well as the 1973 course of the Brahmaputra and Subansiri Rivers as a point of comparison.

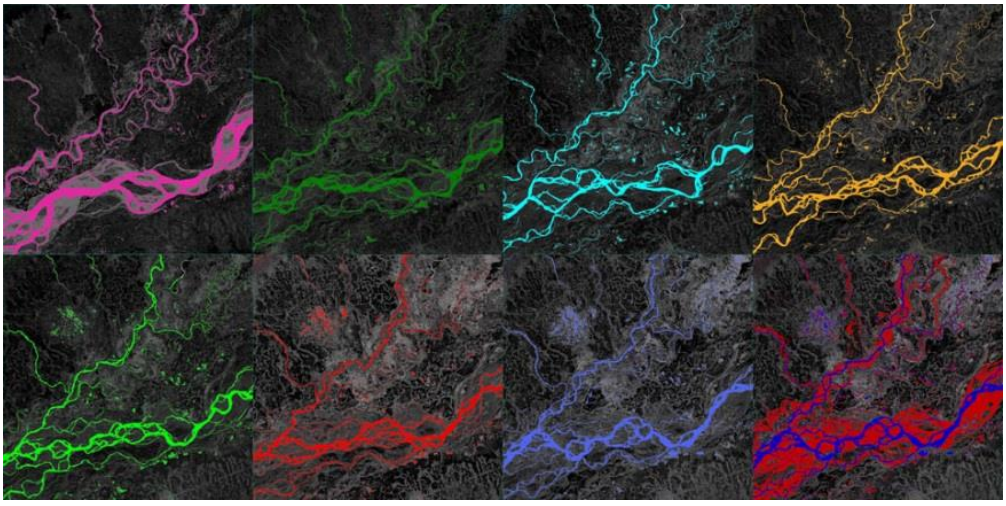

Figure 7: A selection of seven dry-season images of the Brahmaputra and its tributaries surrounding Majuli, with water identified through the use of mNDWI and NDWI displayed in bright colors. The image in the bottom right displays the combined historical courses of the Brahmaputra in red and its 2018 course in blue. Thirty-six images were used in total

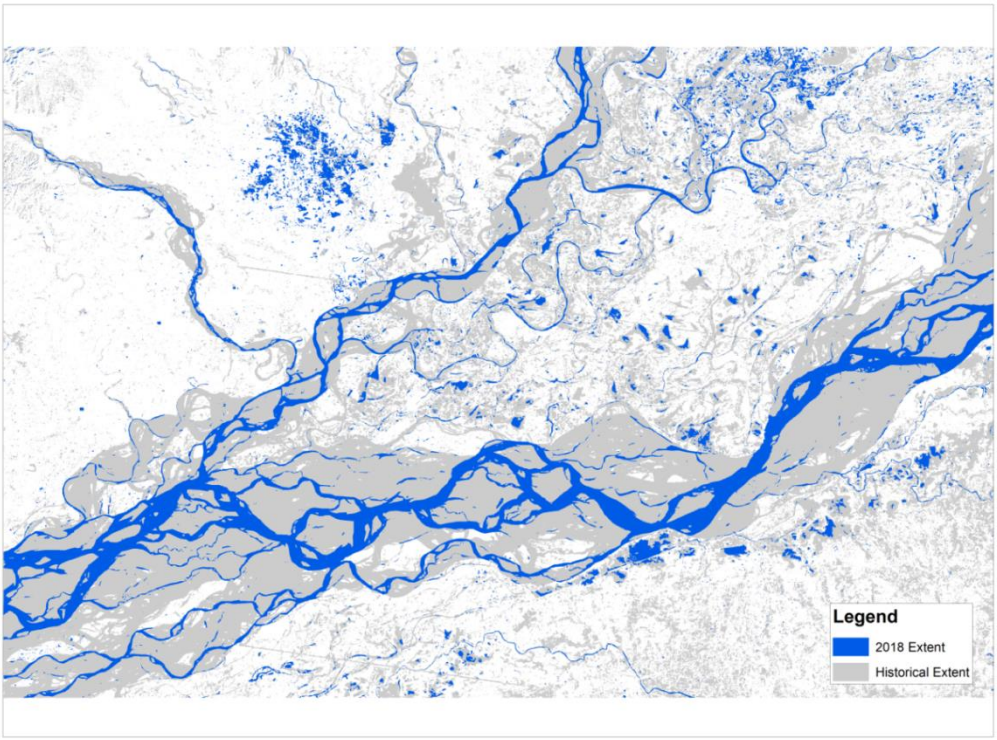

Figure 8: Comparison image of the current course of the Brahmaputra and its selected tributaries bordering Majuli (blue) and unmapped lands created through sediment deposition and channel avulsion (gray)

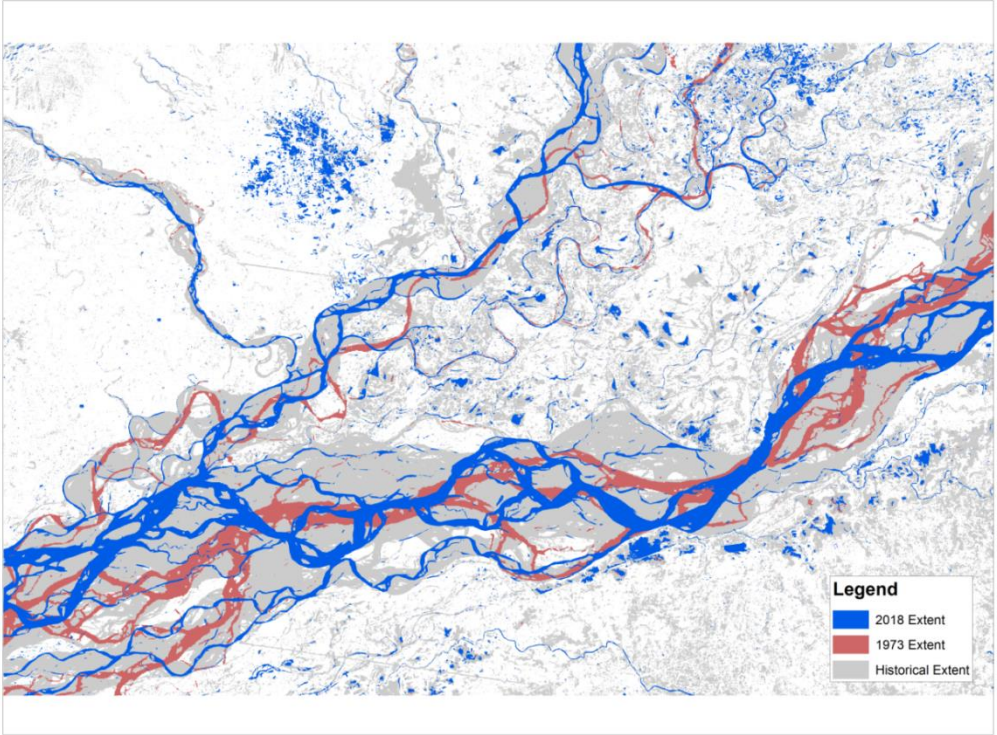

Figure 9: Comparison image of the current course of the Brahmaputra and its selected tributaries bordering Majuli (blue), the course of these rivers in 1973 (red) and unmapped lands created through sediment deposition and channel avulsion (gray)

Figure 10 displays a visualization of the variability of the Brahmaputra, Subansiri, and their tributaries over time. Values were assigned to each pixel according to how many years it was identified as water in the set of dry season images. The darker blues signify a more consistent presence of water, while the lightest blues signify as little as two years of consistent water coverage. In eastern Majuli, where the Brahmaputra curves more dramatically towards the Northeast upriver, we can observe more consistently stable shorelines. In the west of the island, however, the riverine landscape becomes more diffuse, wider, and less consistently inundated. It is here in which we can see the greatest

variability in the shape of Majuli, both in terms of erosion and deposition of unmapped lands.

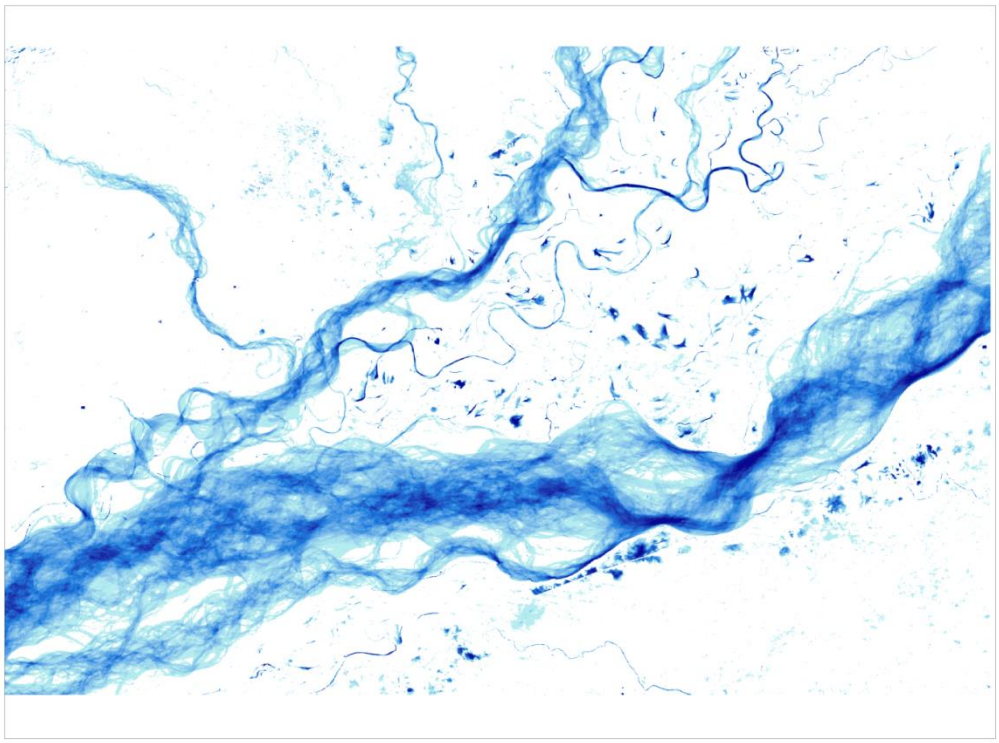

Figure 10: Variability of the Brahmaputra, Subansiri, and selected tributaries around Majuli since 1973. Darker values indicate more consistent water coverage during dry seasons, while lighter values indicate as little as two years of dry-season water coverage

The result suggests that large parts of Majuli near the river shore have become unmapped land since 1973, including nearly all of the sapori islands within the river. These lands, previously-inundated and closest to the river, are at a high risk of future catastrophic flooding and erosion. The residents of these lands are, paradoxically, the least able to access government disaster management services. Nevertheless, the protection of these vulnerable lands and the communities in them remain an important

theme in development discourse in Assam. Although the state has failed to equitably distribute disaster management resources to the most vulnerable communities, investment in disaster mitigation and prevention remains expansive. The state invests a staggering amount of capital in infrastructure designed to prevent disaster, but nevertheless fails to provide the restitution many residents hope for. To understand this seeming contradiction, we must turn our attention toward development discourse in Assam and how it interacts with disaster management and the physical geography of the Brahmaputra.

CHAPTER 2: DISASTER DEVELOPMENT ON THE BRAHMAPUTRA

Inverting the Disaster-Development Nexus

In April, 1996, the renowned activist and development scholar Sanjoy Ghose moved to Majuli to organize grassroots disaster management strategies among its communities. The Maharashtra native was compelled by the island's "ethereal" beauty, which he felt contrasted sharply with the existential danger faced by its riverine communities. Frustrated by a lack of accountability on the part of government and corruption among contractors responsible for flood-prevention systems, he wrote:

> All along the Brahmaputra, we have embanked our valuable cities—Jorhat for its tea, Dibrugarh for its university and oil, Gauhati because it's the capital, and so on. So how will a river, accustomed to carrying a silt load of over a million tonnes a day, react? It will search for weak spots, and break them. And with an aging set of embankments—many have not been rebuilt in over forty years—there are plenty that are vulnerable. But even before that, the river will vent its fury, like a caged tiger, on the parts that for some reason or another have not been embanked—usually because the

> people are too poor, or too weak politically, to demand it. Like Majuli. (Ghose 1998, 117)

Ghose argued, as have a wide variety of development scholars, that disaster impedes economic development (Anderson 1994, Lewis 1999, Bradshaw and Fordham 2007, Pelling and Dill 2010). Ghose advocated for the construction of embankments in flood-prone parts of Majuli which disaster managers had overlooked, and in 1997 mobilized resident volunteers in the construction of embankments using local materials along a 1.7 kilometer stretch of shoreline (Verna 4 July. 2012). Having spoken to residents and found that promised government restitution was rarely delivered, Ghose intended his home-made embankments to offer a model of organized resiliency. He hoped that circumventing official disaster management channels would allow for greater economic development in at-risk communities neglected by the state. Although the effort was successful in preventing flooding, Ghose had earned the enmity of the contracting firms normally relied upon for embankment construction and, by extension, the insurgent United Liberation Front of Assam (ULFA). "The contractors have succeeded," he wrote, "in using the ULFA to further their narrow objectives, and in allowing itself to be manipulated in this way, the 'revolutionary' organization has revealed its real linkages" (Ghose 1998, 19). In July of that year, Ghose was kidnapped and murdered by the ULFA. His remains, likely dumped in the Brahmaputra, were never found.

Ghose operated, as activists do today, within a development regime defined by India's 1991 free-market economic reforms. Since Independence in 1947, Indian economic policymakers had charted a course between the competing global systems which defined geopolitics in the late 20th century. The policies they encouraged, loosely

referred to as *Gandhian economics*, emphasized the development of community and individual satisfaction through the protection of local industries (Kumarappa 1951). Large-scale infrastructural projects were relatively rare in Assam until the 1990s. A set of political and economic crises led Indian policymakers, under the government of Prime Minister P.V. Narasimha Rao, to abandon Gandhian economics and embrace market-oriented reforms in 1991. Although the reforms preceded nearly three decades of massive economic growth in India, their emphasis on market liberalization and courting of foreign investment has remained controversial. A number of scholars have argued that the reforms laid the groundwork for a development discourse characterized by privatization and natural resource extraction (Sampat 2010, Weber 2012, Daftarry 2014, Nielsen and Nilsen 2015). It was during this period of rapid market liberalization in which Rao introduced the Look East Policy.

Billed as an intertwining of development and geopolitical strategies, Look East positioned New Delhi as a regional competitor to Beijing in Southeast Asia. The policy aimed to deepen economic and diplomatic ties with the Association of Southeast Asian Nations (ASEAN), and framed the Northeast as the keystone on which cooperation between the two regions would rest (Das 2010). Central to this effort was the development of northeastern states like Assam, which were traditionally understood to be among India's backwards and chaotic hinterlands (Haokip 2015). Since the establishment of Look East and its expansion into the Act East policy under Prime Minister Narendra Modi, New Delhi's strategic understanding of the Northeast has shifted. As insurgent violence declined and infrastructure development connected the Northeast more fully to

wider Indian popular culture, the region gradually became defined by its strategic value to the Indian state. Haokip writes:

> Contrary to the traditional conception of the Northeast as a cul-de-sac or a periphery, the new policy thinking under the Look East policy intends to deliver a new political imagining of this region, which Samir Kumar Das (2010, pp. 343–358) calls as the 'extended Northeast', that is spread across the international borders to include front-line states such as Myanmar and Bangladesh. This imagination bases itself on the contemporary discourse of 'borderless world'. (Haokip 2015)

More specifically, Haokip notes, Look/Act East imagines the resurrection of the important interregional trade routes which operated in the Brahmaputra River Valley from prehistory and into the British colonial period. Sarkar et al. (2007) argue that the Brahmaputra has substantial untapped economic potential, and that investments in restructuring the river could transform it into a major artery of inland waterway trade. Opening up that artery would serve New Delhi's geopolitical purposes as expressed in the Look/Act East policy, and would expand access to markets and trade routes which have been largely unexploited since India's independence. However, Haokip argues, the development of the Northeast as a hub of international trade faces challenges. Most especially, the continued presence of armed insurgent movements and recurrent, catastrophic disaster preclude significant investment in the region. Consequently, I will argue, the logics of disaster management, geopolitics, and market expansion have become intertwined

The motivations behind Ghose's murder are unclear, but locals speculate that he was killed for circumventing powerful contracting interests on Majuli. The fact that

embankment construction and disaster management were at the time of the murder, and remain, a vital function of these interests presents us with a profound contradiction. That the organs of state disaster management would work against the agency of affected communities in their own protection, even to the point of violence, demands a new paradigm within our understanding of the disaster-development nexus. Many scholars have concluded that, rather than disaster reinforcing underdevelopment, the two are mutually-constitutive (Berke, Kartez, and Wenger 1993; Skoufias 2003; Sawada 2007; Sawada and Takasaki 2017; Collins 2018). That is, disaster engenders underdevelopment and underdevelopment exacerbates disaster risk. While this may be a more appropriate framing of disaster on Majuli than disaster simply causing underdevelopment, I will argue for an inversion of this nexus: that the impulses of post-reform development in Assam reproduce natural disaster on Majuli, and that the logic of this development actively enhances risk. Efforts to prevent or relieve flooding and erosion on Majuli operate within a wider theater of post-reform development discourse in Assam. This discourse argues for the commodification of land, as well as halting the movement of the Brahmaputra, for the benefit of capital and to the detriment of communities at risk of displacement.

Land-as-Motion in Post-Reform India

The unmapped land produced by the interaction between state surveys and the avulsion of the Brahmaputra is necessary for the production of unevenness in disaster management outcomes. It is, however, a category which is only possible within the context of an economic development policy framework fundamentally unsuited to the

physical geography of the Brahmaputra. To understand the contradictions within development discourse in Assam, we must confront land and land tenure as it is traditionally understood by riverine communities. As one interviewee, an academic I spoke with in Guwahati, phrased it: "Think of the land as motion." Adivasi[12] understandings of Majuli, this academic argued, were more appropriate for the particular constitution of the place. The land moves, and so the people must move with it (Name Withheld , interview by author, Guwahati, August 17,2018). To contrast it with privatizing land policy, and to tie it explicitly to the dynamic physical geography of the Brahmaputra, I will refer to this collection of understandings as *land-as-motion*. Where unmapped land refers to a category which falls outside of the state's static understanding of land and its ownership, and is therefore outside of the umbrella of its services and protections, land-as-motion understands the fluidity of the Brahmaputra and its communities as value-neutral or positive. It is not the movements of silt, water, and peoples which produce uneven disaster outcomes, I argue, but rather a logic which seeks to tether this movement in the interest of post-reform development and geopolitics in India.

Recently, the politics of land reform have seen a resurgence in the Global South since its halcyon days in the early postcolonial period (Courville and Patel 2006; Sikor and Müller 2009; Widodo 2017; Rochadi 2018). Wendy Wolford (2016) argues that recent land reform movements have, like their predecessors, struggled for redistribution

[12] Adivasi, or Scheduled Tribes, are federally-recognized indigenous peoples of India. Not all indigenous peoples are recognized as Adivasi, and some Adivasi groups only recently migrated to India. Scheduled Caste status provides significant economic benefits, including preferred admission to universities.

from large landholders to agrarian smallholders. The resurgent land reformers, however, find allies in development economists such as Hernando de Soto who argue that spaces without firmly enforced property rights have hindered development in the Global South. The new land reform emphasizes institutional enforcement of property rights for smallholders, and as such is skeptical of communal land tenure. Proponents of anti-capitalist agrarian reform have, predictably, clashed with privatizing land reform movements. The tensions between these perspectives are explicit on Majuli, where a land title or its absence is the fulcrum on which disaster management turns.

Contestations within and between questions of land tenure and development are not limited to Majuli, however. A wide body of scholarship in a diversity of sites has emerged on this topic, much of it concluding that the privatizing impulse of development policy is at odds with traditionally-understood communal land tenure regimes (Bury 2005, Wolford 2007, Milne 2013, Tubbeh and Zimmerer 2019).Consequently, we may understand disaster management on Majuli as just one site of contestation within a wider story of tensions surrounding titling and land reforms across the Global South.

Land reform has a long and complicated history in post-Independence India. The distribution of privately-owned patta land titles was intended, in part, to secure property rights and expand equitable access to commonly-held lands. After independence, a series of Five Year Plans issued guidelines for distribution of land from large landholders to tenant-farmers, with the goal of their eventual ownership of the land (Kumar 2018). Assam was one of the few states to allow tenant-farmers to immediately take private ownership of lands without payment to the previous landlord.

Although much of these distributed lands had been consolidated into large parcels owned by private interests, land reform and patta titling also enclosed and distributed titles to communal lands. Yanagisawa (2008), in an analysis of changes to communal lands in South India between 1850 and 2000, argues that low-caste agrarians did not enjoy equal access to the commons before their enclosure. The distribution of patta titles to low-caste agrarians successfully increased equity. The usefulness of this case study, however, may be limited in states which, like Assam, never had a strongly-expressed caste system. An analysis by Krishnan (2009), also based on a study of land reform in South India, may be more illustrative for land tenure in Majuli. He argues that legal and geographical ambiguities hindered the effectiveness of patta titling of common forest lands in Gudalur. These ambiguities are abundant on Majuli, where fluidities of land, cultivation, and property are the rule rather than the exception.

This study is only tangentially concerned with whether patta titling has been effective in wider India. In Assam, however, it is vital to note that the politics of patta titling and land reform have intersected with the particular history of forest ownership in the state. Saikia (2008) writes that expansive government ownership of land in Assam is an artefact of the EIC's early excursions into the region. The displacement of smallholders from forest lands during the British colonial period evolved into state ownership of previously-communal lands post-Independence. The state manages these lands in the interest of conservation, although it usually allows informal settlement and production in the former commons. Saikia writes that a series of peasant movements have contested the state's ownership, demanding patta titling to state-owned lands. These movements have been strongest in the hilly, forested regions of Upper Assam, most

especially in and around the town of Tengani. Patta titling is seen as a way of securing the property rights of smallholders in these regions. I assert that reform oriented towards privatization, although it may be effective in hilly forested regions, is inappropriate on Majuli. When understood through the lens of land-as-motion, patta titling provides tenure only as secure as the constitution of the land itself.

Competing perspectives on land reform often find themselves concerned with other economic development strategies in the Global South, especially those emphasizing privatization, large infrastructural projects, and capital infusion. Rao and Behera (2017) argue that agitation for patta titling in India has dovetailed with these post-reform development strategies in India, leading to widespread dispossession of agrarian land. Some scholars have argued that these development strategies are, in reality, state-making projects on the part of national governments (Sharma 2006; Corson 2011; Pemunta 2014; Kelly and Peluso 2015). The commodification of common pool resources, these scholars argue, allow for the state to deepen in its power in previously-ungoverned spaces. Korf, Hagmann, and Emmenegger (2015) argue that ungoverned spaces in which land is not commoditized are imagined as an empty "frontier", a canvas upon which the logic of neoliberal development can play out. Working in the context of Ethiopian rangelands, they write that:

> This projection of emptiness allows for all sorts of imaginings or ideas when it comes to developing these potentially empty spaces and absorbing them into nation-building projects as part of development and progress. This frontier dynamic has often been a state-driven process where state elites, capitalists and 'frontiersmen' have colluded in a rush to claim land and dispossess local inhabitants of the frontier.

The rhetoric surrounding development in Assam since the inception of Look/Act East tracks closely with the state-making utility of development which Korf, Hagmann, and Emmenegger identify. The manifestations of this rhetoric are visible in the form of Majuli's many embankments and the damming projects of the Brahmaputra's upper catchment. However, we may also understand Majuli as a special case within the violence of territorializing development. The island's uniqueness, for our purposes, is a product of the fractal set of movements, shifts, and transitions which define its relationship to development policy and the privatizing impulse of post-reform India.

Unmapped land, insofar as it remains un-surveyed, unparcelized, and unowned, can be understood as a common pool resource. Unmapped lands in Majuli are densely settled and cultivated, and settlement of these lands after they appear is unofficially mediated by the state. Local police and security forces guide displaced people onto newly-created unmapped lands, and in doing so ensure that those people are unable to seek restitution when their new homes and fields are inundated or eroded. These lands, and their occupants, are in a perennial cycle of consumption, deposition, and displacement. If we are to understand unmapped lands as commons, then, we must also understand them as *ephemeral* commons. Most scholarship of communal land tenure is unaccustomed to commons which not only move, but appear and disappear according to geophysical circumstance.

A wide body of scholarship has developed around communal land tenure systems in which common pool resources are indistinct, shift over space, or are otherwise dynamic. Much of this scholarship has focused on rangelands in Sub-Saharan Africa (Hobbs et al. 2008; Fekadu 2010; Moritz et al. 2013; German, Unks, and King 2017;

Snorek, Moser, and Renaud 2017; Behnke 2018). Perhaps most notably, Elinor Ostrom (1990) argued that both state control and privatization led to poor outcomes on common pool rangelands in which movement of herds from pasture to pasture was central to effective pastoral production. Both transhumance[13] and shifting cultivation[14] in the commons require an understanding of communal tenure which is dynamic in space and time. A large body of scholarship has arisen which understands these forms of tenure to be in tension with the impulses of privatizing land and resource management policy (Thaler and Anandi 2017; Lawry et al. 2017; Ginzburg, Thulstrup, and Nielsen 2017; Asaaga and Hirons 2019). Land reforms which emphasize private property rights in contrast to communal tenure may come into conflict with shifting cultivation and transhumance practices. Although it bears similarities to these practices, the concept of land-as-motion is more expansive. I use it to describe lifestyle practices on an island where the physical geography itself, and not just cultivation or grazing patterns, shifts dramatically between seasons and years.

Understanding communal land tenure becomes, in this context, even more complex. Communities which live on and cultivate unmapped lands must shift with the river as these lands are produced and consumed, establishing new residencies on parts of Majuli perceived as safe (or at least less unsafe) after erosion or catastrophic flooding. Inevitably, shifting communities necessitates shifting agricultural lands. Fully 88% of

[13] The practice of moving herds depending on seasonal conditions, typically from high to low elevations and vice-versa

[14] A form of agriculture in which land is cleared, cultivated, and then left fallow while cultivation moves to other lands

survey respondents reported having lost at least some agricultural land to erosion. These lands are, for the most part, allocated as part of a communal land tenure system. This allocation is often mediated by forced resettlement on the part of the state or by the action of NGOs. Most respondents reported either not having ownership of the land which they worked, or were unsure if they did.

Resettlement and reallocation of land after displacement and erosion, then, becomes a complicated task at the community level. Distinctions between land tenure systems and ownership types become blurry. One large landholder reported displaced members of his community living and cultivating crops on his land. He has complained to the local government for a more articulated resettlement system, but has seen no progress. As different parcels of land are not suitable for all crops in all seasons, shifting cultivars and agricultural practices are necessary between periods of erosion and displacement. Four varietals of rice are grown on Majuli, each with particular planting and growing periods and each with particular accompanying practices. As erosion has reduced the overall size of the island and settlement has become more intensive on unmapped lands, many farmers in at-risk communities have shifted away from ahu, sali, and boru in favor of bao deep-water rice, a varietal which, as stated in Chapter 1, is more tolerant of inundation (Catling 1992). Farmers on Majuli exercise agency over their risk of disaster by altering cropping patterns in both time and space, diversifying vegetable cultivation, and selling animals or other stores of capital (Bhowmick and Hazarika 2007). Agricultural and development policy emphasizing private property rights is particularly difficult to successfully implement on a river system in which farmers' agrarian milieu can change rapidly. It is within this context that disaster management policy in Assam

has attempted to develop a disaster management framework built around cadastral surveying, patta titling, and large infrastructure projects, all of which rely on an imagined landscape of stationary, divisible spaces.

Although state disaster management assumes an immobile landscape, it is motivated by rhetoric surrounding the perceived crisis of the island's motion. In addition to understanding Majuli as a static space, state disaster managers understand it as a space of disappearance and deluge. Debojyoti (2014) argues that Assam's disaster management system has developed a "techno-managerial" approach to confronting flooding and erosion on Majuli, and that this approach is motivated by simplistic narratives of the island's disappearance. This top-down management strategy, which emphasizes scientific and capital-intensive solutions, fundamentally devalues traditional ecological knowledge which understands Majuli through the lens of land-as-motion.

The failures of technocratic disaster management policy are vivid on Majuli, as are the grating tensions between its at-risk residents and the disaster management regime. Confronted with these failures, I will argue, the state has turned to a set of large-scale development projects intended to manage disaster by halting the island's manifold movements. By analyzing the political economy of Majuli through the lens of land-as-motion, we may understand how and why the logic of post-reform economic development in Assam has been unable to produce a management strategy for catastrophic flooding and erosion on the island.

The Island as a Body: Perceptions of Disaster Management

On the morning of August 9, 2018, I stood in the crowd by the ferry station south of Kamalabari Satra waiting for the arrival of CM Sarbananda Sonowal. He had chosen to commemorate Indian Independence Day on Majuli, a sign of the island's privileged position in Assam's understanding of itself. He was to deliver a speech and inaugurate a set of motorized ferries, the first of their kind to serve the island. Passage between Jorhat[15] and Majuli had, until that day, been exclusively crossed by small wooden boats operated by independent ferrymen. The old wooden ferries, although necessary, were a wager of human bodies against the force of the Brahmaputra. The temperamental nature of the river, choked as it is with silt and drifting clumps of vegetation, had expressed itself through a long history of well-publicized wrecks and drownings which had spurred investment in a more advanced ferry system.

The new ferry system, although less advanced than that found in Guwahati, carry few of these risks. Passage across the river, if one can afford it, had become trivial. Majuli has become a little less isolated, and commerce between the island and Jorhat can now be pursued in comfort. I would, later that month, take one of the new ferries across the Brahmaputra to Jorhat District. The occasion had the feeling of a festival. Although it only became a distinct district in 2016, the CM's visit reflected a profound appreciation for the uniqueness of the island and its centrality in Assamese identity. This sense is reflected in the tones and phrasing of its residents while describing it. It is not Majuli, an

[15] Jorhat is the largest city in Jorhat District, which lies to the south across the Brahmaputra from Majuli. It is the closest large city to Majuli, and the nearest center of advanced medical care and public transport.

indistinct region of a larger landscape, but *the* Majuli: a place apart, a distinct entity with its own life.

The fanfare surrounding the updated ferry system, as well as the attention from the state's most powerful politician, hint at the untapped potential for tourism development which many sense on Majuli. Although the industry is in its nascent phase, Konwar and Chakraborty (2015) suggest that investment in tourist infrastructure on the island could position it as a prime destination within India. Development narratives have, to this end, framed Majuli as a particular site of linkage in an Assam refurbished into an international corridor. During an interview in his home, a resident of Khorahala expressed his deep affection for the island as well as confusion over the seeming lack of action on the part of the government to protect it:

> The people of Majuli demand that it be recognized as a heritage place. The people are confused why it is not a heritage place. Why do you think we are not a world heritage site? Is it the government's fault, or UNESCO? (Name Withheld, interview by author, Khorahala, August 1, 2018)

It is hard to overstate the particular cultural, historical, and religious value which Majuli holds for its residents and for wider Assam. The relationship between these perceptions of the island and a development discourse structured around physically remaking the island is complex. As the home of the Neovaishnavite movement founded by Srimanta Sankaradeva, Majuli forms the epicenter of a monastic culture unique to upper Assam (Goswami 2016). Many of these monasteries, or Satras, are threatened by flooding and erosion. A significant number have already been swept away by the river.

As Dr. Pitambar Dev Goswami, the head of Auniati Satra and an immensely influential figure within the Neovaishnavite movement, told me:

> Thirty-two or thirty-three Satras [have been] lost to erosion. Thirty-two are left on Majuli… Majuli is the backbone of Assamese culture, and is representative of the Assamese nation. Majuli is the nerve center of Satra culture and Assamese culture. If the Satras are lost, then Majuli is finished and Assam is empty. The people of Majuli believe that [it] will be saved. But we believe in Lord Krishna. We always appeal to the government. We always try to inform them, but we are not successful… All [the] works here are done for examination; no permanent works, no scientific works. We believe and try to appeal to the government, but we are not satisfied. (Goswami, interview by author, Auniati Satra, August 11, 2018)

Interviewees in villages around the island report feeling that the state government's rhetoric towards the island is not reflected by its actions. The so-called inevitability of Majuli's disappearance is not accepted by many flood-affected people on the island, many of whom believe that the heart of the problem is government inaction. A resident of Bhakat Sapori, a farmer who had lost 75 bighas to erosion, concurred with Dr. Pitambar. He told me that many families who had lost their homes to erosion had moved onto his land, and that he has spoken personally with the DC and the former CM without success. His frustration wasn't with the government's failure to protect the people of Majuli, broadly, but rather with its failure to protect Majuli itself. The island is seen by some residents as a repudiation of the ethnic divisions which have bubbled into violence in other parts of Assam.[16] The interviewee reported feeling that the island's peacefulness

[16] Assam has a long history of political violence. In the last decade, and especially in 2012 and 2014, most large-scale political violence has been between Bodo and Bengali-speaking Muslim communities. Majuli has been almost entirely unaffected by this violence.

was a reflection of its particular religious character, and that government's failure to protect the island signified a betrayal of those values:

> This place has many types of religion and caste, but they do not fight. The Saint [Sankaradeva] established a culture of peace and values in this place, but the government is not taking steps to protect it. We used to be sixteen-hundred square kilometers, but are reduced to four-hundred square kilometers, five-hundred square kilometers. The Majuli will disappear from this earth. If Majuli was in your place, USA, surely it would be protected. (Name Withheld , interview by author, Bhakat Sapori, August 5, 2018)

The certainty of his final statement suggests a sense of astonished disbelief that the island, as a discrete physical and cultural entity, didn't fall under the umbrella of the state's protection. The advance of erosion on the island ("a slow process," he told me, "not flash flood like in Golaghat") was more worrisome than the yearly floods and subsequent displacement which have affected the island since before living memory. If Majuli (*the* Majuli) is a religious and cultural world unto itself, then erosion carries with it a sense of apocalypse. That the state would drag its feet to prevent this erasure is, to island residents such as the farmer in Bhakat Sapori, more disconcerting than the expected inadequacies in seasonal disaster relief.

Each year, Majuli College publishes a yearbook compiling selections of research and writing produced by its students. The 2012 yearbook includes a poem by Ranuj Panging, a third-semester student, which articulates this anxiety:

I have lost my legs

Ancient Ahataguri[17];
I have lost my left hand
Holy place Dakhinpat[18];
I have lost my head half
Sikari[19] and Sunuwal Kachari[20];
I have lost my right ear
Sarnashree, Jengraimukh[21]
Lost… lost… lost… lost…
Every organ is losing
Oh! I am the Dying Sun
Majuli
Sons! Oh my sons!
Call a doctor for me
I am paralysed
By violent Brahmaputra.

Panging frames the dissolution of Majuli not in terms of bighas or square kilometers as survey respondents and interviewees in this study did when describing their lost agricultural land. Rather, he understands the island as a body and its constituent parts as organs. Erosion takes on an existential, almost medical, pall. Although an ear constitutes only a small part of the body, its loss has profound implications for the person embodied. That Panging sees the island as paralyzed by the Brahmaputra's violence is

[17] Ahataguri (occasionally anglicized as *Ahatguri* or *Ahotguri)* Mouza was one of the major population centers of Majuli until flooding and erosion after the Great Assam Earthquake of 1950 slowly consumed it. The former center of Ahataguri is now near the center of the Brahmaputra River.

[18] Dakhinpat Satra is one of the most important Satras on Majuli, and is being threatened by flooding and erosion.

[19] A village in northern Majuli suffering from erosion

[20] A village in Northern Majuli. *Sonowal Kachari* also refers to a small ethnic group of the same name concentrated on the island; CM Sarbananda Sonowal belongs to this group.

[21] Sarnashree and Jengraimukh are Important Mising population centers in northern Majuli

deeply meaningful. The cycle of displacement and migration, as well as a physical geography in constant flux, might more intuitively have suggested chaos rather than stillness. The paralysis in Panging's poem, then, may be read as a deeper, less physical sort of stillness: the freezing that accompanies dread, or the exhaustion which overtakes a social body in perpetual, agonizing motion.

If Majuli needs a doctor, as Panging suggests, survey respondents and interviewees reported that government disaster management efforts had largely failed to fill that role. 77.33% of survey respondents strongly disagreed that the government in New Delhi had done a good job of managing flooding and erosion. That number rose to 84% of respondents when asked about the Assam state government. Interviewees in at-risk communities consistently reported feeling that government intervention had been too abstract, too incompetent, and too focused on large projects which never seem to be completed. The Bhakat Sapori farmer who had personally spoken with the former CM expressed this perspective acutely:

> The government is only doing paper works, not physically. Temporary works, not permanent. The engineers are not proper experts. Majuli is a beautiful place, [but the] government is not taking the good steps to protect Majuli… If government plans well, erosion and the flood may not be a big problem. But the government is not planning. Brahmaputra will consume [Majuli]. If they would expend money on the island, Majuli could be protected. (Name Withheld , interview by author, Bhakat Sapori, August 5, 2018)

More broadly, however, there is a sense that the impulses of development policy towards market accessibility, connectivity, large infrastructure projects, and foreign investment are not suited to the physical and human geographies of Majuli. The land-as-

motion perspective is antithetical to a development regime based, in many ways, on privatization and permanent property. Land tenure policy in post-reform India has widely encouraged investment in pucca housing and patta land ownership (Levien 2018). Development goals which emphasize these forms of housing and land ownership, in the context of the Brahmaputra's geophysical dynamism, channel scarce rupees into investments which are at risk of destruction due to catastrophic flooding and erosion. They are, in short, permanent expressions of development in an impermanent landscape. As the river and the land move in tandem, development goals which rely on a deeply-outdated cadastral survey of Majuli become less tenable. Patta land is fed into the river, which in turn disgorges unmapped land. Non-modular pucca housing, representative of massive investment on the part of individual households, is consumed by the river as well. The result is a perversion of the broadly-understood goals of market-oriented development: landowners become landless, homeowners become homeless, and a greater proportion of the island becomes underserviced and informally-settled unmapped land.

The logic of post-reform economic development in the context of the Look/Act East policy, however, suggests a disjunction between the needs of Majuli residents and the strategic and economic interests of the state. CM Sonowal and his government have emphasized solutions to the flooding and erosion crisis which include sweeping infrastructural projects. Alongside these proposals, the ASDMA has taken a technocratic and cost-effective approach which interviewees and survey respondents report has been largely ineffective.

Don't Think: Technocracy and Temporary Measures

As I stood on the deck of the new Brahmaputra River ferry departing Majuli for Jorhat, I could see the island's shoreline stretching broken and precipitous to the east and west. Vegetation hung over the edge of jagged, eroded riverbanks which appeared as though they could collapse at any moment. I struck up a conversation with another passenger who, like me, had been scanning the receding line of the Majuli's crumbling shore. He was, serendipitously, a member of the Brahmaputra Board.[22] After agreeing to an impromptu interview on the condition of anonymity, he told me that the Board was confident in its ability to halt erosion on the island.

The plan, he said, was an ambitious and highly scientific one. The Board had engaged a group of scientists to model erosion and sediment deposition along the Brahmaputra-Majuli interface, kilometer by kilometer. Twenty-two lakhs[23] geobags[24] had been requisitioned, and the Board planned to have twenty-seven kilometers of the island's endangered shore lined with them by May 2019. The heavy bags, stitched from geotextile fabric and filled with river sand, are laid in a tight pattern along at-risk shoreline and into the river itself, providing stability and anchoring the fine, silty soil which would otherwise be swept away (Name Withheld, conversation with the author, Kamalabari Ghat, August 15, 2018). This was, he said, the key to breaking the slow

[22] An important organ of the Department of Water Resources which has, interviewees suggested to me, a dubious reputation on Majuli due to its perceived inefficacy.

[23] One lakh is equivalent to 100,000

[24] A durable cloth sack filled with sand used to strengthen riverbanks

dissolution of the island: massive deployment of resources, both financial and scientific, in order to rebuild Majuli's crumbling shoreline out of sandbags, data, and capital.

This technocratic-yet-cost-effective approach is popular among policymakers in the ASDMA. A high-ranking official within the organization was eager to tell me the extent to which Western scientific institutions had contributed to the struggle against flooding on the Brahmaputra. The ASDMA, he told me, was working with Google engineers to develop a flood forecasting model for the river. Jeffrey Sachs had agreed to aid in the development of a risk reduction plan, and the Columbia University Water Center had become a partner. Budget constraints, however, have prevented the ASDMA from implementing the strategies which this official felt were necessary to satisfactorily reduce risk (Name Withheld, interview by author, Guwahati, August 17, 2018). Disaster managers in both the ASDMA and the Brahmaputra Board, in the context of this restricted budget, have settled on a consensus emphasizing technocratic scientific study, cost-effective temporary measures, and a wish-list of expensive infrastructure projects which are seeing tentative support from CM Sonowal.

The member of the Brahmaputra Board who had cited massive geobag deployment as the solution to the displacement crisis may be disappointed to learn that members of at-risk communities on Majuli do not consider to the organization to be working well. "This place will live forever," one resident of Khorahala told me, "but government gave [an] organization called the Brahmaputra Board the opportunity to protect Majuli, but they don't do well" (Name Withheld, interview by author, Khorahala, August 1, 2018). The appeal of the strategy for the Brahmaputra Board may be in its relative inexpensiveness. Geobags are widely considered to be a more affordable strategy

for preventing erosion and bridge scour than the more traditional use of concrete revetments, which can range between 2.5 million and 45 million USD per kilometer of river bank (Sarker, Akter, and Ferdous 2011). The method is widely considered to be a cost-effective solution for the protection of large stretches of river, although they are not as stable or as effective as more traditional, higher-cost solutions. Figure 11 displays a stretch of the Brahmaputra's heavily-eroded shoreline near the community of Salmora which has been reinforced with geobags. Although the dirt road which once ran along the river has been eroded, the application of geobags has allowed a narrow pathway (visible in the bottom right of the image) to remain passable.

Figure 11: Geobags spread along a heavily-eroded shoreline near Salmora. Image taken August 8, 2018

Geobags are not the only cost-effective riverbank protection method employed along the shore of Majuli. Porcupines[25] have been used within the river to solidify the structure of the island's banks and reduce horizontal scour. Other solutions, such as the construction of anti-erosion revetments from boulders, have been attempted as well (Aamir and Sharma 2015). These methods are largely considered to be short-term erosion prevention measures, yet they nonetheless form a cornerstone of government riverbank protection efforts. The effectiveness of these methods, however, is in question. Porcupine systems, as well as boulder protection and marginal embankments, were found to be largely ineffective in the prevention of erosion and channel migration on Lower Assam's Baralia River, and geobags experience structural failures not associated with concrete revetments (Baishya and Sahariah 2017). There is widespread skepticism of these methods among communities on Majuli. A resident of Sumoimari Ghat, a village at high risk of flooding, expressed disapproval of the government's riverbank protection methods. "Every year the soil is getting less," he told me. "Porcupines are provided by [the] government, but every day the soil is getting less" (Name Withheld, interview by author, Sumoimari Ghat, August 10, 2018).

The absurd contradiction he identifies in disaster management policy is that the government is more open-handed with largely ineffective and short-term erosion prevention measures than they are with individual aid and restitution. This contradiction lies at the heart of the discontentment expressed by many residents of Majuli. The huge

[25] A small structure built from interlocked bamboo or concrete spurs used to prevent erosion

amount of capital invested into disaster management is reified in its physical expressions: boulders, geobags, porcupines. These objects are then thrown into the river, ostensibly to prevent erosion and flooding, and disappear beneath the murky water. Riverine communities, however, remain in crisis, and financial relief remains elusive. However effective the measures may be at different sites of erosion, their physical reality is invisible. The creeping certainty of displacement experienced by many communities, on the other hand, is not.

Two brothers, both of the small village of Khorahala on the banks of the Brahmaputra, told me that their community had been displaced nearly thirty years beforehand. While the government offered free land in Jorhat District, only thirty or forty percent of the community took the offer. The rest settled on the banks of the Brahmaputra west of Kamalabari Satra, a stretch of land at great risk of flooding and erosion. I met the brothers while they were in the process of building a new pucca house of five large concrete rooms. Investing in a permanent home had been a difficult decision, they said, because anti-erosion measures had done little to slow the river's consumption of the nearby shoreline. Even concrete porcupines had been ineffective. They told me that geobags had done more to protect Khorahala than porcupines, although they estimated that even large-scale application of geobags had only solved about twenty percent of the problem. Other small projects, such as embankments, had not been enough either. As one brother told me:

> People are worrying about losing house and paddy. [There is] no space to shift people to another district. Now, no plan from government to give land outside of Majuli, and no space to move to government land in

> Majuli. [There is] less and less land. [People] don't build expensive building for fear of flood… Small projects [are] not enough… So many paddy fields have gone in [the] river. Last two or three years ago, seven square kilometers of paddy [were] gone in one year. (Name Withheld, interview by author, Khorahala, July 31, 2018)

The government lacks, he said, a plan to deal with the crisis, and there was no longer space on Majuli or in nearby districts for displaced people to resettle. He fundamentally distrusted the government's motives, and argued that their incentives were not aligned with those of at-risk communities. "That is not best for us," he said, "that is best for them." With an expression of grim finality, he summarized disaster management policy as: "we'll protect Majuli. Don't think."

A Mising community and religious leader in Citadar Chuk, over cups of rice beer, agreed that the state had other motives besides responsible disaster management. Although the government spends more and more money each year, he said, porcupines and other systems have not been effective. When I asked him how flooding had impacted his community, he told me:

> The flood is no problem for Mising people. We build when [the] flood comes… Water rushes under the house. Men fit on a boat. If [there is] no boat, banana trees. Flood [comes] April to September. [We] collect grass for animals, take animals to high ground, sometimes animals drown. [There is] loss of agriculture. If water is floating more than fifteen or twenty days, then sali [rice] dies. (Name Withheld, interview by author, Citadar Chuk, August 2, 2018)

The Mising, he told me, were well adapted to the realities of riverine life, and their lives were rarely lost to flooding. However, he expressed frustration at the system of financial relief and told me that ethnic politics pervade even the seemingly-tranquil

communities on Majuli. He had lost five bighas of paddy to erosion in 2017, and was denied when he tried to access financial restitution. The government, he said, provides relief by asking for a list of affected households from local politicians. He was not on the list, and suspects that corruption from the prevailing Bharatiya Janata Party (BJP) is to blame.

> Suppose the government asks who is damaged by [the] flood. BJP supporters get the money. [Politicians] file a report, BJP workers submit a list of names, who has lost land. Congress [supporters] get nothing. (Name Withheld, interview by author, Citadar Chuk, August 2, 2018)

The Mising are a Scheduled Tribe, and the privileges granted to Adivasi communities remain a point of contention among many Assamese who support the BJP. Tensions between Scheduled Tribes and non-Scheduled Assamese communities reached a head during my fieldwork. A bandh in Jorhat District protesting affirmative action in higher education for Adivasi peoples forced me to delay my exit from Majuli due roadblocks.[26] However, the perception that government disaster management policy favors certain ethnic groups or political parties is not widespread among survey respondents and interviewees. 84% of respondents strongly agreed that all political and ethnic groups on the island were treated fairly by government disaster management policy, while only 2.67% strongly disagreed. The perception of corruption, however, remains widespread among interviewees even if the perception of ethnic inequity is not.

[26] A bandh is a form of general strike in South Asia in which participants shut down businesses and transportation infrastructure. Bandhs in Assam often include roadblocks which prevent travel.

As a farmer in Bhakat Sapori told me, distribution of government aid and agricultural equipment, such as tractors and fertilizer, is coordinated through bribery. The poor cannot afford the bribes. “Their livelihood is directly impacted by government corruption,” he said (Name Withheld , interview by author, Bhakat Sapori, August 5, 2018).

The contrast between the technocratic approach employed by the ASDMA and the realities of disaster management as reported by residents of Majuli is stark. Strategies which, like the installation of geobags and porcupines, offer a marginal reduction in erosion at relatively low cost have failed to address the concerns of communities at the greatest risk. Attempts to expand understanding of erosion, flooding, and risk dynamics from the top down are not reflected in outcomes among communities. Academics I interviewed in Guwahati were confident in their assessment that corruption plays a large role in the distribution of disaster management funds. That relief money intended for flood-affected communities finds its way into the hands of public officials and contractors was, for these academics, hardly in question. Graft, they explained, was central not only to understanding the failure of short-term erosion prevention, but also the failure of larger-scale flood prevention strategies such as embankments. This is the dynamic which Sanjoy Ghose identified in his journals. Powerful interests, vying for public money through embankment contracts, produce inferior disaster-management infrastructure at the cost of lives and livelihoods.

The Embankment Economy

The passage of the Assam Drainage and Embankment Act in 1954, just four years after the devastating Great Assam Earthquake of 1950, made the construction of

embankments and levees a cornerstone of flood and erosion prevention in the state. However, residents complain that these embankments and are frequently left uncompleted. Ritumbra Manuvie (2017), in his analysis of the failures of disaster management in Assam, writes:

> There is a common belief that the financial resources allocated for development are misspent due to corruption. Assam's link to corruption is as banal as elsewhere in India. It is somewhat accepted and recognized by the bureaucratic officers that delaying the projects is a widely-used approach to gathering 'appeasement funding'… Every year, after the flood season, when major construction works on dams and highways is resumed, a sit-in protest by the local population opposing the projects is carried out. During this time, local politicians act as crowd-managers and demand appeasement funding for dispersing the protesters. (Manuvie 2017)

On the long road from Jengraimukh to Garmur, my companion, an organizer with the Assam-based Rural Volunteers Center, pointed out one such embankment a short distance into the interior of the island. It had, he said, remained unfinished for several years. He had never seen any workers there. The disjunction between promised and completed embankment projects was stark to many interviewees. A laborer and fisherman living in Bhakat Sapori told me that the government only seems to work for people like him when disaster is imminent.

> Preparation isn't workable in [the] time of flood. [The] water level was about 4 feet last year… [We have] no sort of resources at time of flood: no food, even. [The] government only does work at time of flood to resettle people. [The] central government has promised an embankment here, but have not delivered. [I] have complained many times to [the] D.C., but they have given us nothing but food in time of flood. [We have] lost 3 cows to flood. (Name Withheld, interview by author, Bhakat Sapori, August 11, 2018)

His entire village, he said, is preparing to go to higher ground when the flood comes again. The promised embankment, it appears, will not be realized. A similar story was told by a family in Pomua whose home had been destroyed in 1989. Their new home had been completed only a year before I spoke to them. Although they have seen signs of erosion, they have been promised an embankment by the DC. If construction is completed before their current home is destroyed, the head of the household told me, then they will be happy (Name Withheld, interview by author, Pomua, August 12, 2018). A laborer living in Dhakipat Ghat, during an interview outside his home, told me that he didn't believe that the government is seriously attempting to prevent flooding.

> [I] Don't think the government is working. Three months the flood continues in this place. [The] government gives food for one week, but floods continue for three months. [The] central government is working on embankment in river but it doesn't seem to do anything. I doubt it will work. [My family] didn't get tarpaulin, even though [our] neighbors did. (Name Withheld, interview by author, Dhakinpat Ghat, August 13, 2018)

Many residents feel that even completed embankments do more harm than good to flood and erosion-prone communities on Majuli. A government worker in Jaroni Sonowal complained that embankments are harmful for those most at risk. He had once lived with his family by the banks of the Brahmaputra, but lost his land due to erosion.

> We want a natural flood in a normal situation. The embankment is the cause of the unnatural flood. The flood is getting more destructive. Embankment is the cause of erosion. Both sides of [the] river, [the] government build embankments on. Both sides of river don't allow flood waters to be distributed to fields. Sediment settles, [and] is deposited in

> river beds. (Name Withheld, interview by author, Jaroni Sonowal, August 3, 2018)

As the river bed rises due to embankments preventing "natural flooding", he said, the river itself becomes wider. Floods consequently become more severe, more powerful, and more unpredictable. The Bhakat Sapori farmer who had complained of government corruption also expressed his displeasure towards embankment projects, although for slightly different reasons:

> Majuli produced a huge number of fish in ancient times, but engineers construct the embankments so the channels are blocked. So fish cannot travel between their places and cannot reproduce, [and] we on Majuli must eat the fishes that are imported from outside (Name Withheld , interview by author, Bhakat Sapori, August 5, 2018).

The farmer expressed sadness as he said this. He is Assamese, and told me that residents of Majuli once sustained themselves on the great variety of fish which the movement of the river made easily available. Now the fish are gone, he said, as are his two brothers who left the village to escape the threat of flooding and erosion. This sentiment was echoed by shoppers in the Kamalabari fish market. Where once its aisles were stocked with the catch from the Brahmaputra, as well as its channels and tributaries, shoppers now buy fish from downriver as far as Lower Assam and Bangladesh. The farmer believes that his grandchildren, like his brothers, will be forced to leave his land eventually. "If the water breaks the embankment," he told me, "this place will be destroyed."

That contradictory sense of resentment and reliance is indicative of the role embankments play in both disaster management and economic development policy in Assam. They are seen as both vitally necessary and nodes of profound popular resentment. Embankments, like porcupines and geobags, are physical manifestations of disaster management policy. Unlike porcupines and geobags, however, they are extremely visible. A half-completed embankment, or an embankment which was promised but never delivered, leaves a conceptual hole in the landscape. Its presence, or lack thereof, is felt by residents of at-risk communities. Many respondents in these communities feel that, once their homes are destroyed and their agricultural land inundated, their only avenue for adaptation is seeking refuge in tarpaulin tents on the roadside.

Embankments are also symbolic of an ascendant disaster-development politics embraced by the firms which operate in Assam's infrastructure industry. Unlike geobags and porcupines, which are constructed mostly from local materials, and aren't particularly easy to monetize, embankment projects represent major contracts for concrete and construction firms. To policymakers, embankments represent a coherent infrastructural development project which will, at least in theory, accomplish disaster management goals as well. This fact has given rise to what I will refer to as the *embankment economy*: an industry characterized by the dispersal of embankment construction contracts which may never be completed, or which may even exacerbate flooding and erosion. Graft and corruption, ubiquitous in the embankment economy, are a structurally necessary part of the logic of post-reform Indian development as practiced in Assam. The aligned goals of private firms and government contract-givers necessitate

embankment construction, regardless of how well the project actually eases flooding and erosion crises for riverine communities.

That the embankment economy has expanded within a disaster management system built on privatization and patta land tenure is not surprising. Their paradigms are rooted in a shared logic. Development in Assam, in the context of the Look/Act East policy, has been oriented towards India's geopolitical goals and expanding market access as much as towards disaster management. In the eyes of public officials such as CM Sonowal, these goals are explicitly linked. Positioning Assam as a corridor for international trade can only be accomplished by reducing the perceived risk of flooding and erosion, and vice versa.

Not Like Building a House: Constructing the River

The embankment economy is only one pillar of post-reform disaster-development in Assam. A high-ranking public official in the ASDMA disclosed to me that "investment in risk reduction is very much less" than in large infrastructure projects in Upper Assam. "We will build a road," this official told me, "and not consider the flood, climatological changes, rainfall, etcetera" (Name Withheld, interview by author, Guwahati, August 17, 2018). He said the results of effective risk reduction are less visible, and therefore less appealing, than larger construction contracts. He mused on the political impact of investment in risk reduction. "Hammer the head of the people, put up a sign," he said to suggest the difficulty of communicating ASDMA prevention measures. "The results are not so tangible. It is not like building a house that others can come and see."

As a consequence, the ASDMA has begun a thrust towards larger, physical infrastructures for disaster prevention. Chief among these are two projects so monumental in their scope and impact as to be nearly unimaginable in the context of Upper Assam. The first, the ASDMA official told me, is the conversion of the northern bank of the Brahmaputra into a single, uninterrupted state highway stretching from Lower Assam and Kamrupa to Upper Assam and Majuli. In effect, he told me, the proposal represents the construction of a massive, continuous embankment: a permanent ossification of the Brahmaputra itself, and an infrastructural denial of its tendency towards wild channel migration. Existing embankments would have roads constructed over them. In theory, floodwaters would be totally denied entry to the interior of riverine districts like Majuli.

The second proposal is even more ambitious: the dredging of the Brahmaputra itself in an effort to deepen its bed and, in theory, reduce flooding when flow is high. CM Sonowal has supported this proposal. At the 2017 India-Bangladesh friendship summit, the CM said that "dredging of the Brahmaputra and Barak rivers will not only help to deal with the problem of floods, which affects Assam and Bangladesh, but also improve the navigation facilities in the rivers, which can strengthen trade and commerce between India and its neighbors through riverine routes" (Akhtar 29 August. 2017).

Discourse around the dredging of the Brahmaputra among policymakers acknowledges the goal of disaster management, but emphasizes the Brahmaputra's economic potential. The National Waterways Act, introduced by the Lok Sabha in 2015 and passed into law in 2016, envisages the Brahmaputra as a conduit of massive growth in shipping and international commerce (S. 1, The National Waterways Act, 2016). The

CM's statement suggests that this reality, on a river too shallow at the moment to ship most cargo, can only come to pass after extensive dredging. The project, although widely talked about since at least 2016, has not yet been put into motion. Although it is being seriously explored, an ASDMA official tells me, a comprehensive plan to dredge the river "has not materialized yet". This may be, he said, because the silt load of the Brahmaputra is so massive as to render the project nearly useless (Name Withheld, interview by author, Guwahati, August 17, 2018). Development and deforestation along mountainous tributaries of the river, he told me, have increased silt load to the point that the dredged bed of the Brahmaputra "will fill up again within twenty-four hours, unless the upper catchment is dealt with."

That the CM would publicly propose a plan his own officials in the ASDMA believe to be unworkable suggests a disjunction between the politics and engineering realities of dredging. It is reasonable to imagine, assuming the CM is aware of his government's skepticism of the project, that he perceives a political or economic benefit in dredging for its own sake. Given the prominence of graft and corruption within Assam's embankment economy, we may broaden the concept to include a *dredging economy*. That certain contractors, in the context of post-reform India, will profit from perpetual dredging cannot be doubted. The project also provides a sense of urgency to ongoing infrastructural development in the region upriver from Majuli. The Brahmaputra's upper catchment is a site of massive economic and political importance to the Indian state, as well as of concentrated energy potential. The dredging economy, then, may be viewed within the context of a larger push to bring state-making development to

the hilly, river-cut borderlands between Assam and the neighboring state of Arunachal Pradesh.[27]

One Big Disaster: In the Upper Catchment

The Brahmaputra is a complex system, and its upper catchments are the rocky, mountainous landscape of the Tibetan Plateau and Arunachal Pradesh, which contrast with the silty floodplains of the valley below. The hilly borderland between the two states is an important site of development within the wider Look/Act East Policy. The river-cut landscape of Arunachal Pradesh is home to a vast store of untapped hydropower. A series of planned hydropower projects on the tributaries of the Brahmaputra are estimated to raise the state's installed hydropower generation capacity from 97.45 MW in February of 2018 to around 47,000 MW by 2028 (Central Electricity Authority, Arunachal Pradesh State Government, CSO 2018).

Damming along these tributaries has engendered massive opposition from communities in both states, and discharge has triggered flash floods in border districts like Dhemaji. A community organizer and activist working in the district cited intentional discharge and structural failures of dams upriver as the cause of disastrous floods in both 2000 and 2007 (Name Withheld, interview by author, Dhemaji District, July 25, 2018). The Subansiri Lower Dam, directly upriver of Majuli on the border between Assam and Arunachal Pradesh, has sparked particular controversy. Construction of the 2,000 MW

[27] The borders between Assam and Arunachal Pradesh loosely follow the boundary of the Himalayan Mountains and the Brahmaputra River Valley. The state, much of which is claimed by Beijing as Chinese territory, is an important source of stone and hydropower for the more-densely-populated Assam.

dam, which will be the largest in India once completed, has been stalled since 2011 in the face of local protest and litigation (Dodum 12 May. 2019). The Dhemaji community organizer reported feeling that the damming project was "one big disaster," and would have profound impacts on downstream communities as far as the Subansiri's confluence with the Brahmaputra at Majuli. This sentiment is shared along the length of the Brahmaputra River Valley, and damming projects have inspired widespread popular resistance (Sharma 2018).

Hydropower damming has utility for the state beyond energy generation. Gamble (2019) argues that hydropower development projects in the Eastern Himalaya, a region claimed by both China and India and long conceptualized as a frontier borderland, are the manifestations of a state-making competition between Beijing and New Delhi. She writes:

> The fight to control this watershed may be centuries old, but the combination of nationalist fervour and the technical ability to transform its headwaters is new. From this perspective, from the top of the mountain, China and India's nationalist-inspired, competitive state-making threatens rather than protects their majority and minority peoples, and their smaller neighbours. (Gamble 2019)

Hydropower damming is, in this analysis, an expression not only of development policy but of a wider project of state-making in contested territory. The transboundary watershed of the Brahmaputra, then, is a space of geopolitical contestations as well as local and regional conflicts over development. Development policy, as Korf, Hagmann, and Emmenegger (2015) identified in Ethiopia, becomes the medium through which these contestations are expressed. As in other watershed management policymaking in

Assam, disaster management becomes inseparable from the concerns of state-making development.

Damming is not the only mechanism by which development in the upper catchment expresses its influence over flooding and erosion on the Brahmaputra. Residents of Majuli cited boulder extraction and deforestation in the upper catchment as contributors to more serious flooding. Embankments along Majuli are often constructed from boulders removed from Arunachal Pradesh, the closest large source of stone. Removal of these boulders, as I was told by an expert during an interview in Guwahati, increases erosion in the upper catchment and sediment deposition on the bed of the Brahmaputra (Name Withheld, interview by author, Guwahati, July 25, 2018). Counterintuitively, then, the construction of embankments themselves exacerbates flooding, which prompts construction of more embankments. Although there have been no formal studies linking boulder removal in the upper catchment to flooding downriver, the perception is widespread in discussions of flooding in Assam. "The problem," I was told by an activist in Dhemaji district, "is that everything is related. Flood, deforestation, boulder extraction." He described how development along the Brahmaputra tributaries on the Assam-Arunachal border, including damming, deforestation, and boulder extraction, exacerbates flooding and erosion in the valley. "It's a vicious cycle," he said.

The remaking of landscapes in the upper catchments is deeply entwined with the remaking of the Brahmaputra itself, including CM Sonowal's proposals to dredge the river and construct a highway on the river's bank. The dredging effort, he says, will produce an immensity of sand which could be used in the construction of the highway and the reclamation of land lost due to erosion. Sonowal's vision is a violent repudiation

of the Brahmaputra's own perceived violence. By ripping the eroded land from the riverbed itself, he hopes to undo its progressive consumption of Majuli and other riverine districts. These proposals are aimed at halting, and eventually reversing, flooding and erosion. They are also, however, designed to freeze the motion of the river altogether. More broadly, though, Sonowal envisions his rebuilt Assam as the axis around which commerce between South and Southeast Asia tilts. The new Majuli, after the completion of these projects, will be connected to Bangladesh, China, and Myanmar by state infrastructure. If Majuli and the wider Brahmaputra can best be understood through the lens of land-as-motion, then Sonowal's vision is a static landscape: a canvas against which firms can move cargo. The flows of the river are replaced by flows of capital.

Next to Heaven: Bridges, Internal and External

On August 8th, in the Kamalabari Revenue Office, one of Majuli's highest ranking public officials told me that Majuli was not an island. The focus of the interview was land ownership and planned infrastructure projects. I had asked the official about the plans for a bridge between the island and Jorhat, but was taken aback by his response. That anyone on Majuli could understand it as anything but an island was almost unthinkable, and its claim of being the largest river island on Earth relies entirely on that fact. Majuli's island-ness is, for many of the residents I spoke with, central to their understanding of themselves. The island culture is not the culture of Jorhat or North Lakhimpur, nor is its religion or politics. It exists separate from, yet in many ways the archetype of, wider Assam. How, then, could a place so defined by its distinction and its river boundaries not be an island?

The answer, he told me, was that Majuli had stopped being an island once the bridge between it and North Lakhimpur District (the bridge which I had crossed to arrive there) had been built (Name Withheld, interview by author, Kamalabari, August 8, 2018). It was connected now, tethered to the mainland by steel and concrete. That a bridge would invalidate Majuli's island-ness would never have occurred to me. An island, I thought to myself at the time, remains an island regardless of how many bridges are built to it. However, the context of the conversation gave the public official's assertion an additional layer of meaning. That a bridge would be anathema to an island suggests that Majuli is defined by its connectivity, or lack thereof, to the ethnic and territorial politics of wider Assam. If a bridge across a small tributary could remove Majuli's conceptual island status, then how can we understand the proposed bridges across the vastly larger Brahmaputra to Jorhat District?

Bridges have become a central node of the state's development strategy in the Brahmaputra River Valley (Mahanta and Mahanta, 2006). The river, given its width and chaotic nature, is uniquely difficult to bridge. The small number of existing bridges across the Brahmaputra increase access for the state's few major cities, including Guwahati, Diburgarh, and Sadiya. Two additional bridges, one of them connecting Majuli to Jorhat, have been proposed as of June, 2019. CM Sonowal has expressed his support for the project (*The Assam Sentinel* 7 March. 2019). Several residents I interviewed, especially those in the remotest and most flood prone areas, stressed the importance of this proposed bridge. Medical care on the island is not as sophisticated as that which is available in Jorhat. In an emergency, the residents of Bhakat Sapori and

other unmapped land spaces would need to travel hours by bicycle, pole boat, and ferry to reach the city.

Although the public official at the CRO framed connectivity simply between Majuli and the mainland, internal connectivity remains a significant issue for people in flood and erosion-affected communities. Pohardya, a community on a small, remote river island, is accessible only by pole boat or by a bridge of interwoven bamboo. The village is nestled in a copse of trees within sight of the Brahmaputra, and the river drifts by below a three-foot shelf of collapsed banks. Several residents of Pohardya suggested that the damage of flooding would be greatly relieved if the government would invest in transportation infrastructure. "Every year we need to build a new bridge because it is swept away by [the] flood. We go to [the] DC and ask for assistance to build a new bridge, but it does not help" (Name Withheld, interview by author, Pohardya, August 6, 2018). Another resident expressed her frustration at the lack of a bridge out of the village, both during and after seasonal flooding.

> There is no good transportation system to go to school. The bridge is frequently broken and children must use boat or swim to get to school after floods. There are [also] problems with the roads. We have complained to the DC, but he does nothing. (Name Withheld, interview by author, Pohardya, August 6, 2018)

Pohardya's distance from adequate roads is especially worrisome when one considers that roads provide lifelines for households displaced by flooding. One resident of Pohardya recalls, during the flood of 1998, having to go up to the roadside to find high ground. The temporary shelter provided by the government was blown away in the wind.

Another resident's home was destroyed by an elephant, and she also had to seek temporary shelter on the roadside to access government assistance (Name Withheld, conversation with author, Pohardya, August 6, 2018). Although the bridge out of the village is destroyed nearly every year, the creeping advance of the Brahmaputra has made Pohardya a dangerous place to live. Although they have heard that the central government will take steps to protect the village, they have seen no workers come to the sapori. After years of farmland eroding into the river, many men in the village have been forced to become laborers. One resident I spoke to fears for the life of her children when the floods come again (Name Withheld, conversation with author, Pohardya, August 6, 2018).

Although investment of transportation infrastructure is central to the state's development goals, local officials involved in disaster management are skeptical of the efficacy of these large projects. Majuli's DC, during an interview in his office, told me that inland water transport, and not ground transport, was the most important consideration during a catastrophic flood (Deba Prosad Misra, interview by author, Garmur, August 7, 2018). The fear, he said, is that communities like Pohardya will become isolated by water. Several residents, especially Mising people, expressed a similar sentiment. The key to survival during the height of the flood, they said, is a personal boat. These boats can be used to transport livestock, looms, and families to higher ground. These boats are expensive, however. One resident of Bhakat Sapori whose family had been displaced by erosion estimated that an average boat would cost around twenty-thousand to forty-thousand rupees, if one didn't have the skill to build it oneself. He, like many others in flood and erosion-affected communities, had nothing but

skepticism for government infrastructure plans. He planned to find land in Golaghat if his family were displaced again. He told me:

> The water resource central minister came before she was elected and said she will make Majuli next to heaven. But that is only promises. It's fake. It's all fake and corruptness. (Name Withheld, interview by author, Bhakat Sapori, August 5, 2018)

Whether expanded connectivity and transportation infrastructure would improve disaster management outcomes is uncertain. The Brahmaputra is wide, and the engineering demands of bridging such an expansive and excitable river are massive. An academic, during an interview in Guwahati, explained that previous bridges built on the Brahmaputra have necessitated the construction of spits into the river itself, effectively reducing its width without reducing the volume of water. The result of this constriction is an increase in flow rate. The water moves more quickly downriver of the bridge, and flooding can become subsequently more intense (Name Withheld, interview with the author, Guwahati, July 25, 2018). Many residents I spoke with did not believe that a bridge was a realistic possibility. Dr. Goswami of Auniati Satra believed that support for a bridge was not as widespread as it may have appeared to me, and doubted whether officials on the island would support such a project. A resident of Bishnu Pur expects that, since the introduction of the updated ferry system, the construction of a bridge would no longer be realistic (Name Withheld, interview by author, Bishnu Pur, August 9, 2018).

State infrastructure projects, it was suggested to me by the activist I interviewed in Dhemaji, can only do so much in reducing unevenness in disaster relief. Resiliency

must be developed at the community level, and Assam-based NGOs such as the Rural Volunteers Center have been organizing around that purpose. Sanjoy Ghose, before he was murdered, illustrated the effectiveness of community infrastructures for disaster management. Locally-built embankments, although effective for the communities which Ghose organized, are only one of a suite of options available to households and communities for deepening their resiliency to disaster. Many of these options, however, are demarcated along ethnic and religious lines. In the context of Majuli, Mising lifeways have proven to be effective at mitigating the worst impacts of flooding and erosion.

Traditional Livelihoods as Development

While Majuli has been largely untouched by the ethnic violence which has pervaded other districts during the last decade, ethnic differences in livelihood and response to catastrophic flooding and erosion continue to exist on the island. Debojyoti (2015) shows that, although flooding and erosion have had significant negative impacts among Mising communities on Majuli, their access to flood-proof stilt housing and a deep store of traditional adaptation strategies offers a foundation for increased resiliency. The rights and privileges of Scheduled Tribes, such as the Mising, remains a point of fiery contention within Assamese politics, and adaptation strategies perceived to be exclusive to particular ethnic groups (such as Mising stilt housing) seldom bridge the divide. Consequent differences in livelihood and income between ethnic groups are reflected in survey responses.

While flooding and erosion has a major impact on the lives of both Mising and Assamese survey respondents, Mising respondents reported much higher resiliency.

While only 9.3% of Assamese strongly or somewhat agreed that they had the resources or skills to replace or repair damage caused by flooding and erosion, 59% of Mising respondents reported that they did. While 34.4% of Assamese respondents strongly or somewhat agreed that their neighbors were prepared for catastrophic flooding and erosion, 71.88% of Mising respondents were confident in their neighbors' preparation. 20.93% of Assamese strongly or somewhat agreed that they had a plan in place if their family was to be displaced, while 34.4% of Mising said the same.

While we should be wary of essentializing ethnic groups based on a small sample of research participants, many Mising interviewees reported confidence in the ability of their communities to overcome catastrophic flooding and erosion. In towns and villages like Jengraimukh in northern Majuli and Sumoimari Ghat on the banks of the Brahmaputra, interviewees often cited the Mising community's long history of adaptation to the Brahmaputra's seasonal flooding. Most Mising, as I was told by a community and religious leader in Citadar Chuk, continue to build their houses on stilts. This architectural style is common in other flood-prone parts of the world. These houses are often modular, made of bamboo slats which can be disassembled with relative ease or abandoned and rebuilt without significant financial resources. Figure 12 displays an example of flood-resistant bamboo structures built in the traditional Mising style on inundated land. The construction in the image is typical of Mising buildings throughout Majuli.

Mising families often supplement their income through crafts such as loom-weaving and boatbuilding, skills which require easily-transported equipment (Name Withheld, interview by author, Citadar Chuk, August 2, 2018). Unlike most Assamese on

Majuli, Mising often raise hogs. These animals represent a significant store of capital which, unlike cattle, can be easily transported to higher ground by boat during a flood. The interviewee reported that, while flooding undoubtedly impacts lives in Mising communities, it does not represent the sort of existential threat to those communities that many Assamese respondents felt it did to theirs.

The livelihoods of Mising people are, according to a Mising community organizer living in Jengraimukh, heavily reliant on skills and modular property. Mising people, she told me, have traditionally built semi-migratory communities in response to the dynamism of the Brahmaputra and its tributaries. The outcomes of flooding in these communities are less severe, and bamboo homes taken by erosion represent less lost capital than lost concrete homes. The latter are the standard in Assamese communities (Name Withheld, interview by author, Jengraimukh, August 2, 2018). A rural organizer and activist in Dhemaji district reported that his organization has been encouraging the adoption of Mising traditional practices in Bodo, Assamese, and Bengali communities prone to flooding. These technologies are a major component of community training and a point of advocacy for his organization's work in Dhemaji. In districts like Majuli, where erosion is likely to affect nearly all communities at some point, he argues that their use is a long-term inevitability (Name Withheld, interview by author, Dhemaji District, July 25, 2018).

Figure 12: Flood-resistant structures, constructed in the traditional Mising style, on inundated land. Image taken August 2, 2018

This adoption of cross-ethnic adaptation strategies has not, as of yet, materialized. Although Majuli is perceived by many to be exempt from the worst of Assam's ethnic violence, it is does not exist completely outside of the state's larger ethnic politics. Most survey respondents (84%) strongly agreed that they would want to resettle in a community of people from their own ethnic group if they were displaced. Several interviewees, although by no means a majority, expressed some frustration about the perceived privileges granted to members of Scheduled Tribes. "Tribal people need to pay less for house replacement," one Bhakat Sapori farmer told me. "Tribal people get special

treatment even if relief is the same" (Name Withheld, interview by author, Bhakat Sapori, August 5, 2018).

Whether these technologies and lifeways can cross the fractured ethnic politics of Assam remains doubtful, but their utility in a landscape as dynamic and ephemeral as Majuli's unmapped lands is not. If we are to understand this landscape through the lens of land-as-motion, then we must also understand adaptation and resettlement strategies by their fluidities as well. While communities in other parts of Assam have agitated for land tenure based on patta titling and privatization, I assert that economic development and disaster management strategies based on this form of tenure have largely failed in Majuli. Other examples, such as Mising strategies for effectively moving with the landscape, may serve as a source of inspiration for a more appropriate form of tenure and disaster management which has yet to be articulated. Before policy reform, however, there must be a reimagining of the supposedly violent landscape of the Brahmaputra on the part of the state.

CONCLUSION: REIMAGINING A VIOLENT LANDSCAPE

The cartographic imagination of the state understands Majuli as a static landscape which can be parcelized, titled, and distributed. Disaster management policy has been built on the bedrock of this imaginary Majuli. Unmapped land and its residents, existing outside of this cartographic imagination, suffer from uneven outcomes following disaster. Rather than understanding Majuli through the lens of land-as-motion, New Delhi has prioritized its geopolitical goals by attempting to halt the movement of the river. Massive infrastructure projects, most of which are either ineffective or unrealistic, have been

proposed in order to subdue the motion of the landscape and encourage the motion of capital.

While some outcomes of disaster management on Majuli (such as short-term emergency aid) are perceived by most residents to be largely equitable, more are constructed on the foundation of a land ownership system which relies on a static understanding of the Brahmaputra and its geomorphology. The intertwined processes of riverine change and land ownership policy have produced a disaster landscape defined by the tension between cadastral and un-surveyed land.

Residents of communities at risk of displacement exercise agency over their relationship to the river and its changes, but are largely unable to meaningfully interact with the ambiguities of government restitution policy. Residents of cadastral patta land may, if displaced and able to prove ownership, expect financial compensation for lost homes, lives, and agricultural lands, and therefore invest more freely in disaster mitigation strategies. Residents of reclaimed, unmapped land, in contrast, are often forced to live in a state of precarity. For many of these residents, disaster management means only short-term emergency aid. Many residents are uncertain of the official designation or status of the lands on which they live and work. Local, state, and national governments have largely failed to communicate the process by which they manage the interaction between land tenure and flooding. Many residents express exasperation with a set of disaster management policies which are perceived to prioritize ineffective infrastructural projects at the expense of a holistic resettlement strategy.

Displaced residents of un-surveyed and reclaimed land are often forcibly relocated to similarly precarious new homes in which they have little anticipation of

being safe from future displacement. These residents, who are deeply in need of government assistance but ineligible for much of it, are much more likely to be repeatedly displaced than the residents of patta land who qualify for restitution and government aid. The result is a semi-permanent, semi-migratory group of residents which exists in a state of near-perpetual displacement due to the particular interactions of government land policy and the geomorphology of the Brahmaputra itself. These residents deserve to be included in the bureaucracy's mental map of the Brahmaputra. A more flexible and dynamic understanding of land tenure and river morphology within the geographic imagination of state disaster managers would significantly reduce the perceived violence of the Brahmaputra.

While it is easy to prescribe more flexibility, it is harder to articulate exactly how state disaster managers and surveyors can achieve it. Although exact policy remedies are outside of the scope of this study, we may explore future directions of disaster management along the Brahmaputra. If unmapped land and the perennial displacement of its residents is the cause of unevenness in disaster management on Majuli, then land-as-motion can be a model for its success. We may imagine a disaster management system in the Brahmaputra River Valley which de-emphasizes the role of cadastral lands in the distribution of resources, acknowledges and embraces the geophysical fluidities of lands and waters in at-risk districts, and breaks the ouroboros of post-reform development financing and disaster management.

While resurgent land reform movements across the Global South have emphasized the role of private property protections for smallholders, post-reform understandings of private land ownership in Indian development policy are poorly-suited

to the geomorphology of the Brahmaputra. Cadastral surveying and distribution of privately-owned patta land parcels perform poorly as guarantors of property rights in a context in which land is rapidly created and destroyed. A land tenure system which protects the rights of smallholders while acknowledging traditional understandings of land and its motion would do much to resolve the tensions within state disaster management policy. What potential forms this system may take, and whether such a system is politically viable, are beyond the scope of this study. Any successful reform of land tenure along the Brahmaputra must be accompanied by a formalized resettlement system which acknowledges the humanity of the displaced. A disaster management system which is tied to taxonomies of land and ownership can only produce taxonomized subjects: the landowner and the migrant, the secure and the displaced.

In addition to breaking the centrality of cadastral surveying along the Brahmaputra River, a reimagined disaster management system must also divorce itself from the need to ossify a geomorphology which tends towards motion. Large infrastructure projects which attempt to limit this motion have reinforced uneven disaster management outcomes rather than rectifying them. Freezing the avulsion and migration of the Brahmaputra's channels through the construction of a shoreline highway or the dredging of the riverbed represent an inversion of effective land policy. Rather than developing a land and disaster management system which reflects the geophysical dynamism of the Brahmaputra, policymakers have pursued a strategy of warping the landscape to fit established policy. If land-as-motion conflicts with a disaster management regime built on private land tenure, then the motion of the land must be halted so that privatization can become effective.

Although large-scale development proposals are built around technocratic disaster management rhetoric, some policymakers emphasize their geopolitical and economic utility. The logic of development in post-reform India stresses expansion of capital access and international trade, and envisions the Brahmaputra as a primary corridor for the movement of international capital. Residents of the Brahmaputra's unmapped lands are forgotten in this analysis. That these unmapped lands are produced and taxonomized by an understanding of the landscape which refuses to acknowledge its motion is not considered. The thrust of policy proposals has been towards calcification, parcelization, and capital-intensive infrastructure.

Where this infrastructure already exists, it is often poorly constructed or left unfinished. Embankments, although effective at preventing catastrophic flooding in some circumstances, are too-frequently allowed to become instruments in a political economy of development captured by graft and corruption. Half-completed embankments haunt Majuli's shoreline communities, and even completed embankments often exacerbate damage due to catastrophic flooding. In limiting the movement of the river, they have impeded local access to fisheries. In altering the "natural flood" (as one resident phrased it), they have prolonged inundation when floodwaters do overtake them. Continued investment in these projects is justified by their perceived economic benefit, and not their efficacy in improving disaster management outcomes. The chief utility of these projects is their value as conduits of capital from policymakers to rent-seeking contractors and construction interests.

This embankment economy, like the proposals to dredge and pave the Brahmaputra and transform it into a trade corridor, deploys disaster management as a

rhetorical cloak. Undergirding all of these proposals is the logic of market-oriented development in post-reform India. This logic places immense value on the Northeast, and the Brahmaputra River in particular, as a passageway for international capital between South Asia and ASEAN. A reimagining of disaster management along the Brahmaputra must break the state's understanding of the river and its residents as subjects of development, or elements to be transformed according to a geopolitical vision.

A reimagined disaster management regime along the Brahmaputra should articulate local and traditional understandings of land-as-motion. In doing so, it would dissolve the inflexible spatial categories which have dominated the state's cartographic imagination of the Brahmaputra. Uneven disaster management outcomes are largely a function of the tension between the imaginary landscape and the geophysical landscape. The challenge, then, is to remake the imaginary landscape. In doing so, disaster managers would abolish the perverse taxonomies of unmapped land which it produces. Policymakers have, however, chosen to remake the physical landscape so that it more closely resembles the cartographic imagination of the state.

The supposed violence of the Brahmaputra has been central to both popular and scholarly understandings of displacement along its shores. The human tragedy which accompanies flooding and erosion in riverine communities is framed as the consequence of natural disaster, or the expression of a violent landscape. I assert that this violence, rather than being a natural and inevitable occurrence, is produced by the clashing geographies of state and sediment. To reimagine disaster management on Majuli and the wider Brahmaputra, we must first reimagine space and landscape as they are represented within the imagination of post-reform India. We must develop a new understanding of the

Brahmaputra: not as violent, but as dynamic. Where imaginary landscapes have produced unevenness and state violence, new imaginaries can acknowledge the land-as-motion, abolish the distinction between cadastral and unmapped lands, and develop a disaster management system which embraces and utilizes, rather than combats, the dynamism of the Brahmaputra.

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