# Sedimentary logics and the Rohingya refugee camps in Bangladesh

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## ABSTRACT

This paper adopts a geosocial approach to sociopolitical research by thinking with sediment as a forceful mode of terraqueous mobility driven by interactions between dynamic earth systems inflected by social processes. It demonstrates that sediment is an active and vital state of matter, with the potential to erupt into and disrupt human politics. Unpacking sediment as a form of movement challenges assumptions of the earth as a stable platform on which socio-political processes play out. The paper develops its argument through analyses of the Rohingya refugee camps in southeast Bangladesh and a *char* (sediment) island in the Meghna Estuary to which Bangladesh proposes to relocate the refugees. In the first situation, the sedimentary logics of anticline geology, deforestation and monsoon rains push back against political agendas directed towards constraining refugee movement. In the second, fluvial and oceanic sedimentary dynamics and the post-Holocene volatility of the monsoon throw into doubt the engineering solution proposed by Bangladesh to the political problems the refugee presence poses. Through these examples, the paper adds to literature on how states of matter inflect, exceed, undercut or in other ways interfere with matters of state through their unique, dynamic environmental properties.

## 1. Introduction

In their introduction to the special issue of *Theory Culture and Society*: *Geosocial Formations and the Anthropocene*, Nigel Clark and Kathryn Yusoff (2017: 3) argued that for some time "most social thought has taken the earth to be the stable platform upon which dynamic social processes play out." However, they argued, contemporary climate change and the Anthropocene thesis are prompting social thought to engage more closely with the dynamics of earth systems and to consider how social and political agency is constrained, made possible and emergent with earth forces. This proposition reiterated Elizabeth Grosz's (2012) call to think through rather than about the earth and to afford political power to "the elemental forcefulness of the earth itself" (Clark, 2017b, p. 223).

In this paper I take up this geosocial approach to sociopolitical research by thinking with the materiality and mobility of sediment and sedimentary processes. My interest in sediment arises from an ongoing research project into the monsoon as a global weather system and its socio-political entanglements in south and southeast Asia. While sediment rarely features in materialist geopolitical analyses except as sedimentary strata (Clark, 2017b; Yusoff, 2017) and is largely absent from hydropolitical analyses that focus on water (Kaika, 2005; Linton, 2010; Swyngedouw, 2004, 2015), it features strongly in monsoonal political

analyses (Cederlöf, 2014; Lahiri-Dutt & Samanta, 2013). This prominence is predicated on the annual cycle of monsoon rains that transform soil and strata into terraqueous sediment in vast quantities and mobilize it in ways that have long evaded attempts to govern it (Da Cunha, 2018; D'Souza, 2006). The monsoon, in other words, introduces hydrological dynamics to territory and sediment to politics. It stretches materialist theories of politics into dynamic geohydro sedimentary terrains (Elden, 2017).

Thinking with sediment as a geosocial materiality brings the paper into conversation with recent work on the geopolitics of material planetary mobilities (Peters, 2015; Peters, Steinberg & Stratford, 2018, particularly the chapters by Nieuwenhuis and Whitt). Nieuwenhuis (2018) discusses the mechanics of air-born sediment as it whirls around in suspension and Whitt (2018) analyses the sticky viscosity of mud and its translation into political disputes and bodily discomforts. Both speak to what I attempt to do with sediment in this paper. As are dust and mud, sediment is a mobile, terraqueous state of matter that challenges imaginaries of *terra firma* and undercuts notions of territory as dry, stable or bounded. Sediment is a reminder that territory was born when the geometers of the Nile River settlements retraced the borders of fields each each year when the river's flood waters withdrew (Clark, 2017b; Elden, 2013). From this annual apportioning of alluvial deposits, politics, laws and territory were born (Serres, 1995). Territory, in other

words, was a political technology of sediment (Clark, 2017a). As such, it was always provisional and open to annulment by subsequent flows of earthly matter-on-the-move.

Sediment is the product of the decomposition of earth strata by weather. It is particulate matter formed when surface strata are mechanically or chemically broken down by exposure to the atmosphere, and then carried by air, water or technology across the surface of the earth. Sediment thus exceeds its identification with sedimentation, understood as the concentration and layering of forces into strata (Yusoff, 2017). It is earthly matter in a mode of terraqueous or terraerial mobility. Its properties arise from processes of weathering, erosion, saltation and alluviation that characterize the dynamic reworking of the earth's surface by weather, wind and water. These dynamics and the characteristics of sedimentary movement they give rise to call for geopolitical theorization as much as strata do. By tracking and telling stories of how sediments form, travel and settle, of who or what they meet along the way and of the political disputes they become tangled up with, possibilities for re-thinking the materiality of politics are opened up (Cresswell, 2010; Peters, 2015).

In this paper, an analytic of sediment is brought to bear on the stateless condition of Rohingya refugees in Bangladesh. In international law, a stateless person is one who is not considered to be a national by any state under the operation of law and whose rights as defined by law are denied (Goris, Harington & Köhn, 2009). This denial includes denial of *jus soli*, the law of the soil, which provides that those born in the territory of a country have the right to citizenship of that country. To be stateless is not only a juridical category, but also a material, environmental one - denial of access to soil. This does not mean that the stateless are without soil, but rather that their access to soil is fragile, tenuous and always provisional. In the paper I argue that in the Rohingya refugee camps in south-east Bangladesh and the *char* (sediment island) in the Meghna Estuary to which Bangladesh proposes to relocate the refugees, the materiality of sediment undercuts statist mechanisms to assign the Rohingya to soil, albeit temporarily. In the first situation, the sedimentary logics of anticline geology, deforestation and monsoon rains undermine the statist-humanitarian assemblage Bangladesh has put in place to accommodate the Rohingya. In the second, fluvial and oceanic sedimentary dynamics and the post-Holocene volatility of the monsoon throw into doubt the engineering solutions proposed by Bangladesh to shore up its solution to the political problems the refugee presence poses. In both cases, sediment serves as an affective reminder of the unruliness of territorial materialities in relation to statist agendas, as well as of the precarity and valuelessness of stateless life to statist machines.

The paper comprises five sections. The first section discusses the dynamics of sedimentary mobility and its potential for violent territorial and social disruption. The second introduces the reader to the Rohingya and their relations with Bangladesh, sketching out the complex layers of historic entanglement between them. In the third and fourth sections, the paper discusses the Rohingya camps in southeast Bangladesh and the *char* island in the Meghna Estuary through the analytic of sediment. The paper argues that in both situations the vast humanitarian "apparatus of capture" (Deleuze & Guattari, 1987, p. 424) assembled by Bangladesh to contain and constrain the refugees is exceeded and undercut by sedimentary logics. The paper concludes by summarizing its contribution to emerging fields of scholarship on volatile, intractable more-than-human terrains which impede or disrupt a state's vision (Usher, 2019).

In preparing the paper, I consulted and integrated a range of literatures and sources. These ranged from scientific literature on sedimentary processes in Bangladesh and the Bay of Bengal (Rogers & Overeem, 2017; Brammer, 2014; Uddin, Alam, Khan, Hasan, & Rahman, 2014; Hussain et al., 2012; Rogers, 2012; Mohanti, Nayak, Pradhan, & Panda, 2008; Keuhl, Levy, Moore, & Mead, 1997) to historical texts on the Rohingya (Abdelkader, 2013; Chan, 2005; Yegar, 1972). Grey literature (UN and other NGO reports) of the Rohingya crisis as it developed from 2017 onwards was a source of information about the refugee camps, and

I visited the UN's Office for the Co-ordination of Humanitarian Affairs (UNOCHA) in Yangon in 2018 and interviewed several researchers who were working in the Rohingya camps in both Myanmar and Bangladesh. In addition to this, given that the situation I was researching was current and fast moving, I worked with media reports, though I was limited to what I could access online and in English. The *Dhaka Tribune*, a national English language daily in Bangladesh, was particularly thorough in its coverage of the refugee crisis as it unfolded. In relation to the facility on Bhasan Char, few, other than those who work there are able to access it and information about it is limited. I gleaned what I could from online sources – media reports, satellite imagery and YouTube videos made by reporters who had managed to visit it. The data informing the paper was thus a patchwork of information from multiple, diverse sources. The data were analyzed from the perspective of what they revealed about the dynamics of sediment and sedimentary processes, insofar as they interfered with the territorializing impulses of the statist-humanitarian machine in the refugee camps of Bangladesh. The paper is an attempt to integrate these various sources to produce new insights into the constraints placed on geopolitics by dynamic terraqueous, sedimentary terrains.

## 2. Sediment

This paper owes considerable debt to Nigel Clark (2017b: 211) idea of the "politics of strata." Prompted by Deleuze and Guattari (1994, 1987) who "keep coming back to the idea that our planet pulses with the possibility of destratification, new combinational possibilities, reorganization." Clark (2017b: 213) proposes that "all human life - all life in general - plays on the potentiality of the "stratifying-destratifying earth." This idea taps into ideas present in Nietzsche (1968), Bataille (1991) and Deleuze and Guattari (1987) of the earth and its strata as excessive, ungrounded and ungrounding. While "the process of stratification might lock in the flux, free play and intensities of a particular strain of matter-energy … strata remain a locus of essential redundancy, the embodiment of a potentiality that always exceeds their current state" (Clark, 2017b, p. 224). Clark quotes from stratigrapher Jan Zalasiewicz (2008: 17) who describes the earth as "a gigantic machine for producing strata." Its mechanics are driven by the "churning currents of magma in the inner earth" (Clark, 2017b, p. 213) powered by the radioactivity of the planetary core, and by the earth's atmospheric and hydrological circulation systems, propelled by incoming solar energy (Zalasiewicz, 2008). Produced by interactions between the earth's coupled systems - the lithosphere, the biosphere, the hydrosphere and the atmosphere, strata and strata forming processes are the forcefulness through which life and politics unfold (Clark, 2017b; Grosz, 2012; Yusoff, 2017).

Sediment is the product of these interacting earth systems. It is what happens to strata when they are exposed to weather, when their particulate matter is unlocked or chemically transformed by the atmosphere and carried by air, water or technology across the surface of the earth. Sediment is lively, restless and, to humans, profoundly unsettling. Suspended in the air or dragged along river beds, sediment moves in lively constellations by saltating (from the Latin *salire*, to leap, and *saltare*, to dance) along. In water, its particles form turbulent, relational terraqueous assemblings, along with liquids, surfaces, textures, other organic and inorganic matter, gravity, slope, shape and volume. As they move, sediment particles are abraded, scratched, rubbed and generally worn down by friction until they end up as tiny fragments a fraction of a mm across, when they become viscous and sticky. In places these particles aggregate and accumulate, in others they undercut and erode, in others they flow on unimpeded. Over long periods of time, they pile up, push down and lithify into new layers of sedimentary strata - shale, sandstone, siltstone or claystone – awaiting remobilization by future tectonic upheaval. Sedimentologists tell us that while sedimentary rocks comprise only about five per cent by volume of the terrestrial crust, they make up eighty to ninety per cent of its surface and contain its entire store of groundwater and fossil fuels (Encyclopedia Britannica, 2019).

Sediments are thus the earth's liveliness, its archives (Yusoff, 2017) and its storage deposits. They serve as testament to the earth's history, and increasingly, to human interference with it (Zalasiewicz et al., 2008).

In the northern part of south Asia, a billion tons of sediment is transported each year from the Himalayas to the Bay of Bengal by the Ganges, Brahmaputra and Meghna Rivers and their many tributaries. For most of the year these rivers carry their sediment load sluggishly, but during the monsoon rains from June to October they change into forceful, sediment heavy torrents. These rivers evade the logics of hydrology because they are too weighed down with sediment, and of strata, because they are too mobile. To understand them requires thinking with the logics of sedimentary mobility. Here I was inspired by Peters (2015) whose paper 'Drifting: Towards Mobilities at Sea,' proposed that thinking through drifting as a mode of mobility (what it is, who or what drifts, how and under what conditions and what it means and how it feels to drift) unlocks knowledge about the earth beyond that of static, solid earthiness. I propose that thinking through sedimentary mobility offers similar insights.

Sediments, whether dragged along a surface or in suspension in air or a fluid, move by saltating (from the Latin *salire*, to leap, and *saltare*, to dance) along (Parsons, Cooper, & Wainwright, 2015). At low velocities, particles stay in contact with the lower surface and roll along. This is called creep or reptation. Here the forces exerted by the fluid on particles are only enough to roll them over the point of contact with the surface. Once fluid velocity reaches a certain critical value, the drag and lift forces exerted by the fluid are sufficient to lift particles against gravity from the surface. Particles are accelerated by the fluid, but pulled downward by gravity at the same time, causing them to travel in roughly ballistic trajectories. If particles obtain sufficient speed from the acceleration by the fluid, they bounce up again and can eject, or splash, other particles in saltation, which intensifies the process. Particles might also disintegrate on impact with a surface or eject finer sediment particles from their mass. In air, this process is known as saltation bombardment and creates most of the dust in dust storms. While moving, sediment particles are also worn down and reshaped, their bumps, angles or smoothness recording their journey. Sediments are thus lively trans-corporeal bodies (Alaimo, 2018), barely distinguishable from the dynamics and characteristics of their mobility. In their interactions with fluids, gravity, surface, texture, area and gradient they form an intra-active, turbulent process of mutual becoming (Parsons et al., 2015).

In describing this dance of sediments, the reader might have noticed that I have used militaristic terminology - ballistic trajectory, projectile, bombardment. This terminology is used because saltation is a mode of mobility in which a fluid transforms sediment particles into little missiles set against and reshaping each other and the environments they move through. This mobility carries with it the potential for violent territorial and social disruption. In Bangladesh it can result in sudden, territorial ruptures known in Bengali as *chapa banga*, *banga* or *hanria banga*.

*Chapa banga* literally means the breaking of the bank in *chaps* (chunky portions) and occurs during the rainy season when the rivers overflow in swift currents … *Banga* or the breaking of the soil can wipe our large pieces of land - from one to two acres - in a matter of minutes. The breaking is often preceded by a sound that can be heard from a distance and the formation of large rings of circular water currents called *ghurnis* that loosen the soil along the bank walls and make them slide immediately. *Hanria bhanga* means the breaking away of the soil as if it is a clean sweep down to the bottom of a *hanri* (a round cooking pot). In *hanria bhanga*, the strong, speedy and sharp undercurrent of the river cuts through the soft, sandy layer and reaches two to three kilometres inland from the bank (Lahiri-Dutt & Samanta, 2013: 40–41).

These ruptures produce what is known in Bangladesh as "the land of Allah *jaane* (of God only knows)" (Baqee (1998) in Lahiri-Dutt (2014: 24), referring to the precarious, nomadic units of land called *chars* that emerge from sedimentary processes each year. These lands are transient assemblages of geo-hydro matter-energy that move around each year and may disappear without notice. They have historically been occupied by precarious, marginal populations, often those without official documents. Those who live on them lead perilous, calamitous lives. When the monsoon breaks and the flow of the river increases each year, their land frequently deserts them, their shelters are devastated, crops are damaged and livestock washed away. As the river recedes, new *chars* emerge and fierce, at times violent struggles to occupy them ensue. These are overseen by local strongmen who exert unquestioned authority over the distribution of land, and subject *char* dwellers to subservience (Lahiri-Dutt, 2014; Lahiri-Dutt & Samanta, 2004). This land cannot be mapped or legally owned or recorded in revenue papers because it moves around too quickly and too frequently. Attempts to control it go back to when the East India Company took over the management of Bengal, Bihar and Orissa from Mughal Emperor Shah Alam in 1765. The British, confounded by the seasonal transmogrification of the territory, attempted to fix Bengal's geo-hydro flows on maps by surveying them and on the earth by constructing embankments (D'Souza, 2006). However, these measures to engineer the division of land from water were disrupted each year by sediment transporting monsoonal torrents.

## 3. The Rohingya

The Rohingya are Muslims of the Mayu Frontier of Myanmar's Rakhine (formerly Arakan) State. Rhakine lies between the Bay of Bengal and the Arakan Mountains and borders Bangladesh across the Naf River. The history of the Muslim presence in Rhakine State is disputed. Rohingya historians claim indigenous status traceable back for more than 1000 years while others trace Rohingya history back only to the 1950s when Bengali Muslim intellectuals began to call themselves Rohingya. They were descendants of immigrants from the Chittagong District of East Bengal who had migrated to Arakan after it was ceded to the British at the end of the first Anglo-Burmese War (1824–26) (Chan, 2005). However, there were Muslim settlers in Arakan long before 1826. The earliest of such settlers were the Bengali retinues of King Min Saw Mon, the founder of the Mrauk-U Dynasty (1430–1784). They were allowed to settle in Mrauk-U after the King regained his throne with military assistance from the Sultan of Bengal (Chan, 2005). In the 17th Century, the Muslim population in Arakan grew when Bengali slaves were acquired by the Arakanese from the Portuguese and assigned to agriculture and other services. Arakan was conquered by the Burmese in 1784, who ruled it until 1824. During this period, many Arakanese fled to British Bengal. As a result, when the British annexed Burma in 1826, Arakan was scarcely populated. Favouring Bengalis over Burmese, the British encouraged Bengali Muslims to migrate as agriculturalists into the fertile valleys of Arakan to reinstate former high yield paddy fields. At the time, there was no international boundary between Bengal and Arakan and no restrictions were imposed on movement between the two territories. In the 1830s, thousands of Muslims migrated from Chittagong to Arakan as seasonal labourers. Their labour provided the impetus for the economic development of Arakan. Arable land expanded 4.5 times between 1830 and 1852, regular shipping lines opened between Akyab (now Sittwe) and Chittagong and Akyab became one of the major rice exporting cities in the world. During this period the British introduced policies favourable to Bengalis in Arakan. These policies included the Zamindary System that allocated land on 99 year leases to Bengalis while denying leases to the Arakanese. Arakanese peasants who had fled Burmese rule and returned after British annexation were thus deprived of the land they had previously owned through inheritance. Bengali Zamindaries did not want Arakanese as tenants, instead importing Bengali peasants to cultivate their lands. As a result, many Chittagonians made Arakan their home and after a century of colonial rule they

became the numerically dominant social group in the Mayu Frontier (Chan, 2005).

Peaceful co-existence between Muslims and Buddhists in Arakan was maintained until beginning of World War Two despite political, ethnic and religious cleavages that had been simmering for a century (Chan, 2005). After the withdrawal of the British from Burma in 1942, ethnic violence between Arakan Buddhists and Muslim Chittagonians broke out. Yegar (1972) suggests that underlying cause for the violence was the Zamindary System, aggravated by Buddhists and Muslims siding with the Japanese and the British respectively during the Second World War. This conflict transformed the Mayu Frontier into a no-go-zone, with many atrocities committed on both sides. In 1946 Arakan Muslims formed the Muslim Liberation Organisation (MLO) and sent a delegation to Karachi to discuss a proposal with the leaders of the Muslim League to incorporate some of Arakan State's northern townships into East Pakistan. This proposal was ignored. In 1948, after subsequent demands for recognition made to the newly independent government of Burma were also ignored, the MLO, renamed the Mujahid Party, destroyed Arakan villages in the north of Maungdaw. In a historical reversal of the Zamindary system, one of the major reasons for this rebellion was that Muslims who had fled Japanese occupation were not allowed to resettle in their villages (Yegar, 1972). In 1951 the Mujahid Party demanded that Northern Arakan become a Muslim State as an equal constituent of the Union of Burma. This demand was not acceded to. Subsequent uprisings in the guise of Jihad encouraged by Muslim clerics gave way to banditry, arson and rape and the frontier was thrown into turmoil for a decade. In 1962 a military coup resulted in Burma becoming a one-party military state and the Mujahid movement was driven underground. In 1982, the military government passed the Citizenship Act that recognized only ethnic groups who had lived in Burma since before 1824 when the First Anglo-Burmese War began. This legislation was designed to deny citizenship rights to Rohingya Muslims, most of whom had arrived in Myanmar after 1824. In this way the Rohingya became officially stateless. They were subsequently denied citizenship documents, education, employment, freedom of movement or the right to marry freely and were vulnerable to arbitrary detention, forced labor, discriminatory taxation and confiscation of property (Abdelkader, 2013).

In 1978 the Myanmar military had launched a nationwide initiative known as *Naga Min* (Dragon King) to register the population prior to a national census. This initiative provoked the flight of 200,000 Rohingya into Bangladesh, where they were not welcome and denied food aid to force them back to Myanmar. It should be noted that Bangladesh is not a signatory to the 1951 UN Convention Relating to the Status of Refugees nor its 1967 Protocol. The UNCHR only operates in Bangladesh via a Memorandum of Understanding signed in 1993. There is also no specific provision for refugees in Bangladesh's legislative apparatus. The law governing their presence is the 1946 Foreigners Act, which grants the government the powers and discretion to decide on the scope of the Act's application (UNCHR, 2012). In 1978, more than 12,000 Rohingya refugees starved to death and others were forcibly repatriated. According to one scholar, this hostility was owing to the siding of the Rohingya with Pakistan during the Bangladesh War of independence (Yegar, 1972).

Again in 1988 and 1992, Rohingya Muslims fled to Bangladesh after counter insurgency campaigns against them. After the 1992 incident, 250,000 remained in Bangladesh. 28,000 were registered as refugees and lived in two official United Nations High Commissioner for Refugees (UNCHR) refugee camps, Kutupalong and Nayapara, and up to 220,000 lived in surrounding villages as undocumented migrants (Sidhu & Parnini, 2011). In 1993, the UNCHR and the Bangladesh authorities signed a memorandum of understanding guaranteeing protection of the Rohingya in the refugee camps and setting out a process of voluntary repatriation. At the same time, the UNCHR and Myanmar agreed the issuing of identity cards and limited rights to movement and employment for those who returned to Myanmar. Between 1993 and 1997, 230,

000 Rohingya returned to Rakhine State, though many subsequently went back to Bangladesh (Danish Immigration Service, 2011). In March 2016 Aun San Suu Kyi's democratically elected government took office in Myanmar and hopes were high that Rohingya citizenship would be restored. In October 2016 however, attacks were launched on police posts in northern Rhakine State allegedly by Rohingya militants. The subsequent security operations saw 87,000 Rohingya flee into Bangladesh. In August 2017 further attacks on police posts resulted in hundreds of Rohingya villages being burned to the ground. A mass exodus of 600,000 Rohingya followed in 2017. They joined the estimated 200,000 Rohingya already living in Bangladesh concentrated in its two southernmost *upazilas* (districts), Ukhia and Teknaf. The refugees were accommodated in refugee camps, makeshift settlements and local villages or stranded in the border regions of Bandarban and Cox's Bazaar (United Nations & Partners, 2017). Here a geological borderland of sub-ducting, folding tectonic plates is substrate to a frontier culture, where traditionalism meets Islam meets Buddhism and weak institutions of democracy are subject to political, ethnic and religious violence and cleavage (Guhathakurta, 2018).

## 4. Anticline geology

The Rohingya refugee camps are concentrated on the Teknaf Peninsula, a narrow finger of land sixty km long and five to ten km wide between the Bay of Bengal and the Naf River, which is the boundary between Bangladesh and Myanmar (Fig. 1). To the north of the peninsula is an area of approximately 40 sq. km (4000 ha) that is recognized as protected forest by the Bangladesh Forest Department. In September 2017, 800 ha of this forest were allocated for the extension of the UNCHR's Kutupalong camp set up by the 1993 Memorandum of Understanding between the UNCHR and Bangladesh. Prior to the 2017 influx, Kutupalong was home to 13,900 refugees. 100,000 undocumented Rohingya lived in makeshift settlements around it (Danish Immigration Service, 2011). To its south, separated by a swathe of forest, was Bulukhali, another makeshift settlement. By 8 November 2017, these settlements had become contiguous, forming the Kutupalong-Balukhali expansion site. It was the largest refugee settlement in the world, housing over 600,000 refugees. Just to its south the Jamtoli, Hakimpara and Potibonia settlements housed another 100,000 refugees. Further south, Nayapara and Leda had joined to form a third sprawling concentration of more than 88,000 refugees, spreading into surrounding villages (Strategic Executive Group, 2018) and an estimated 56,000 refugees were absorbed into host communities (Tani & Rahman 2018).

The 2017 influx of 600,000 Rohingya refugees into Bangladesh was met by an extensive administrative machine, which Deleuze and Guattari (1987: 424) might call a humanitarian "apparatus of capture." It was coordinated by a National Task Force set up by Bangladesh, chaired by the Foreign Secretary with participation from twenty-two ministries, including the military, security and intelligence agencies. A District Task Force led by the District Commissioner monitored and coordinated activities on the ground. These initiatives were supported by the humanitarian sector, through an Inter-Sectoral Coordination Group (ISCG) hosted by the International Organisation for Migration (IOM) under the UNCHR's Resident Co-coordinator. By March 2018, the humanitarian sector included 130 organisations, ranging from UN Agencies, the Red Cross and the Red Crescent to civil society, faith and government based organisations (Strategic Executive Group, 2018). The refugee camps were divided into zones each managed by a government-appointed Camp-in-Charge official. Humanitarian agencies were allocated to zones as site management partners. Refugees were organized into groups of two hundred families run by Rohingya leaders selected by the Bangladesh military (Karim, 2018). Refugees did not have freedom of movement to leave the camps or the right to take up work outside the camps. A large surveillance system was set up, including a network of internal and external intelligence officers who controlled who and what
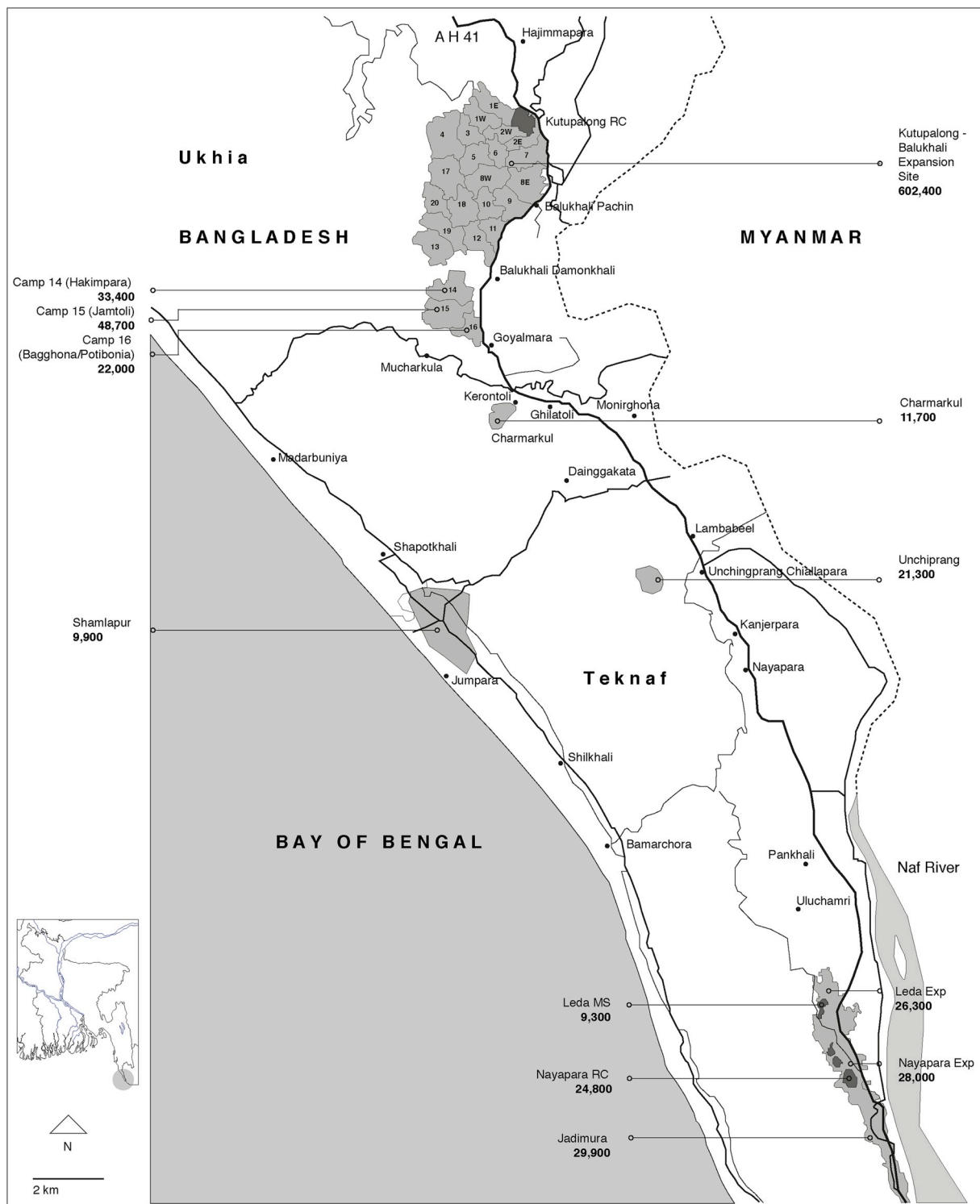
**Fig. 1.** Map showing the location of and number of residents in the Rohingya refugee camps in Ukhia and Teknaf in Bangladesh in February 2018. Map drawn by the author after Strategic Executive Group (2018: p. 5).

could or could not enter the camps, ostensibly to prevent drugs and human trafficking and recruitment by militant groups (Karim, 2018). At least twenty-seven military checkpoints monitored movement in and out of the area (Safi, 2018).

This vast governmental and humanitarian apparatus served as a machine of capture to organize, consolidate and compress the multidirectional flows of humans, medicines, aid, food, drugs, arms etc. in and out of the camps, between camps and surrounding settlements and in

and out of Bangladesh. It was a stratigraphic machine to lock down the intensities and flows of matter mobilized by the refugee influx into a manageable socio-political entity (Yusoff, 2017). In doing so however it mobilized other forces and flows - the enactment of stability on one level disrupted what had previously been stable geophysical and geopolitical strata (Colebrook, 2017). It exerted considerable pressure on its geological substrate and its topographic surface layers. South-east Bangladesh where the camps are located has a topography of steep,

parallel, north-south orientated hills and valleys formed when the Indian tectonic plate collided into the Shillong Plateau between 2.6 and 66 million years ago. Its geological substrate is made up of layers of sandstone, siltstone and claystone that manifest their tectonic history in folds, faults, steep tilts and sharp faulted anticlines (Quazi, 1986). An anticline is a ridge or fold of stratified rock in which the strata follow the angle of the topography. This arrangement means that the oldest beds are at the centre of the fold and the newer, less compressed strata lie on the surface. They are less firmly consolidated and subject to weathering and erosion. As a result, the narrow valleys of south-east Bangladesh are alluvial, fertile and cultivated, while slopes and hilltops are forested to stabilise their soils. The forests are significant wildlife habitats and also conscripted into a well established social forestry program providing an income to local villagers through the growing and selling of timber (Hossain, Alam, & Miah, 2008).

This terrain was unsettled and its material and ecological dispositions transformed by the speed and manner in which the refugees were settled on it (Fig. 2). Refugee families were each allocated a portion of forested hillside by a Camp-in-Charge official. They removed its vegetal growth and levelled it into roughly formed terraces. Makeshift shelters of bamboo and plastic were erected. Terraces were connected by narrow footpaths and bamboo bridges to hand pumps and tube wells, latrines, wash rooms and social facilities. Flat, low lying valleys that were still being cultivated or susceptible to flooding were avoided. Permanent construction materials other than bricks for roads and concrete for drains were not permitted as they would give permanence to the refugee presence. Once settled in this way, refugees turned to surrounding forests for fuel. West of the camps, the forests receded rapidly as they made ever longer journeys to collect the estimated eight hundred tons of firewood the camps required each day, which then filled the air with wood smoke and heightened respiratory infections (FAO, 2017). As of January 2018, 1485 ha of forest land had been "hacked from the hills"

for settlement or for firewood (Suman, 2018). A Bangladesh Forestry Department (BFD) officer summed this up: "They are cutting down the hills, they're chopping all the trees, herbs, shrubs, then erecting their shelters … the topography of that area has been greatly damaged" (Ahmed, 2018).

The speed and violence of these transformations loosened the earth and disrupted ecological and geopolitical relations. For instance, deforestation of the hillsides for settlement disrupted a social forestry program, causing tensions between authorities, refugees and villagers who requested compensation for their loss of earnings (Strategic Executive Group, 2018). It disrupted wildlife habitats and habits. The Kutupalong–Balukhali expansion site lies across a heavily trafficked elephant corridor. As elephants follow habitual routes and destroy any obstacles in their paths, human-elephant conflicts on the edges of the refugee camp became more frequent and a number of refugees were killed (BBC News, 2018; IUCN Bangladesh, 2018). As the monsoon approached, the potential for de-stratification increased. The Teknaf Peninsula has a high annual rainfall of approximately 4000 mm. It follows a typical monsoonal pattern, with negligible rain from December to March and very heavy rainfall from June to August. Flash floods and cyclones frequently occur. It was estimated that more than 200,000 refuges in the camps were living in zones that would flood or collapse (United Nations & Partners, 2017). Root systems that once held the soils together had vanished, rendering hillsides unstable and in danger of sliding: "I'm afraid that the hills will fall onto us," a refugee in Chakmarkul, one of the smaller settlements remarked (UNCHR, 2018).

The imminent release of the geologic forces, fault lines and cleavages of the substrate (Yusoff, 2017) by the monsoon was rapidly transformed into politics. The monsoon was mobilized as a threat and framed as a disaster by different political agents for different ends. Myanmar's panel of international advisors argued that camps in Bangladesh were not built to withstand storms and argued that all parties needed to come to an



**Fig. 2.** Satellite image of the Kutupalong Refugee Camp to the right and the Kutupalong- Bulukhali Expansion Site to the left in July 2018. Source: Google Earth.

understanding on repatriation (Ungku, 2018). The Bangladesh government on the other hand used the impending monsoon and delays in the repatriation deal as justification for the preparation of Bhasan Char for relocation. Aid agencies mobilized the monsoon as a threat to argue for additional resources to stabilise the hillsides, dredge waterways and cut channels for excess water. The UNCHR identified 150,000 people at high risk from mudslides and floods and began to level and stabilise a 9.3-ha plot allocated by the Bangladesh government to relocate 12,000 of the most vulnerable refugees (Lazarus, 2018). It delivered tens of thousands of 'Monsoon Defence Kits' comprising bamboo poles, tarpaulins sandbags and basic medicines to protect against water-born diseases. Families began reinforcing their shelters in any way they could, with sandbags, stronger rope and plastic bottles filled with sediment and hurled on the roofs of shelters (Safi, 2018). Cyclone warning training by Bangladesh's Cyclone Preparedness Programme, which had made significant progress in reducing lives lost in coastal communities since its launch in 1970 (Haque et al., 2012), was extended to the refugee camps (UNCHR, 2018).

The first rains came in April 2018. They transformed the sedimentary topography into a hydro-geological force that damaged roads, destroyed buildings and blocked drains (Ganguly, 2018). In June 2018, landslides triggered by rains were reported to have killed at least thirteen people and risk of water borne disease was high as floodwater mingled with latrine run-off (Agence-France-Presse, 2018). It was not as if the Rohingya were unaccustomed to monsoons, they had lived with them all their lives. It was not the monsoon, but the encounter between refugee life and the anticline geology of the Teknaf Peninsula that exposed them to the surplus potentiality of intersecting earth systems, that is of sediment, and put their lives at risk. Precipitation rates, location, elevation, slope and fine scale differences in sediment grain size and porosity became active (though entirely indifferent) agents in the identification of who lived and who died and in the prioritisation of humanitarian services. The hydro-geo power of the monsoon released the material energies of the deforested sedimentary hillsides, turning sediment into a weapon against the encamped refugees. This was cited as reason by Bangladesh to relocate 100,000 refugees to a *char* island in the Meghna Estuary, which it proposed as a temporary arrangement until conditions were right for the refugees to return to Myanmar.

## 5. Char

The sediments of the Ganges, Brahmaputra and Meghna rivers eventually reach the Bay of Bengal through the Lower Meghna River. Here they enter a highly dynamic oceanic system where a complicated interplay between the forces of the river, tides and waves creates complex patterns sediment displacement (Rogers, 2012; Rogers & Overeem, 2017; Uddin et al., 2014). This displacement is strongly influenced by the seasonal reversals of the monsoon and the cyclones and storm surges that frequently accompany them, amplified by the triangular funnel shape of the northern Bay of Bengal (Alam & Dominey-Howes, 2015; Michaels, Hidras, Heubscher, Suckow, & Wiedicke, 1998). During the wet south-west monsoon months, ocean currents circulate clockwise in a northerly direction along the east coast of India. Their collision with the freshwater influx of the Lower Meghna River creates anti-clockwise currents along the Chittagong coast (Mohanty et al., 2008). The two currents converge on the Swatch of No Ground, a fourteen km wide ocean canyon stretching for thousands of kms down the centre of the Bay of Bengal (Keuhl, Levy, Moore, & Mead, 1997). During the dry north-east monsoon months, currents reverse and circulate in the opposite direction - sediment is carried away from the Swatch of No Ground and southwards along the coasts of India and Bangladesh. These reversing patterns can be altered by more distant and apparently unrelated geological events. For instance, the 1950 Assam earthquake dislodged so much sediment that the entire course of the Lower Meghna River shifted (Brammer, 2014). Human agency also plays its part. Dams and embankments, particularly the widespread armouring of the coast

since the 1960s has greatly impacted sediment dispersal and coastal morphology in recent years (Roy, Hanlon, & Hulme, 2016). These factors all play a role in moving sediment around the northern Bay of Bengal in swirling, unruly, irregular ways and influencing the unpredictability of where it accumulates on the ocean floor. Some aggregates into shifting estuarine *chars*, some eventually beds down on the continental shelf extending Bangladesh's subaqueous delta, while some is carried by the Swatch of No Ground deep into the Bay of Bengal. Over time this has produced the Bengal Fan, a 16.5 km thick submarine stratum of Himalayan sediment (Keuhl et al., 1997).

It was into these complex meteorological, fluvial, oceanic and anthropocenic churnings of monsoonal sediments that the Bangladesh government approved a plan in November 2017 to relocate 100,000 Rohingya refugees from the camps on the Teknaf Peninsula. In February 2018 Prime Minister Sheikh Hasina announced that her country was preparing a *char*, newly renamed Bhasan *Char*, to house 100,000 Rohingya refugees as a temporary arrangement until conditions were right for them to return to Myanmar. British engineers, H. R. Wallingford and Chinese construction company Sinohydro (best known for building China's Three Gorges Dam) were contracted to undertake the engineering works to make the island inhabitable (Paul, Baldwin, & Marshall, 2018).

If one scrolls back historically over the Meghna Estuary on Google Earth, a faint dark stain comes into view at approximately 22° 23′N, 91° 23′ E in 1988. It spreads northwards in 1989, disappears a year later, reappears in 1997, disappears in 1999 and then comes more steadily into view from 2003 onwards, moving around each year. In 2006 another elliptical smudge emerges to its south west, becoming more distinct from 2013 onwards. These smudges on Google Earth are satellite images of emergent estuarine *chars*. According to the Bangladesh Forestry Department (BFD) (Shaqif, 2017b), Thengar *Char*, the more recently formed of the two is under water during the monsoon from June to September and during high tide throughout the year. The older, more stable landmass named Jalier *Char* by local people (meaning 'fisherman's island') has a landmass of 20,250 ha, 6500 of which have been planted with mangrove forest to stabilise its sediments. Local officials call it *Char* Piya.

Thengar *Char* was the name of the island announced by Bangladesh as the island designated for Rohingya resettlement. However, development activities led by the Bangladesh Navy have been taking place on Jalier *Char*. In an extraordinary report in the *Dhaka Tribune* (Shaqif, 2017b) a claim was made that when asked to identify an island for relocating the refugees to, the Noakhali District Administration pointed to the newer Thengar *Char*. During an inspection visit however, officials landed at Jalier *Char*, but mistakenly thought they had landed on Thengar *Char* and declared it as the island for development. Possibly to clear up the confusion, Sheikh Hasina renamed Jalier *Char* as Bhasan (or Vasan) *Cha*, meaning 'floating island.' However, confusion still reigned in the media, which was reliant on official records, expert interviews and on-line satellite maps for information. Many online maps were not current enough to show both islands and many showed the area as open sea. The maps used by Reuters identified Jalier *Char* as Thengar *Char* (Slodkowski, 2017). Google Maps named Jalier *Char* as *Char* Piya. A report in the *Dhaka Tribune* in September 2017 reported Bhasan *Char* as the new name for Thengar *Char* (Kalloi, 2017). As the islands are really free-flowing sedimentary matter-energy, they can emerge from the ocean only to disappear again or change shape from season to season and year to year. They are elusive and confound the temporalities of satellite data collection and official practices of naming and mapping. They challenge abstract, data driven ways of knowing, in favour of highly local, experiential forms of knowledge. In response to questions about this, a geomorphologist at Dhaka's Centre for Environmental and Geographic Services remarked that "its very confusing for people to identify them because the islands are so new and are not on any official records. Only local people know which island is which" (Yanofsky & Lahiri, 2017).

The first infrastructure that appeared on Bhasan *Char* was a helipad, visible on satellite images in March 2017. In November that year, tracks began to appear. In January 2018 a portion of mangrove forest was cleared and a grid of roads was laid out. A month later the beginnings of the thirteen km long embankment aimed at preventing inundation at high tide began to be visible (Fig. 3). A *Reuters Graphics* sketch (2018) shows that these defences comprised offshore breakwaters, 300–400 m of foreshore and an embankment. The embankment was a 32 m wide, 2.5 m high berm of compacted sand covered by a 1-m thick layer of undefined anti-erosive material (Reuters Graphics, 2018). The area inside the embankment was divided into 120 plots, each for twelve housing blocks arranged in pinwheel formation around three courtyards (Reuters Graphics, 2018). The blocks were built on concrete columns which elevated them 1,2 m above surface level. Each block was to house sixteen families, each family in a 3m x 4 m room arranged back to back, eight in a row, with no cross ventilation, accessed via walkways on each long side. There were two shared kitchens at one end of each block, eight toilets at the other and solar panels on the roof. The plan was to build 1440 of these blocks to house 100,000 refugees. This barracks type housing was one of two alternatives proposed by the local administration. The other was a cluster village type that included small yards adjacent to housing blocks and a tube well for every six to seven families. However, it was estimated that only 250,000 people could be accommodated on the island in cluster villages as opposed to 400,000 in barracks, suggesting that the longer term plan was to develop the island to accommodate more than 100,000 people (Shaqif, 2017c; 2017a).

The engineering corps of the Bangladesh Navy was given responsibility for overseeing construction of the infrastructure. It was the largest construction project it had ever undertaken. The plan was dubbed *Asrayan 3*, (*asrayan* meaning to shelter) and completion was planned for the end of 2019 (Kahn, 2018). *Asrayan* was a project inaugurated by the Bangladesh Navy in 1996 to "rehabilitate the homeless and landless people of the rural area" (Bangladesh Navy, 2018). Between 2003 and 2018, it had constructed 3022 barracks type housing blocks at an average of 201 per year compared with the 720 per year required for Bhasan *Char*. Heavy duty construction equipment (excavators, trucks, lorries), construction materials (stone, aggregate, cement, bricks) and day labour was contracted to meet this target. A frenzy of activity resulted, as observed by a reporter who journeyed to the site: "when the

boat reached the island, hundreds of water vessels carrying construction materials were seen in the area. Workers were busy uploading these materials. After entering Bhasan *Char*, this correspondent also found trucks and lorries carrying bricks and stones. Excavators were seen piling up mud for the construction of the embankment. Roads have been built across the char and several officer cadets of the Bangladesh Navy were seen roaming the construction site on bikes" (Raju, 2018). By October 2018, construction was underway on the bulk of the development (Fig. 4).

That month a video was posted to YouTube via a website platform called The Stateless Rohingya(The Stateless Rohingya, 2018) run from the Republic of Ireland. The video documents a helicopter flight over the Bhasan *Char* construction site. Seen against a vast oceanic horizon, the facility is approached from the mangrove covered portion of the island. The helicopter flies over the embankment and helicopter pad before zooming in closer to the housing blocks. These are in varying stages of completion – some are still a grid of columns, some are concrete slabs, some are completed up to roof height, some are covered with low-pitched, bright red, corrugated metal roofs. They are densely arranged in pin wheel fashion around courtyards, all of which are waterlogged. Interspersed between the fractal pattern of housing blocks are larger four storeyed concrete framed structures, whose purpose is not apparent, but they could be cyclone shelters.

The video confirmed a number of things. Firstly, it confirmed Bhasan *Char*'s isolation - no other landforms are visible on the horizon throughout the video. Secondly, it confirmed that the facility's purpose was detentive. Its dense mat of cellular housing blocks, encircling embankment and the ocean do not suggest infrastructure conducive to civilian life, but rather the kinds of infrastructure associated with incarceration. Thirdly and most significant for the argument in this paper, it confirmed that Bhasan *Char* was "hardly an island at all" (Yanofsky & Lahiri, 2017a), but rather a shifting, accumulation of terraqueous matter-energy in the process of being stabilised by mangroves, but whose surface had barely emerged from the sea. Its measure was more bathymetric than topographic. Questions of detention became entangled with questions of currents, tides, winds and waves. The video confirmed that the refugees were to be relocated into a sea of geo-hydro uncertainty, where their statelessness (denial of *jus soli*) would be matched by material groundlessness. It reminded me of the opening
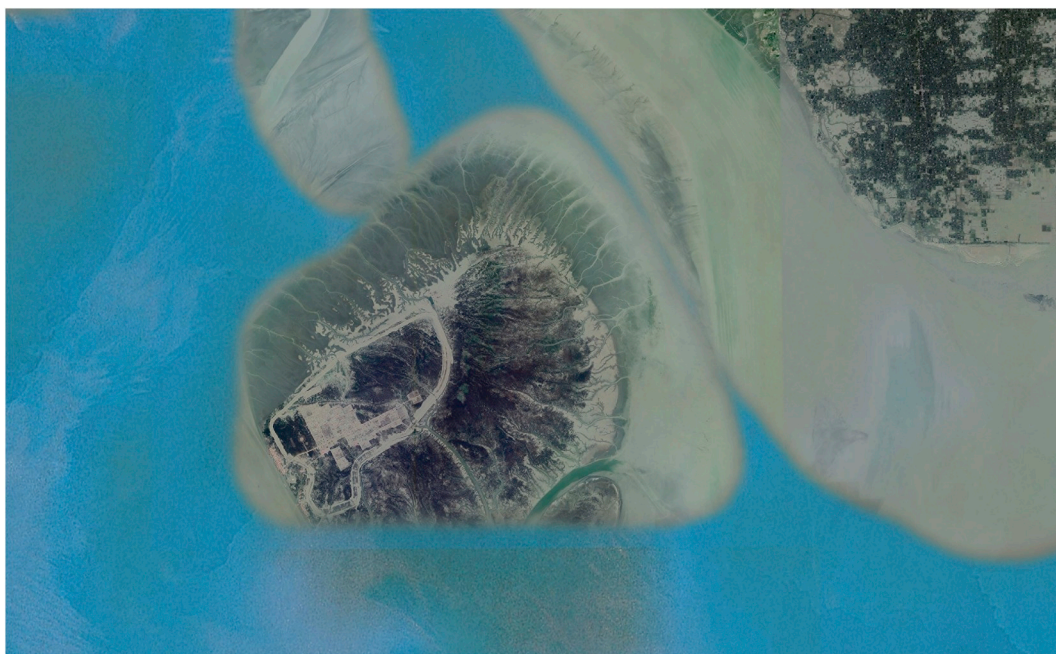


**Fig. 3.** Satellite image of Bhasan Char in July 2018. Source: Google Earth.
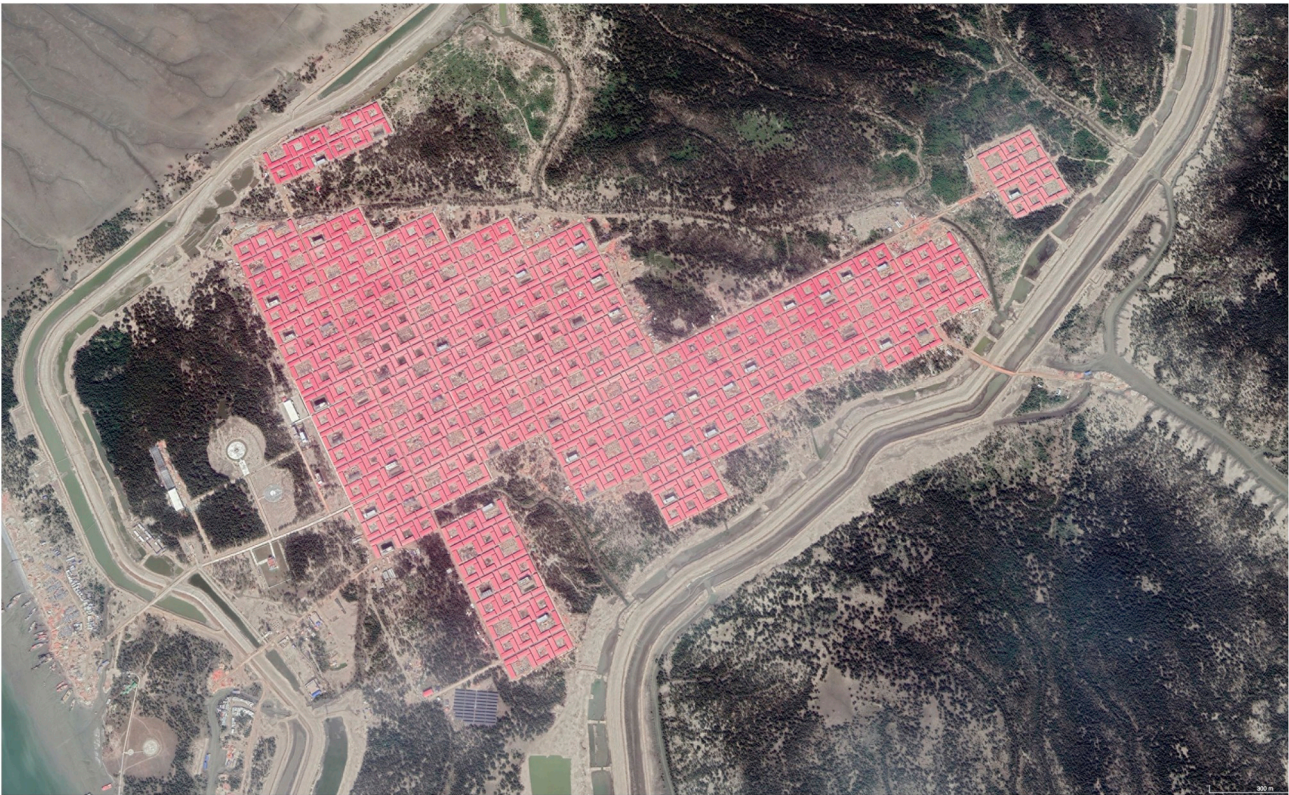
**Fig. 4.** Satellite image of Bhasan Char in April 2019. Source: Google Earth.

question in Suvendrini Perera's *Australia and the Insular Imagination* (Perera, 2009, p. 1) "What if the ground beneath our feet turns out to be the sea?" While her question was aimed at a critique of Australian exceptionalism, it could equally be used to question the potential consequences of the incarceration of stateless refugees on a floating platform of sediment in the sea, where they would be in the direct path of cyclones and storm surges and where there was little evidence that human life could be sustained (Ferrie, 2018; Paul et al., 2018).

The plan was forcefully opposed by human rights groups and the refugees themselves. Human Rights Watch characterized it as a disaster in the making (Kullab, 2017) and the humanitarian Inter Sector Coordination Group (ISCG) overseeing the refugee camps expressed deep caution about the plan (Mostofa, 2018). It feared that refugees would not be given free and informed choice to relocate to the island, which would then constitute arbitrary detention (Ferrie, 2018). The executive director of Ain-O-Salish-Kendra (ASK), a leading Bangladeshi human rights organisation said "as far we know, this island is uninhabitable. In these conditions, shifting Rohingya refugees there is not rational and it is inhumane … It requires huge time and money to make this island liveable. Within this short time and capacity, I don't think, it will be possible'' (Radio Free Asia, 2017). In an open letter to the Prime Minister of Bangladesh published in the *Dhaka Tribune* in February 2017, the refugee community of Kutupalong argued that relocation to Bhasan *Char* "amounted to imprisonment in a flood-prone place of extreme isolation," which would "only jeopardize the lives of thousands of refugees" (Sakhawat, 2017). They voiced suspicions that the relocation, while mooted as temporary, would be permanent, and designed to keep them from ever leaving the island pending unlikely repatriation to Myanmar. They appealed for a "durable and lasting solution" without moving them from where they were (Sakhawat, 2017).

The official position by Bangladesh at home and abroad was that the Bhasan *Char* facility was intended to provide the refugees with humanitarian support (Kuri, 2017). A local politician told *The Bangla Tribune* that the project was very important for humanitarian reasons

and for the 'rehabilitation' of the refugees (Shaqif, 2017b). Planning Minister A.H.M. Mustafa argued that conditions where the Rohingya refugees were living were inhumane and that the project aimed to provide them with shelter (Radio Free Asia, 2017). At an event I attended in London in July 2018 on the occasion of the upgrading of Bangladesh from a least developed to a developing country, the Bangladesh High Commissioner spoke proudly of Bangladesh's policy towards the Rohingya as a humanitarian role model for the rest of the world. The statement was echoed by Anne Main, Chair of the UK Parliamentary Group on Bangladesh, who said that she was in awe of the country's generosity, which was a beacon of good practice and evidence of the agility of the Bangladeshi people to respond to crisis. Was it a coincidence that this re-framing of the country's identity from problem to role model on the global stage was made on the occasion of the celebration of its upwardly mobile credit rating and to promote of the idea that Bangladesh was open for business?

When measured against other more localised political, economic and territorial dynamics, other narratives emerge. 2018 was an election year in Bangladesh. Teknaf was a ruling Awami League constituency, whereas neighbouring Cox's Bazaar was a Jamaat-e-Islami one. Its Awami League candidate was a popular leader who campaigned using anti-Rohingya rhetoric (LSE-UC Berkeley Bangladesh Summit, 2018). The Rohingya were branded as a social problem, involved in criminal activities (drug and human trafficking) and as bearers of disease, including HIV-Aids (Shaqif, 2017a). They were accused of being undeserving (Ahmed, 2008) of scarce resources that could be directed elsewhere. Some saw the potential for the Rohingya to disperse across the country and create all kinds of hindrances in economic and cultural life (Kahn, 2018; Kalloi, 2017). Fears were expressed that interactions between Rohingya and local people would lead to intermarriage and other kinds of integration and make repatriation to Myanmar more difficult. The refugee camps were also seen as impediments to the economic potential offered by newly constructed Asian Highway 41 (AH41), a long-awaited sub-regional highway in the Asian Highway network

extending from Dhaka to Teknaf (Daily Star, 2009; Guhathakurta, 2018). Tropes of criminality, contagion, impurity and undeservedness constructed the Rohingya as stateless entities to be defended against.

Bangladesh's commitment to hospitality towards the Rohingya on a global stage required that it balance a commitment to *non-refoulement* (the customary principle in international law that forbids a country receiving asylum seekers from returning them to a country in which they would be in danger of persecution), with a commitment to itself as a sovereign post-colonial state open for business. The Rohingya presence in Bangladesh threatened to subvert this as it reactivated the historical archive of movement, entanglement and surplus of potentially that had long existed between Bangladesh and Myanmar's borderlands. Bhasan *Char* was Bangladesh's way of solving these problems. It appeared to proffer the Rohingya hospitality and shelter while re-asserting stable notions of Bangladeshi citizenship and territorial sovereignty. It reassured Bangladeshis that their government was able to separate the healthy from the infected, control migration and police their borders (Mountz, 2011). It appeared to offer the Rohingya stability and protection until they could return to Myanmar. This solution forgot or chose to ignore that Bhasan *Char* is a shifting, unconsolidated agglomeration of Himalayan sediment enveloped by and unfolding in earth forces that are inhospitable to humans. While the energy-matter of sediment might eventually bed down into strata, here it still swirled with ongoing potentiality and impolitic re-combinatory possibilities (Deleuze & Guattari, 1994). The *char* elaborated an impossible encounter between the refugees and the powerful earth system dynamics of the Meghna Estuary. Military engineering was deployed to lock in its intensities and flows. Imminent to this militarised infrastructure was the de-stratifying potential of the planetary forces it was designed to capture - constantly in motion, always threatening to exceed, and utterly indifferent to human survival.

## 6. Conclusion

In this paper, I have taken up two related challenges posed by Clark and Yusoff (2017) in the light of climate change and the Anthropocene: to engage more closely with the dynamics of earth systems, and to consider how social and political agency is constrained, made possible and emergent with earth forces. The objectives of the paper were framed by my encounters with sediment and its extraordinary volume and force in a developing monsoonal research methodology in south and southeast Asia. Thinking with sediment unlocked knowledge about the earth beyond that of static, solid earthiness. It thoroughly undermined the position that holds that the earth is a stable platform upon which dynamic social processes play out. It invested *terra* itself with a mobile, terraqueous materiality that exceeded attempts to divide it according to land/water binaries. As a materiality derived from interactions between geological, hydrological and atmospheric dynamics, sediment similarly confounded attempts to confine questions of territoriality to abstract surfaces. Its materiality foregrounded the "manifold agencies, materialities and forces of nature that undergrid territorial space" (Usher, 2019, p. 17).

In the paper, I have explored the extent to which sediment's mobile, terraqueous materiality was inflected in or interfered with attempts by Bangladesh to house Rohingya refugees in its territory, in the camps in south-east Bangladesh and on Bhasan Char in the Meghna Estuary. I found that, in both the refugee camps and the *char*, the materiality of sediment exceeded and undercut the engineered machinic assemblies put together by Bangladesh to stratify and territorialize refugee life. The terraqueous sedimentary terrains on which the refugees were grounded served as an ongoing, affective reminder of the unruliness of territorial materialities in relation to territorializing agendas, as well as of the precarity and valuelessness of stateless life to statist machines.

The paper thus makes a contribution to emerging scholarship on the volatile, intractable more-than-human terrains which impede or disrupt a state's vision (Usher, 2019). These include Gordillo (2018) on

mountain warfare in Afghanistan; Clark and Jones (2017) in their study of state formation in Iceland; Bremner (2015) on the failed search into the disappearance of Malaysian flight MH370; Barry (2013) on the Baku-Tbilisi-Ceyhan pipeline in Georgia, and many others. As Clark (2011: xiii) argues, "the raw physicality of the world is rising up the agenda" not only because of concern over the ways in which human demands are pressing against the physical limits of the earth and its systems, but also in order to come to terms with "a planet that constantly rumbles, folds, cracks, erupts, irrupts" (xiv). How we organize our relations with it and the care and support we show for those who have been struck by its force might open the way to geopolitical recalibration.

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