Engineering Vulnerability

In Pursuit of Climate Adaptation

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Cover art: Laborers folding geotextiles. Construction site of the Hope Canal in Guyana, 2014. Courtesy of the author.

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CAP	Conservation Adaptation Project
CARICOM	Caribbean Community
CDC	Civil Defence Commission
EDWC	East Demerara Water Conservancy
GD	Georgetown Datum
GDP	gross domestic product
GHRA	Guyana Human Rights Association
GUYSUCO	Guyana Sugar Corporation Inc.
GYD$	Guyanese dollars
LCDS	Low Carbon Development Strategy
MMA Scheme	Mahaica-Mahaicony-Abary Scheme
NDIA	National Drainage and Irrigation Authority
NGO	nongovernmental organization
PAHO	Pan American Health Organization
PNC	People's National Congress
PNC-R	People's National Congress-Reform
PPP	People's Progressive Party
TVA	Tennessee Valley Authority
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change

UNICEF	United Nations Children's Fund
UN IPCC	United Nations Intergovernmental Panel on Climate Change
UN REDD+	United Nations Program on Reducing Emissions from Deforestation and Forest Degradation
VCA	vulnerability capacity assessment
WUA	Water Users Association

In Guyana, English is the national language, but Creole, or what is locally called *Creolese*, is widely spoken in both urban and rural areas. I became familiar with Creolese through daily conversation, reading newspapers, and attending seminars in the Department of Language and Cultural Studies at the University of Guyana, Turkeyen campus. To make the text easier to read, I have opted to translate interview quotations into Standard American English, adding Creolese terminology where relevant.

Race in Guyana also takes on fluid linguistic categorizations. The national census, for instance, has seven designated racial categories: African, Indian, Portuguese, Chinese, European, Amerindian, and Mixed Race. In daily conversation, however, many people use the terms *Afro-Guyanese* and *Black* when referring to African; *Indo-Guyanese* and *East Indian* when referring to Indian; *White* when referring to European; and *Indigenous peoples* when referring to Amerindian. To this end, it is important to note that the country name Guyana derives from the word Guiana, the original name for the region that formerly included the colonial territories of present-day Guyana, Suriname, French Guiana, and parts of Brazil and Venezuela. When noting the Dutch and British colonial eras, I refer to people of African and Indian descent by the historical denotation Afro-Guianese and Indo-Guianese, respectively.

Finally, I use a mix of pseudonyms and given names to identify people. I adhere to the requests of those who wanted me to refer to their given names and of those who wanted pseudonyms. All government agencies, nongovernmental organizations, development agencies, and engineering firms are identified by their most commonly used names. The engineering agency the Ministry of Public Works changed its name to the Ministry of Public Infrastructure circa 2014. For the sake of clarity, I identify the ministry by its current name in reference to ethnography I conducted between 2009 and 2019.

Engineering Vulnerability has been on my mind for quite some time, and I have many to thank for helping me put my ideas down on paper. I am grateful first and foremost to those I came to know, work with, and befriend in Guyana. My introduction to Guyana in 2007 would not have been possible without D. Alissa Trotz and the late Andaiye. Both lovingly made space for me on Bonasika Street and gave me the opportunity to contribute to the women's collective Red Thread. My time with Red Thread has shaped my perspective on the importance of uncompromising honesty in both research and life. The late Jocelyn Baccus, Karen De Souza, Halima Khan, Joy Marcus, and Wintress White all welcomed me with open arms. Andaiye's support for me and this project was infinite. I cannot thank her enough for simply being a friend and interlocutor.

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INTRODUCTION. "Where Would I Go? There Was No Place with No Water"

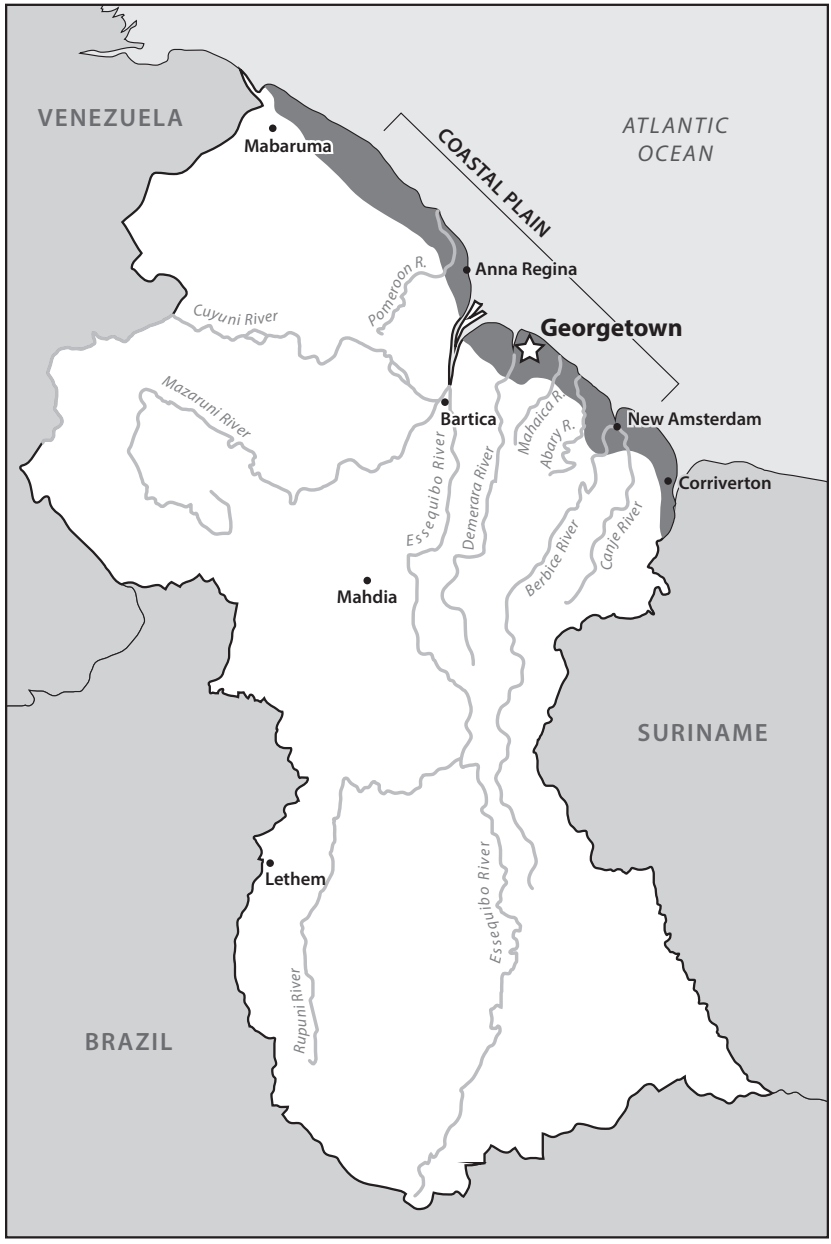
In the years immediately following a disastrous flood in 2005, the Guyanese state embarked on the multimillion-dollar enhancement of irrigation and drainage infrastructures. In August 2009 when I visited, earthmoving equipment dotted the coastline. These machines clawed through peatlands, locally known by the Creolese term *pegasse*, in an effort to reinforce a dam. Excavations were gaining momentum because of the state's plans for ventures in carbon markets and the World Bank's Global Environment Facility grants. The enhancements were not the first in Guyana's history but were building on over two centuries of engineers transforming the country's Atlantic coastal region into a place suitable for sugar plantations. The state insisted that these enhancements were different because they would offer a first step toward adapting the nation to climate change. They are expected to help the country better withstand torrential rainstorms and make it easier to store and drain water during a flood. The extreme nature of today's climatic events has compelled the state's rethinking of coastal life in Guyana. This has led me to treat climate adaptation as requiring analysis on its own terms, as a large-scale project that alters understandings of settlement or

the multilayered processes that contribute to dwelling and the habitation of a place.

Climate adaptation and its connections to settlement provide this book's unifying theme. I draw on ethnography, oral histories, colonial records, photographs, and engineering reports to make these connections visible. I ask: How can Guyanese who felt abandoned by the state during the 2005 disaster come to believe in or at least consider climate adaptation? What can their vulnerability tell us about the persistent forms of technological optimism that frame climate adaptation as a project that has the potential to advance and sustain the settlement of nation-states? What would it mean for the state or the citizen not to partake in climate adaptation? And what would such a refusal do to one's sense of belonging? The climate adaptation of irrigation and drainage infrastructures has occurred along Guyana's low-lying coastal plain, where roughly 90 percent of the country's population resides. In addition to enhancing irrigation and drainage infrastructures, climate adaptation has enabled many to mobilize support from state officials and NGOs for water, disaster preparedness, food security, housing, and environmental conservation. Even still, many Guyanese face difficult dilemmas as they attempt to square the 2005 disaster and their past experiences of state abandonment with climate change.

My aim in this book is twofold. First, *Engineering Vulnerability* tells the story of how climate adaptation's importance lies not only in its technological feats but also in constituting political imaginations. Each chapter focuses on the ways knowledge of flooding becomes situated in Guyanese state-sponsored climate adaptation projects. This focus gives ethnographic specificity to popular and academic understandings of climate change as a lived reality of settlement rather than as an abstract risk. Climate adaptation reshapes the links between forms of state welfare and reform. By making these links visible through ethnography, this book complements scholarship on climate adaptation policy making and postdevelopmentalism.

Second, I analyze climate adaptation by tracking the demands people make on one another as they recognize that race is a source of vulnerability to climate change. The book contributes to theories of vulnerability to climate change by foregrounding the enactment of race beyond human bodies to include flood-prone environments. Throughout, I explore the coproduction of vulnerability and race as exemplified through questions about scale, measurement, and temporality that climate-related flooding in Guyana incites. My aim is to develop an analytical framework that takes seriously the uneven and speculative ways race comes to shape climate adaptation. Put another



MAP 1.1. Map of Guyana

way, this book explains why climate adaptation in Guyana has gained traction alongside racialized apprehensions about the suitability of the coast for future settlement.

From Disaster to Climate Adaptation

The 2005 disaster was a life-altering event for most Guyanese I know. It came on the heels of a national surge in crime and violence tied to the racial calculus of electoral politics, especially among the coast's Afro-Guyanese and Indo-Guyanese residents. The surge in crime pitted generations against each other and reignited the racial sentiment that Guyanese call *apaan jaat*, a Bhojpuri-Hindi phrase loosely translated into Creolese as "vote for your own kind." The state was nearly twenty years into a transition from socialism to market liberalization during the height of the crime surge. But the transition had not loosened the state's grip on the economy, and elected political elites supporting the interests of an international business class emerged.

During this time, the People's Progressive Party (PPP) held both the majority of seats in parliament and the presidential office. Known as a party serving Indo-Guyanese interests, the PPP took steps to concentrate executive power over all aspects of national decision-making. Such efforts were nothing new, as they reflected the political opportunism during socialism under the then ruling Afro-Guyanese political party, the People's National Congress (PNC). The 1997 and 2001 national elections, nonetheless, were overshadowed by feelings of discontent among Afro-Guyanese and sympathetic Indo-Guyanese.[1] People protested in the streets for constitutional reforms and, among other things, a national agenda to eradicate poverty, corruption, and racial discrimination in public sector hiring. But when the storms came in 2005, few were prepared to expand the dialogue about apaan jaat to include climate change.

Torrential rains pounded Guyana's coast from late December 2004 to early January 2005. Houses once protected on stilts were transformed into marooned islands. Leptospirosis, a zoonotic waterborne disease, knew no boundaries, wreaking havoc across rural and urban environs alike. Roads were damaged, leaving many with no place to sell and buy food, supplies, and water. The flooding was prolonged by a major dam system, the East Demerara Water Conservancy (EDWC), overfilling with water. In response, the Civil Defence Commission (CDC), a state-sponsored disaster relief agency, and NGOs repurposed school buildings into shelters and pickup points for relief hampers (emergency rations). Even when the rain stopped, the talk of floodwaters

persisted as engineers and state officials affiliated with the Ministry of Agriculture worked to reinforce the EDWC. By the spring of that year, the country was fortunate enough to count only thirty-four people dead.

One of the places hardest hit was Sophia, a former squatter town located on the fringe of Guyana's capital city, Georgetown. I became familiar with Sophia through the work of residents involved in climate change awareness and disaster preparedness activities sponsored by the Guyana Red Cross. By the early 2000s Sophia was known as an Afro-Guyanese working- and lower-middle-class neighborhood, with many residents in transition working to secure land titles. Sophia's unfinished network of canals and sloped terrain shaped the state's timid disaster response. Residents recount using refrigerators as boats to meet state officials at public roads to retrieve relief hampers. Margaret, one of the residents who participated in the Red Cross activities, knew these roads well. I frequented her vendor stall where she sold sweets and refreshments (see figure 1.1). As a street vendor she could map the spaces

FIGURE 1.1. Boys sitting at Margaret's vendor stall

where floodwaters were most prone to accumulate, the makeshift bridges residents maintained for emergency evacuation, and areas not to visit when the sky turns gray.

This know-how, she insisted, informed all the "mess" she saw during the disaster. I asked what she meant by "mess": "At some point you knew no one was coming. Back then, I was a security guard at the Georgetown Botanical Gardens and Zoo. People [zoo staff] called in to tell me animals—the manatees—were going to swim into the streets. We saw caiman in the canals here too. Everyone just had to do their thing . . . until it ended." I asked if all the mess made her want to go somewhere else to wait out the storms. "No. Where would I go? There was no place with no water." The rainfall was unprecedented, and the flooding was inescapable. And by the time the storms came, Margaret realized that she and state officials were too late to change course or, simply, to retreat to higher ground.

In the months following the initial storms, the national government partnered with the United Nations (UN) Economic Commission for Latin America and the Caribbean to report disaster statistics. The estimated damages were in excess of GYD$93 billion (US$465 million), and the floods reversed that year's gross domestic product growth from 0.4 percent to -2.6 percent (World Bank 2009). Economic damage was severe in the country's agricultural, manufacturing, and retail sectors. Subsistence farmers, small-business owners, and street vendors suffered the most because of a paralyzed supply chain and liquidity constraints. The state attempted to revitalize the economy by providing relief checks to workers as well as to those categorized as living in low-income households.

There are no reported statistics that break down the distribution of relief checks by race. Yet the checks can still provide helpful insight about the influence of apaan jaat on the disaster. According to the 2002 census, Guyana's 750,000 citizens were distributed across seven racial groups: 43.5 percent Indian, 30 percent African, 16.7 percent Mixed Race, 9.2 percent Amerindian, and less than 1 percent Portuguese, Chinese, or European (Beaie 2007, 27). Roughly two-thirds of the population lived in poverty, with the majority counted as Indo-Guyanese and concentrated in rural coastal areas (Gampat 2002).[2] At the same time, the distribution of wealth tells another story: there was a small—but growing—upper class of Indo-Guyanese with access to capital for small-business development and a large proportion of Afro-Guyanese concentrated in the ranks of the lower middle and working classes (Gampat 2002, 16–17). Everyone—including an elite business class—was in

need of disaster assistance. The 2005 disaster momentarily blurred the life chances of Guyana's racial majority and minorities while underscoring the ecological and material contingencies of apaan jaat to statecraft.

Engineers responded with a promise to adapt Guyana's coast to torrential rainfall, sea-level rise, and erratic storms related to climate change. By May 2005, they were already pouring millions into damming and building canals in ways that anticipated the attempts to revive the levee system and hurricane-ravaged coast of post-Katrina Louisiana just a few months later (Bijker 2007). And while these coastal disasters had very different causes, infrastructural origins, needs, and environments, race emerged in both locales as a condition of vulnerability.

A state-mandated evacuation during Hurricane Katrina, for instance, has contributed to a New Orleans diaspora of African Americans that is reconstituting the racial demographics of the city and surrounding Mississippi delta region (Adams 2013; Johnson 2006, 147). Engineering priorities for building levees and reclaiming wetlands have followed suit by focusing on areas deemed worthy of real estate and business reinvestment. Unsurprisingly, these areas are majority White with capital to rebuild (Bullard and Wright 2009). On the other hand, Guyana's 2005 disaster did not involve a state-mandated evacuation nor inspire the long-term mass exodus of residents to other parts of the country.[3] So whereas in New Orleans engineers have attempted to separate areas of the coast into adaptable and inadaptable zones, in Guyana—at the time of writing, no such distinctions have been made.[4] All racial groups have become associated with state-sponsored climate adaptation, albeit in different, uneven, and tenuous ways.

Engineers have focused their climate adaptation efforts on the EDWC. The 355-square-mile (571-square-kilometer) structure comprises what is locally called a *water conservancy* (reservoir), a forty-two-mile (67-kilometer) embankment dam, and an intricate system of primary and secondary channels that connect to canals that drain water into the Atlantic Ocean (Bovolo 2014). The embankment dam's walls are composed of compacted soil, sand, clay, and rock. In 2005, when water overtopped the EDWC, many blamed engineers for not closely monitoring where erosion along the embankment dam was occurring. Trenches and canals were also clogged with trash, particularly in Georgetown, which made engineers' decisions about when to release water from the EDWC inconsistent. Engineers releasing water between high tides was crucial for avoiding further flooding in residential and farming areas adjacent to the EDWC. While they were eventually able to release

water between high tides, the danger of water overtopping the EDWC has become the primary motivation shaping engineers' commitments to climate adaptation.

The possibility of repeated disastrous flooding, however, cannot in itself explain why climate adaptation has taken hold in Guyana. The contested role of global governance in climate adaptation is, in many ways, central to the EDWC's enhancements. The term *climate adaptation* has its roots in ecological theories of resilience that assume a sociobiological system can absorb shock, transform, and ultimately maintain itself in the face of external stresses. Integrated into UN-related climate-policy agendas in the late 1990s, climate adaptation is treated as an alternative to the steps nation-states have already taken to reduce carbon emissions (Pelling 2010).[5]

In the most basic policy terms, climate adaptation involves nation-states governing in response to actual or expected climate change effects. The UN climate governance institution, the Intergovernmental Panel on Climate Change (IPCC), has called on political leaders across the Global North and Global South to advance climate adaptation projects. The UN IPCC has designated funding sources for those countries that cannot afford to do climate adaptation on their own. The diplomatic value of the UN IPCC, then, is in its claim to inclusivity and commitment to the differential needs, expertise, and ambitions of nation-states responding to climate change. To date, UN IPCC funding for adaptive interventions has ranged from the enhancement of infrastructure systems, ecosystem services, and information networks to health care across urban and rural sites (Adger et al. 2005; Orlove 2009).

Guyana has not only benefited from but also helped define the trajectory of such UN IPCC initiatives. In 2009, President Bharrat Jagdeo held a press conference in Guyana with a handful of foreign dignitaries to release the Low Carbon Development Strategy (LCDS), a report detailing the country's plans for climate adaptation (Government of Guyana 2010, 11). Ambitious in scope, LCDS looks to the country's forests as a resource for carbon trading schemes with Norway. The funds raised from these schemes are intended to partially sponsor the long-term adaptation of, among other things, irrigation and drainage infrastructures.[6]

The LCDS also contributes to the government's Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC). The communication highlights the improved management of engineering data and technologies as an invaluable component of climate adaptation. Climate change in Guyana is expected to materialize as a 4.2-degree increase in average temperature, 10-millimeter decrease in rainfall,

and 40-centimeter sea-level rise by the end of this century (Solomon et al. 2007). Laying out these national data around the various blind spots of the UNFCCC, the LCDS creates a critical nexus between transnational climate negotiations and research networks needed to sustain them.

Jagdeo made a plea for the LCDS through diplomatic partnerships with Conservation International, lecture tours at foreign universities, and interviews with celebrity environmentalists, including American actor Harrison Ford. He also attended the fifteenth session of the UNFCCC in 2009 in Copenhagen. Selling the LCDS to a sympathetic audience, he explained that all Global South nation-states are not alike and that those that are not high emitters of carbon dioxide emissions have a stake in climate negotiations. Guyana was not alone in taking such a stance, as chronicled in the documentary *Island President* (2011). At Copenhagen, Guyanese envoys aligned themselves with those from the Caribbean and the Maldives, a country that had taken the lead in previous UNFCCC meetings representing small island states. They argued that, although it is not a literal island, Guyana is a *small island state*—a country with a population so at risk it will either get wiped off the map by climate change or never be able to afford to adapt on its own (see also Sealey-Huggins 2017).[7] Their use of the phrase *small island state* offered a way to put climate change at the center of Guyana's modern understanding of itself as a nation. It signaled that the composition of the nation's future population—its size and demographics—is in question.

More than a simple description of geography, the phrase *small island state* is symbolic of Guyana's concern that climate change has the potential to drive a further wedge between its racial majority and minority groups. Arjun Appadurai (2006) has articulated similar insights in his analysis of the sovereign preoccupation with scale and population or what he calls "the fear of small numbers." Globalization in the post–Cold War era, Appadurai notes, has rested on the assumption that with the expansion of free markets, finance capital, human rights, and democracy, racial inequalities would recede worldwide. But in many instances the opposite has unfolded, with racial inequalities deepening and violence becoming a mainstay of national political life. This anxiety about well-being, about the lack of consensus between racial populations, and about the enumeration of racial populations via census data creates the conditions for "the fear of small numbers." Moreover, the sense of social injustice that characterizes the fear of small numbers is not bound to any single identity or geopolitical territory. As the Copenhagen meeting demonstrates, the fear is often rationalized through efforts at comparing levels of socioecological degradation across as well as within nation-state contexts.

The fear of small numbers, in other words, is not limited to the question of the human: the binary preoccupation with racial majority and minority has, over time, ravaged environments or the terrain nation-states call home.

Against this backdrop of fear and diplomacy, climate adaptation may not only hinge on efforts to design so-called resilient infrastructure systems. It also seeks to influence public attitudes about the importance of lessening racial inequalities while bringing attention to the fact that all people—no matter their race—are vulnerable to climate change. By *race*, I mean "a set of sociopolitical processes that discipline humanity into full humans, not-quite-humans, and nonhumans" worthy of survival (Weheliye 2014, 4). Climate adaptation puts pressure on this conventional framing of race as a hierarchy of difference predicated on the "administration of life" or a biopolitics of the population (Foucault 1990). This is because climate adaptation creates space for people to develop a racialized awareness about the contingencies, risks, and instabilities that characterize the environments in which they live.

Scholars, for instance, have begun to ask if combining the insights of the climate sciences with paleoanthropology provides a new vantage point on race as a social construct (Gunaratnam and Clark 2012). This proposed shift in perspective warns against treating climate adaptation as an inherently progressive project that advances humanity along a predetermined path.[8] In turn, those typically counted as on the margins of society stand in as key figures for reconstructing the nation-state's histories of interracial strife as well as its solidarities (see also Abu El-Haj 2002; Collins 2015; Thomas 2011).

Improving race relations in climate adaptation often coalesces around compensation for resettlement and community-level climate change awareness programs that emphasize inclusivity. By not dismissing long patterns of suffering, such forms of redress demonstrate the difficulty involved in simultaneously attributing responsibility for racial inequalities and envisioning antiracist futures. Climate adaptation, in other words, demands a precise historical accounting of the ways in which people speculate about the end of race.

Engineering Vulnerability offers such an account by analyzing climate adaptation's unfolding in the daily lives of ordinary citizens and a variety of experts. Climate adaptation's impacts on Guyana cannot be evaluated with censuses and statistics alone. Enhancements of the EDWC and related irrigation and drainage infrastructures enable Guyanese to reconsider how they want to live and to what extent they care or even interpret racial sentiments, such as apaan jaat, as shaping their futures. I understand these reflections as essential to climate adaptation, whereby people evaluate how past events

contribute to vulnerability in the present, in order to consider what actions are needed to live with climate change moving forward. Climate adaptation is eerie: the lessons of the past are known only indirectly, and the future is associated with a world filled with risk instead of aversion to it. Why and how people decide which pasts matter for enacting climate adaptation is the question that animates the rest of this book.

Vulnerability

The EDWC is the thing that connects all Guyanese to the coast. It is the object of intervention in climate adaptation whereby national life is situated in an emergent, sometimes ill-maintained system of irrigation and drainage infrastructures. Many think about the EDWC only when they have flashbacks about the 2005 disaster, see too much water in their yards, or hear meteorologists warn of a rain-drenched forecast. This is why community-oriented interventions such as the Red Cross project in Sophia have become ubiquitous throughout the country since 2005. Many people have come to see such interventions as complementing engineers' efforts to enhance the EDWC. But in no way do the actions of ordinary citizens and engineers rely on similar timelines, histories, or technologies. Their actions are discontinuous, with multiple origins and sites of knowledge production about flooding. No single person can make climate adaptation happen, nor does anyone appear to have the desire to claim such authority. All individuals come equipped with their own perspective on what counts as vulnerability, and in the process of climate adaptation they seek to become aware of what the EDWC is doing.

In the Atlantic coastal subregion called the East Demerara Coast, the main source of irrigation and potable water is the EDWC.[9] Torrential rainfall similar to the weather in 2005 has informed engineers' efforts to create models to monitor the EDWC's water levels. They use these models to determine when to release water to stop the EDWC from overtopping and its pegasse-laden walls from eroding. Whereas engineers once emphasized the storage of floodwaters in the EDWC, climate adaptation unfolds with the sole purpose of building large canals that can drain floodwaters quickly and coordinate with nearby rivers.[10]

Engineers' decision not to abandon but redesign the EDWC brings into focus neocolonial associations of irrigation and drainage infrastructures with sugar plantations, the political geography of terrain qua the nation, and day-to-day experiences of apaan jaat. Specifically, climate adaptation complicates

ideas of coastal Guyana as a place where vulnerability is structured by a dependency on the engineering inventions and sciences of its colonial past. I often heard people lament that they did not altogether trust the work of engineers but nevertheless hoped that they could figure out how to maintain the EDWC. This skepticism toward state-sponsored climate adaptation mobilized many to take climate adaptation into their own hands. From building embankments on their property to creating flood evacuation routes, they envisioned vulnerability as manageable in discrete and pragmatic ways.

Anthropologists analyzing climate change have increasingly theorized vulnerability less as a condition of exposure than as an effort in becoming aware of disturbance (Vaughn 2019).[11] Anna Tsing (2015, 35) argues that the "art of noticing" involves people telling stories about the flourishing of biological and social life in the ruins of capitalist landscapes. Adriana Petryna (2015) offers the concept of the horizon to detail the practices that push people to take action even when climate change appears daunting or out of control. They and other scholars have shown that vulnerability is reproduced in everyday encounters with environmental transformations that are often unintentional or without precedent (Barnes and Dove 2015; Cons 2018; Crate 2011; Günel 2019; Moore 2019; O'Reilly 2017; Whitington 2016).[12] Vulnerability constitutes a complex set of ethical relations that draw people into caring about environments in ways they never would if they felt more secure (Khan 2014; Mathews 2017). Questions of how vulnerability maintains specific social arrangements of care become especially acute in climate adaptation. What happens when people decide not to draw direct attention to the things that make them vulnerable? Are there some forms of vulnerability that are more essential than others?

These questions are not neutral for Guyanese who aim to pursue climate adaptation in ways that do not get stalled by apaan jaat or undermined by it. Apaan jaat has functioned as a means for upholding a *racial political order* wherein an individual's racial identity or affiliation with a racial group determines access to resources, information, and protection from the state.[13] In theory, apaan jaat ought to benefit an individual whose race is well represented or is the majority in state bureaucracy. Likewise, for those who are not, they may find it advantageous to maintain relationships with the majority. Even so, a single experience of racialized resentment or indifference can breed contempt for apaan jaat, to the point where one would rather turn to nonstate institutions—from NGOs to gangs—for care. Within this tenuous field of address and response, apaan jaat can easily exceed boundaries of the state and creep into daily life, shaping how an individual pursues work, intimacy,

worship, commerce, and the like. Race, as David T. Goldberg (2001) argues, is integral to standardizing state arrangements, reminding us that forms of political influence are marked symbolically and affectively as well as physically. And yet apaan jaat does not unfold in ways that simply replicate existing state institutional norms and values. Apaan jaat takes on a new sense of import, and perhaps urgency, every time Guyanese engage state bureaucracy. Climate adaptation is one such instance.

Past political events, alliances, and forces inform assumptions about the role apaan jaat will play in climate adaptation. But the various ways in which Guyanese articulate these pasts, while subject to emphasizing flooding as a common threat, reveal that apaan jaat's powers of incitement and intensity of variation are not equally distributed. A gap opens between their efforts to let go of apaan jaat and their struggles to identify how it might linger and accumulate over time as a source of vulnerability. This dynamic of embodiment, apaan jaat, and distribution reinforces a subtle process in climate adaptation activities. People make decisions about when to pay attention to or even ignore race in their assessments about how they want to live moving forward. To be sure, race does not determine the scope of climate adaptation, but it does serve as an important, and at times fleeting, point of reference.

Taking into account this dynamic, I draw on the philosopher of science Karen Barad (2007), especially her work on measurement. She argues that measurement is not an individual act but a process of cutting together/apart the agentic qualities of a phenomenon. In particular, measuring apparatuses such as a kitchen scale, which people use to identify and make sense of, say, a piece of fruit, illustrate how agency emerges from being in *intra-action* rather than an individual property. To quote Barad, measuring apparatuses are not "static arrangements"; they produce boundaries or "agential cuts," which allow people to observe certain things in the world and not others (816).[14] Measuring apparatuses have a dual nature: the act of observation makes cuts in what is included or excluded while creating new understandings about the way responsibility, or ethical relations, might be maintained.

By far, the most repeated comment about ethics posed to me by my informants, especially engineers, when I described my research was that I ought to find a social solution for flooding. For some, this suggestion was a judgment about my status as an anthropologist without a background in hydraulic or geotechnical engineering. Others gestured to frustrations with apaan jaat as a strategy of flood management and life on the coast more generally. In both cases, they assumed that flooding was reducible not to racial

conflict but to struggles over who or which entities had authority to provide resources and skills to make climate adaptation happen. In making such distinctions, my informants often parsed out the different capacities of state ministries, NGOs, and civic groups to offer them assistance. These distinctions were based on their experiences leveraging and organizing the interests of local communities, or villages as they are called outside of Georgetown.

How they recall episodes of flooding is a strategy for keeping together or disentangling flood knowledges from apaan jaat and is central to what they mean by having a social solution for flooding. And as these flood knowledges circulate in climate adaptation activities, they shape and are reshaped by the actions of irrigation and drainage infrastructures, pegasse, and other more-than-human flood hazards. Thus, it is important to know whether particular ideas about apaan jaat existed before or are a creation of national efforts at climate adaptation and the environments within which ways of knowing disturbance, or vulnerability, materialize.

Engineers have not been the only experts in search of a social solution for flooding. Through coordination with disaster management consultants and military personnel affiliated with the CDC, engineers have developed a flood early warning system. Inspired by the media, technology, and data related to this system, nonstate or community-based drainage monitoring programs were established in the villages I engaged during my fieldwork. These interventions gave ordinary citizens space to debate the usefulness of the flood early warning system or do away with it altogether, as they invented their own methods for living with what they called big flood and intense flooding, or floodwater levels that came near, met, or exceeded those of the flooding in 2005.[15] In making such distinctions, experts and ordinary citizens alike were not treating climate adaptation as an extension of developmentalism (see Chandler 2019; Grove 2014). Instead, they were approaching climate adaptation as an intervention that exposes gaps in the state's investments in development agendas.

And as they became comfortable speaking about climate adaptation from an authoritative angle, they grew more aware of the various material forms apaan jaat can take—from pegasse, irrigation, and drainage infrastructures to water filtration kits. They sought to invert hierarchical and exclusionary relations of expertise across sites of governance (see also Boyer 2008; Carr 2006). They depended on not only the flood early warning system but other measuring apparatuses, including hydraulic models, accounting and bookkeeping ledgers, and vulnerability assessments, to quell and, in a few cases, reimagine apaan jaat's meaning.

Ethnographic attention to measuring apparatuses and their redistribution across climate adaptation activities reveals that all racial groups—whether Afro-Guyanese, Indo-Guyanese, Amerindian, Mixed Race, Portuguese, Chinese, or European—are affected by the EDWC and its enhancements.[16] Following Barad's (2012, 15) phrasing, the use of measuring apparatuses by experts and ordinary citizens reveals that "each 'individual' is made up of all possible histories of virtual intra-actions with all Others." Measuring apparatuses, in other words, highlights the latent arrangements of settlement, race, and vulnerability at stake in climate adaptation. In this respect, climate adaptation remains symbolic of a larger unresolved environmental problem in Guyana—that of a nation-state whose fear of small numbers is entangled in a particular history of race.

Situating Apaan Jaat

Named after the Amerindian term(s) *land of many waters/water people*, Guyana is located on the northeast coast of South America (Marco 2013). The country comprises 83,000 square miles and is divided into three geographic zones—forest, savannah, and coast. Varying in width and with areas up to six feet below sea level, its 248-mile coastline is subject to inundation from the Atlantic Ocean. Mudbanks and patches of mangrove forest have dotted the coastline for millennia, offering a natural form of protection. As it is located south of the eastern Caribbean hurricane belt, a biannual wet season and the swelling of large rivers also contribute to flooding. The upper reaches of these rivers originate in the country's interior forests, producing massive tons of silt that add to the coast's nutrient-rich swamps and peaty soils. Essential to the ecoregion known as the Guiana Shield, these rivers, peatlands, and forests encompass varied ecosystems that store globally significant amounts of water and carbon. Historically, this biodiversity, along with flooding, has made the coast a costly and time-consuming place to settle.

The reclamation of coastlands by the Dutch for permanent settlement began in the eighteenth century (see chapter 2). After securing outposts upriver through violent force and trade treaties with Amerindian groups, the Dutch established sugar and tobacco plantations along the direct coastline. The digging and construction of irrigation and drainage infrastructures for plantations were completed by enslaved Africans. When the colony transitioned to British rule in 1814, not only canals but large-scale damming became integral to coastal settlement. With slave emancipation in 1838, indentured laborers from India, China, Portuguese Madeira, and the West Indian islands

were imported to work plantations and facilitate damming (Rodney 1981). By 1880, freedmen (formerly enslaved persons) and indentured laborers completed the EDWC and radically transformed the coastal geography by connecting all working plantation estates to a single dam source for water and flood management. Despite their major contribution to the colony, however, planters perpetuated forms of wage and employment discrimination, particularly between Afro-Guianese and Indo-Guianese. By the mid-twentieth century, this exploitation became the groundings for anticolonial mobilization and the formation of a nationalist political movement led by the PPP.

The various personalities, interests, and trade union activities that informed the PPP's founding in 1950 are well documented (Chase 1964; Jagan 1997; Seecharan 2005). For my purposes of tracing a history of race alongside the fear of small numbers, it is important to note that the party began as a multiracial coalition that called for progressive social reforms. The PPP was led by Cheddi Jagan, the son of an Indo-Guianese sugar estate laborer who found professional success as a dentist and union organizer and Forbes Burnham, an Afro-Guianese lawyer from Georgetown. Building on the recommendation of the Waddington Commission, the PPP proposed a new constitution that mandated, among other things, universal adult suffrage and a general election. In 1953 an election was held, and the PPP won the majority of votes. The PPP's elected ministers sought to challenge the enormous economic influence the sugar empire, Booker Brothers, had on the colony. But the PPP's interracial class mobilization proved a threat to the British colonial bureaucracy. Within 133 days, the colonial governor declared a state of emergency, the constitution was suspended, and many PPP ministers were removed from office and imprisoned (Palmer 2010).

During the constitutional crisis, disagreements arose within the PPP leadership about the ideological direction of the party (Fraser 2004). In particular, arguments centered on whether British Guiana should join the West Indian Federation, an organization comprising colonies in the region that intended to become independent from Britain as a single state. Jagan spoke openly at the time against federation, citing other Caribbean nationalist leaders as unsupportive of his Marxist-Leninist approach to national liberation (Birbalsingh 2007, 32–33; Jagan 1997). A number of Afro-Guianese PPP members criticized Jagan, viewing his reluctance as "in part driven by a desire not to be marginalized within a federal structure in which African-Caribbean people would be the dominant grouping" (Fraser 2007, 14). Shattering a sense of civility within party ranks, the question of federation put pressure on PPP

members to appease requests from the British for a slower and incremental transition to independence (Hintzen 2019).

By the 1957 general election, the PPP had split into two factions. The Jaganite faction embraced a communist platform, while the Burnhamite faction embraced a Fabian socialist platform. During the campaign cycle, both factions mobilized racially charged campaigns that invoked the sentiment apaan jaat for the first time (Birbalsingh 2007; Jagan 1997; Palmer 2010). Some political commentators argue, however, that apaan jaat was predated by Afro-Guianese candidates who used the phrase "Black fuh Black" during the 1940s legislative elections (Rickford 2019). While this may have been the case, the wide circulation of the phrase "apaan jaat" serves as a testament to Hindi and Indian political media shaping attitudes about decolonization in British Guiana (Persram 2004). Either way, the Jaganite faction won the election by gaining substantial support from across the working class, especially from Indo-Guianese residing in rural areas.[17]

Following the 1957 election, Burnham left the party to establish the PNC. His intent was to build a base of middle- and working-class Afro-Guianese and Mixed Race voters residing in urban areas. But he might have been overly ambitious in his plans. According to historian Colin Palmer (2010), much of the voting electorate, regardless of race, still envisioned a rosy future for the budding nation under PPP leadership. As Palmer notes, colonial officials were amazed that "although the politicians slung racial mud among themselves, this did not mean that the society as a whole consisted of racially hostile camps with no social interaction" (200). The PPP's subsequent win over the PNC in the 1961 general election is a testament to their observation.

But under pressure from the American government to contain communist influence in the Caribbean, the British again interfered in British Guiana's transition to independence. This time the British and Americans provoked labor disputes that contributed to the eruption of antigovernment protests and race riots (Rabe 2005; Waters and Daniels 2005). In response, the British implemented a constitutional reform for proportional representation, an electoral system under which parties gain seats in parliament based on the number of votes cast for them. British and American operatives also provided financial support and intelligence to the PNC campaign. Seeking to exploit the new electoral system, the PNC built a coalition with the probusiness party the United Force, which targeted Portuguese, Amerindian, and Mixed Race voters. The coalition proved successful, with the PNC winning the 1966 general election and Burnham taking office as Guyana's first head of state and prime minister.

Despite grand proclamations for interracial unity and modernization, Burnham failed to see through needed reforms in land, voting, and education during his tenure (1966–85). His critics attributed the failure to many factors, especially his rigging of elections, declaring Guyana a socialist republic in 1970, and creating diplomatic relations with Cuba (Premdas 1982). These decisions contributed to the withholding of aid by Western lenders, the country's mushrooming debt, and the underresourcing of public services. Meanwhile, political violence escalated, and critics of the PNC deemed the country's future crippled by race. As the economy worsened, middle-class professionals migrated. Burnham only aggravated the migration by awarding government jobs and contracts to people who demonstrated their loyalty to the party. He also implemented constitutional referenda in 1980 that replaced the premiership with the office of the presidency and extended executive power over all branches of government (Chandisingh 1982). Many critics, and even PNC members, interpreted these actions as evidence of a budding authoritarian state (Birbalsingh 2007; Thomas 1984).

Within this context, Guyanese learned to invoke apaan jaat in daily life as a method to protect their racial group interests but not at the expense (or the detriment) of other racial groups. This was a delicate act whereby many participated in governmental activities (e.g., civic and cooperative groups) to help build the nation while staying vigilant of the moments when apaan jaat had the potential of transforming into racism.[18] This dynamic has made apaan jaat distinct from Guyana's national motto, "One People, One Nation, One Destiny," in that apaan jaat indexes individual agency and not only a social ontology of community.[19] And given that rigged elections and the abuse of power characterized Burnham's administration, apaan jaat began to shape relations of not only political opportunism but also trust. As Brackette Williams (1991) argues of the socialist era, people drew on good and bad racial stereotypes in order to make sense of what an individual had to contribute to the nation. Her point, of course, is that people could never know for certain if their friends, neighbors, family members, or foes were voting for their own kind. Individuals simply did what they needed to do in order to rationalize their deepening sense of social alienation.[20]

Socialism ended with Burnham's death in 1985. A transition government headed by the PNC worked with the World Bank and the International Monetary Fund to introduce structural adjustment policies to the country. Still, market and democratic liberalization in the late 1980s through the early 1990s provided little incentive to do away with or nuance apaan jaat (Hintzen 1989). After the PNC-led transition government implemented World Bank

structural adjustment policies, foreign observers provided support to monitor the national elections in 1992. In what was deemed Guyana's "first free and fair election," the PPP won the majority of seats in parliament, and Cheddi Jagan reentered the national political scene as president.

Pejoratively described by its critics as ushering in a Hindu revival, the Jagan administration distinguished itself not only in terms of its racial leadership. Structural adjustment policies supported projects that developed mining and logging, while agriculture was cautiously diversified to further accommodate sugar, rice, and cash crops. This diversification may have advanced employment in agriculture, but it did not directly address funding for neglected public services. Over the next decade the austerity measures that accompanied structural adjustment contributed to escalating poverty. So, although the national economy grew by 7 percent between 1998 and 2014 under PPP leadership, Guyana was ranked by international funding agencies as a below-medium development country (Vezzoli 2014). Many critics attribute the ranking to the lack of agreement between the parties over the kinds of constitutional reforms needed to curtail state corruption (Bulkan and Trotz 2019).

The country's shifting racial demographics have only further reinforced this political gridlock. On the one hand, Guyanese out-migration has decreased since the early 1990s; on the other, the national population has stayed stable at just under 800,000 people, according to the 2012 census. Moreover, while Indians remain the largest racial population (39.8 percent) followed by Africans (29.2 percent), their overall numbers decreased compared to an increase among those who self-identify as Mixed Race (19.9 percent) and Amerindian (10.5 percent). This is not to say, however, that the census captures everyone. (Un)documented immigrants from Brazil, Haiti, Cuba, China, and Venezuela have made homes in Guyana at record numbers in the last decade and a half (*Stabroek News* 2019). As either merchants or trafficked refugees, many earn Guyanese resident status on their way to other destinations. At the same time, the ongoing humanitarian crisis in Venezuela is having the reverse effect. Not only has it increased the population in Guyana's interior (specifically Region 1), but it has inspired the remigration of Amerindian Guyanese and their descendants (Valencia 2020). Dreading that the humanitarian crisis will change the racial demographics of the voting electorate, (il)legal immigration has become a platform for campaigning (Chabrol 2020).

This dread sheds light on the varied forms of state corruption and violence that have become the Achilles' heel of both parties since the end of state socialism. In particular, Guyana is now a Caribbean–South American

hub for drug trafficking (Hill and Morris 2018). Murders of state officials and ordinary citizens have been associated with the trade (Thakur 2019). This violence has tested citizens' beliefs that apaan jaat can mobilize national development in industries such as agriculture, logging, and mining and especially new ventures in carbon markets and offshore oil, with the latter less reliant on local expertise. Even with the electoral victory of the People's National Congress Reform (formerly the PNC) in 2015, the pleas Jagdeo made at the 2009 Copenhagen meeting for the LCDS were only slightly repackaged with the slogan and report "The Green State Development Strategy."

In short, apaan jaat persists because it makes coastal settlement appear familiar even as racial demographics transfigure, markets transition, resources deplete, and political regimes collapse. Apaan jaat offers an image of a people either on the road to ruin or striving to make a home elsewhere. As Achille Mbembe (2019) notes of the twenty-first century, the planet Earth has been "repeopled." He explains: "Repeopling is about shake-ups, large and small dislocations and transfers, in short, new figures of exodus. The new circulatory dynamics and creations of diasporas pass in large part via trade and commerce, wars, ecological disasters and environmental catastrophes, including cultural transfers of all sorts" (12). Such dynamics suggest that apaan jaat offers a dwindling sense of normalcy for Guyanese and, perhaps more broadly, a model for political representation. With the Cold War a fading memory, apaan jaat has not only challenged their commitments to the nation but asked them to reconsider what it might take to make a good life that is not determined by the fear of small numbers. Climate adaptation is one such effort. During the 2005 disaster, witnessing the erosion of the EDWC, caimans in trenches, and refrigerators repurposed as boats was enough to convince many that climate adaptation provides an opportunity to renounce apaan jaat.

Race as a critical focus of analysis has gelled in recent years in the environmental humanities and social science studies of climate change. The case of Western states' security policies that manage climate refugees as racial others with no "political status" has stood as a prime example (Baldwin 2013, 1474). In other instances, scholars point to how climate change materializes in tension with ongoing processes of environmental racism (Nixon 2013). This insight is also implicit in scholarship on the Anthropocene, a term that characterizes the current geological epoch in which human activities contribute to geological change. Here, race is referred to as liberal humanism's failure to think beyond the social category of Man, or the White/Euro-American, carbon-dependent subject (Wynter 2015; Yusoff 2018).

The problem with these conclusions is not that they are inadequately supported by evidence; they are, and they have provided fruitful terrain for examining the intersections of race and climate change. The difficulty is that the evidence for them is sustained by multiscalar relations of knowledge exchange and agency and not only racialized subjugation. In other words, the causality attributed to race, vulnerability, and climate adaptation is nonlinear. A tension unfolds between race as lived experience and *how* race emerges as a framework that shapes people's commitment to climate adaptation as an environmental, technopolitical, and ethical project.

In short, climate adaptation is without guarantees. This reminds us of Paul Gilroy's (2000, 126) insight that the attempt to "free ourselves from the bonds of all raciology" is a world-making act (see also Gilroy 2002). Climate adaptation allows for a surplus of praxis that emphasizes pursuit alongside acts of reform, force, and resistance. In this way, climate adaptation troubles the historical division of White, Black, Asian, and Indigenous while making visible so-called minor or peripheral histories of race.

Engineering Vulnerability considers the world-making potential of climate adaptation alongside the material underpinning of concepts, subjectivities, and imaginings indebted to race. Each chapter approaches climate adaptation as a practice fundamentally shaped by two interrelated historical processes: knowledge exchange and claims of belonging. In this respect, climate adaptation is not only informed by the racial political orders of liberal governance (e.g., parliamentary democracy). Climate adaptation also reflects people's ongoing efforts to square race with the active force of "the past" lingering as memory, legacy, deferral, nostalgia, and burden.

With these efforts in mind, it is important to note that climate adaptation does not enact a clean break with high modernism, which many have long noted, (re)produces intellectual investments in race as a bio-physical property and web of sociocultural meaning (Du Bois 2007). Climate adaptation, in other words, is entangled in humanist and technoscientific conversations about race. Taking this entanglement seriously requires freeing race from a singular leftist model of future revolution to focus on models of local transformation that negotiate the uneven rhythm and flow of climate change.[21]

A critical approach to climate adaptation, then, involves mapping the very sites people are invested in calling home for the foreseeable future. Take, for instance, that anyone browsing Guyana's geological reports would find a plethora of references to the coastal plain's topography and, more specifically, its layers of pegasse (see figure 1.2). It settles on the coast's back lands,

FIGURE 1.2. A mound of pegasse soils mixed with clay soils

in contrast to the clays, white sands, and swamp-bed soils that settle on the direct coastline.

Dark brown-black in color, porous, squishy, and wet to the touch, pegasse is a shape-shifter that has accumulated overtime as peatlands crossing human and more-than-human worlds. Following Stuart McLean (2011, 610), peatlands and other water-logged lands, possess "an active principle, one that, much as [they] participate in a variety of ways in human history making, nonetheless subsist independently of their implication in any possible version of the story of modernity." Peatlands "shift in modality"—from solid to liquid to goo—making visible the discontinuities in culturally and politically specified boundaries (592). Indeed, peatlands are not only life generating but life taking. Recent ecology and biogeography studies have dubbed peatlands "an enormous missing contribution to global warming" (Mooney 2021). Identified as main players in the story of the planet's climate crisis, "the mass conversion of carbon-rich peatlands for agricultural use since the industrial era has added over 250 billion tons of carbon dioxide to the atmosphere" (Mooney 2021). And the peatlands of Guyana are no exception.

Guyana's pegasse-laden coast continues to endure glacial retreats, uprooted forests, migrating mudbanks, and engineering projects. Pegasse's deep history, along with its industrial manipulation, reminds us that human understanding of the past is always incomplete. And since no one in Guyana

is immune from its conduct or erosive effects, pegasse offers a counterpoint of reference—to apaan jaat—as Guyanese figure out what they want of climate adaptation and how to put it into action.

What's more, encounters with pegasse may matter not only for empirical reasons. They shed light on the colonial assumption that still begs to be questioned today: Was and is the ongoing settlement of the nation-state necessary at any and all costs? In posing this question I do not intend to provide a definitive answer by the end of this book. Rather, I point in the direction of treating climate adaptation as a practice that creates space for *counter-racial thinking*. By this I mean an ethico-political stance whereby people simultaneously acknowledge race while creating distance from it in order to imagine a new, or at least different, kind of engagement with the planet.

Developing counter-racial thinking as both a description of climate adaptation and an analytic, this book attempts to come to terms with race haunting both extremes of climate change's social reality—mass extinction and utopia. Counter-racial thinking not only offers a way to trace the racial political orders that lurk in the shadows of scientizing debates about climate change but also brings to the fore practices that insist on action across a variety of scales. More specifically, counter-racial thinking makes visible the forms of denial in liberal humanist institutions that block action on climate change and racism.

Tracing the dynamics of counter-racial thinking falls in line with the concerns of Candis Callison (2014) when she muses about how climate change comes to matter—an idea that positions anthropology toward mobilizing facts as much as sentiments. From the vantage point of Guyana, when ethnographic descriptions of people's life chances to survive climate change become conflated with race, anthropology is *engineering vulnerability*. Ethnography of climate adaptation requires attention to the everyday realities that make race relevant to people, while at other times it may limit their political imaginations of climate change. Such a focus might help anthropology learn something more about the way our own understandings of race have been (re) constituted by not only the materiality of science, culture, and economy but the warming planet Earth.[22]

Problematizing the relationship between race and materiality is a persistent theme in the discipline, especially for scholars examining the promissory claims of evolution, the life sciences, and biotechnologies (Baker 1998; Fullwiley 2011; Hartigan 2017; Helmreich 2009). But climate change also lays bare that radical critiques of race create potential openings as well as closures for

analyzing the vulnerability of a given place. I return to this point in the conclusion. For now, I raise it to suggest that race—as a concept—has varied pasts that scholars need to reckon with in order to imagine more livable futures.

Organization and Scope

Engineering Vulnerability is based on yearlong fieldwork I conducted in coastal Guyana in 2009–10 and during shorter visits in 2012, 2014, and 2019. When researching this book, I assumed that I would tell a story about a place on the margins of American anthropologies of the Caribbean. But within a few months of being in the field I realized that the disciplinary distinctions of regionality are as much a spatial as a temporal demand. The state's post-2005 disaster LCDS agenda, which tied the coast's future to that of the interior's, incited my own discomfort with categorizing Guyana as on the margins of something. It seemed to me that the state was trying desperately to challenge the idea that Guyana's coastal flooding is unmanageable. Colonial explorers were the first to write about the coast as a wild place. The moniker was an effort to rationalize their travels in the colony's interior region, which they called Amazonia and where they encountered abundant biodiversity in nature and Indigenous peoples (Whitehead 2009). I was interested in how a state newly conscious of climate change attempts to undo the wild coast moniker while rebranding Guyana's nested experience of regionality. I tracked these attempts by spending time in the coastal administrative districts Region 4, Demerara-Mahaica, and Region 5, Mahaica-Berbice.

A Guyana Red Cross official who had recently completed a project in Sophia and handed its stewardship off to residents was the first to introduce me to ordinary citizens doing things that were parallel to engineers' work on the EDWC. I volunteered time organizing meetings and writing reports with Sophia Red Cross participants and attended festivals and other informal social events. I lived in Campbellville, a mixed-income and racially heterogeneous neighborhood in Georgetown, located roughly half a mile from Sophia. With access to major transportation routes along the coast and into Georgetown, my residence in Campbellville made engagements in Sophia, research at government archives, and travel across the country feasible. Through these engagements I made contact with engineers and other state officials implementing climate adaptation projects across Region 4 and Region 5. I observed planning, excavation, and construction for the EDWC and the creation of its flood early warning system. At these sites I also observed residents of rural villages located near the EDWC design their own flood protection. I attended

meetings sponsored by state ministries and social events residents organized, including harvests, selling at markets, and *jhandis* (Hindu celebrations). My time accompanying engineers and state officials provided perspective on the sheer scale of Guyana's irrigation and drainage grid and its relation to people's desires for coastal settlement.

All of these sites are critical to the book advancing a historical and ethnographic analysis of climate adaptation. In doing this I draw on oral histories along with the Guyana National Archives, HathiTrust's digital collection for the natural history journal *Timehri*, the National Archives, Kew (digital collections) for colonial records from the mid-nineteenth century through today, drainage and irrigation legislation, and engineering reports related to the EDWC. I have relied on the historiography of slavery, emancipation, and empire to help situate these materials, given the relative scarcity of archival records on the EDWC. The discovery of facts about the EDWC entailed working across disciplinary boundaries of Caribbean-Amazonian studies and the history of science. This book is not, however, a theoretical elaboration on archival forms; nor is it a standard ethnography of one object, social group, or place.[23] Instead, it demonstrates the dynamic intrusion of the past onto the present and the forms of expertise as well as translation that make such observations possible and, at other times, unthinkable (Buck-Morss 2020). Climate adaptation unfolds as particular arrangements of people and measuring apparatuses interested in making the past legible.

Engineering Vulnerability reflects on these arrangements as they gain uneven traction across sites. For this reason, the book's argument is meant to be interpreted on two levels. The book's theoretical claim about counterracial thinking stresses that the commonality between Global South and Global North responses to climate change is the question of race. On another level, the book undoes the commonly held belief that climate change is all about the future and letting go of the past. Each chapter challenges this idea by drawing on varied historical and ethnographic data. In this respect, the book is meant to be read as a whole, with the initial chapters offering a roadmap for tracing the historical narratives, metaphors, arguments, and models climate adaptation seeks to confront in the present.

Chapter 1 details the 2005 disaster to demonstrate how disaster evidence creates the conditions of possibility for climate adaptation. It elaborates the theoretical perspective on climate adaptation that guides my research by emphasizing the forms of reflexivity that become available to people as they reconsider their expectations of state welfare and reform. Distinguishing climate adaptation from disaster management teases out how climate change

has reconstituted the temporality of settlement. This distinction allows us to consider what is and is not a moment of political transformation and which citizen—or who of the body politic—has the potential of being addressed in different ways through state-sponsored climate adaptation.

Chapter 2 argues that the 2005 disaster was only one event among many that has shifted the relationship between claims of belonging and flood knowledge in Guyana. To make this point, the chapter traces how flood knowledges of the colonial past shape political desires for climate adaptation in the present. Specifically, I consider the historical emergence of flood management practices, first with Dutch settler colonialism and the introduction of empoldering and later with British settler colonialism and its dependence on large-scale damming. These engineering practices brought about a form of settler identity based as much in a racialized regime of flood knowledges as in land rights. Thus, settler colonialism is an ongoing process that has contemporary ramifications for how people envision climate adaptation as a project invested in counter-racial thinking. Chapter 3 links climate adaptation to engineers' professional ethos for keeping archival records of dam designs. How do such records help cultivate engineers' professional status as unbiased experts? These records serve the purpose of mobilizing a sense of epistemic community and belonging among engineers despite transitions in racial political orders, from slavery through apaan jaat. Engineers' archival practices and commitments matter not only for making visible the technopolitical assemblages that historically constitute climate adaptation. They also help slow down an academic analysis that would rush to treat climate adaptation as merely perpetuating forms of White-colonial domination. Instead, the chapter gives focus to Guyanese engineers' formulation of race (and its historical fragmentation) across state engineering bureaucracies.

Chapter 4 explores the racializing tropes of compensation that undergird climate adaptation and its relationship to liberal multicultural governance. It focuses on farmers' skepticism toward compensation packages the state offered to resettle them for the construction of a storm relief channel called the Hope Canal (also known as the East Demerara Water Conservancy Northern Relief Channel). Their skepticism centered on the fear that compensation was replicating apaan jaat instead of creating a space for the integration of their flood knowledges into the project. They believed that the state treated them as "Indian small men" as opposed to citizens with expertise that contributes to the EDWC's adaptation. Compensation for the Hope Canal brings to the fore the relationship between race and materiality, especially as it shapes questions of belonging. Chapter 5 continues the

discussion of race and materiality but by asking whether climate adaptation depends on particular discourses about settlement in order to gain traction. Moving across an ethnography of engineers' day-to-day work of damming and their collaborations with CDC staff to create a flood early warning system, the chapter details what I call love stories about the EDWC. Love stories open up the narrative relation between encounter, desire, and expertise to show how predictive measures, such as hydraulic modeling, often fail to mobilize engineers' interest in settlement. Love stories reinforce engineers' credibility, despite moments when they recognize apaan jaat as having an effect on power differentials within engineering-CDC collaborations.

Chapter 6 explores what love stories and these new collaborations mean for the CDC staff's sense of accountability to engineers and Guyanese publics. The ethnography focuses on the efforts of CDC staff and engineers to develop a national flood plan that does not reinforce the racialized logics of witnessing endemic to the other branches of the military in Guyana. When viewed from within the state, accountability is anchored as much in apaan jaat and flood knowledges as in CDC staff and engineers learning to manage a sliding scale of expert status, force, and persuasion. In chapter 7, I return to Sophia to examine how participatory climate adaptation projects are shaped by an emerging logic of governance that is centered less on the management of biological life than on knowledge of the ordinary. The target of intervention and analysis of such projects are testimonials about how conditions of crisis reconfigure people's day-to-day interactions with climate-related flooding.

INTRODUCTION

1 In the months prior to the 1997 election, several independent forums were established to develop a model for power sharing that departed from the Westminster system, which was inherited from the British colonial period (Thakur 2019).

2 This is not to say that rural areas of the coast were racially homogenous (Beaie 2007). Afro-Guyanese households were equally distributed across urban and rural areas, while Indo-Guyanese households were heavily concentrated in rural areas. Overall, 52 percent of Afro-Guyanese lived in rural areas compared to 73 percent of Indo-Guyanese (Gampat 2002). This racial and geographic distribution remains more or less the same today. Even within Georgetown, and especially within coastal rural villages, communities are heavily segregated along racial-ethnic and class lines. This is a divide that dates back to the racial political violence of the preindependence period. Before these riots, many people attest that coastal villages and Georgetown neighborhoods were relatively integrated among Afro-Guyanese and Indo-Guyanese.

3 Those with means took refuge in the handful of hotels located in Georgetown, and those without means moved to shelters, while countless others, like Margaret, opted to stay in their homes.

4 The exception are villages located adjacent to the EDWC and within the catchment of the Mahaica River (see chapters 4 and 5).

5 See Schipper 2006 for a brief history of climate adaptation as a term and strategy and its place in UN governmental protocol. For a brief history of the UNFCCC, see Agrawala 1998a and 1998b.

6 Monies for the EDWC-related projects did not come from LCDS. They were earmarked through World Bank loans and the country's PetroCaribe Rice Compensation Scheme with Venezuela. The EDWC's climate adaptation projects started before LCDS was finalized; nevertheless, the government used related project reports as references and models for future LCDS funding schemes for coastal climate adaptation engineering activities. Other engineering activities include mangrove restoration co-organized by engineers, agronomists, geoscientists, and ecologists to enhance sea defense (Vaughn 2017).

7 The small-island-state coalition is a reaction to the indifference high-emitting Global South and Global North states have shown low-emitting Global

South states throughout history. Copenhagen marks a turning point in IPPC agreements because unlike the 2001 Marrakesh Accords, there was explicit dialogue about what climate adaptation entails and not simply who funds it or how (Schipper 2006). Other regional identities in the name of climate adaptation have emerged in recent years, such as the Caribbean's "1.5 to Stay Alive" campaign. Such commitments to rethinking regionality through vulnerability suggest that there is "no shared common future" for the planet but rather multiple and ongoing climate crises that have inspired various frameworks of calculation, intervention, and diplomacy (Latour 2018).

8 While beyond the scope of this book, the question of how different technosciences become associated with race in climate adaptation projects also plays into the way states imagine the rights and liberties of its citizens. As Nikolas Rose and many others have argued, technosciences have a critical role in shaping racial conceptions of the vital human being and the racial characteristics of the actual and desirable citizen.

9 Guyana's low-lying coastal strip depends on three other large-scale embankment dams: the Boeraserie Conservancy, the Tapakuma Conservancy, and the Abary Conservancy. Given that the EDWC was the sole site of dam overtopping during the 2005 disaster, this book does not focus on the operations of the other three.

10 Climate adaptation is animated by the idea that nature is a form of infrastructure, as Ashley Carse (2014) notes when describing the operations of the Panama Canal. He and others have shown that the rapid growth of public and private sector investments in environmental engineering exposes the speculative operations of governance and its collective social agencies (Ballestero 2019; Disco 2002; Helmreich forthcoming).

11 This emphasis distinguishes recent work in anthropology on climate change from the political ecology approaches in geography on risks and hazards and the social constructivist approaches in the field of science and technology studies on the vulnerability of sociotechnological systems. Rather than a discrete condition, "ways of knowing disturbance" gesture to relations of dependency not only between humans (Butler, Gambetti, and Sabsay 2016) but also between human and more-than-human forms. From this perspective, vulnerability constitutes a range of ethical-affective processes that underscore what counts as adaptation to climate change.

12 These writings have two diverging concerns. On the one hand, they remind us that vulnerability provides an alternative vantage point from which people can begin to act against political and economic systems that support excessive carbon consumption, species extinction, inequality, and the like. On the other, they track the relations of capital that accelerate climate change and its pernicious arrangements of abandonment that privilege some life forms over others.

13 When referring to apaan jaat and its capacity to label human bodies and divide groups into singular entities, I prefer to use the term *individual*. I use the term

while recognizing the ways that race can never be disentangled from claims of personhood that are historically informed by the Enlightenment's emphasis on reason (e.g., mathematics), modern descriptions of the human (e.g., census categories), and liberalism's ethico-political claims to the body (e.g., citizenship). With that said, I find that the term *individual* helps delineate the various forms of address—as much as recognition, at stake in racial political orders. On race and personhood, see Comaroff and Comaroff 2001; on enumeration, theories of race, and categories of the individual, see Winant 2000.

14 My reading of boundary making and agential cuts is primarily based on Barad's *Meeting the Universe Halfway* (2007) and "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter" (2003). In these texts she is concerned with explaining what counts as representationalism and the ethical relations that emerge from knowledge-making practices and their material reconfiguration. The concept of agential cuts is part of a broader analytic approach called posthumanist performativity, which treats human and more-than-human agencies as shaping the conditions of possibility for ethical action. Barad's emphasis on the distribution of agency and the practices that enact responsibility for different actors distinguishes her work from other scholars taking a new materialist approach to examine agency, who tend to deploy the concepts of force (Bennett 2010) and assemblage (DeLanda 2019). Barad's reading of agential cuts is worthwhile to the extent that it treats ethics as an issue that emerges from the way people perceive boundaries/difference rather than as a given or assumed category of subjectivity or even identity. For a sharp critique of Barad's notions of subject formation, nonduality, and responsibility, see Braunmühl 2018.

15 The terms *intense flooding* and *big flood* were repeated by many of my informants to describe above-average rainfall that contributed to floods. When they spoke of intense flooding, the actual watermarks did not always meet or exceed the three seven-foot watermarks of 2005; nevertheless, the watermarks reminded them of this possibility.

16 Measuring apparatuses dramatize the moments when people decide whether or not to interpret their place in the world as structured by race. Here I part with scholars, especially within the disciplines of security studies and geography, who assume that climate adaptation activities necessarily advance arrangements of biopower (see Evans and Reid 2014). They often critique climate adaptation activities as doing three things: conflating social values with the biological capacities of infrastructural systems; privileging emergent modes of self-organization instead of those that persist over time; and reinforcing structures of political power through lifestyle choices and modes of sustainable consumption. In such accounts, measuring apparatuses are often described primarily as preserving liberal ideologies about the management of life (e.g., development or the welfare state) (see Oels 2005). But conflating measuring apparatuses with the management of life leaves unanswered how and why life becomes a problem of concern in the first place for some people

and not others. Throughout this book, my focus on race looks to ask how and why this flattening occurs while simultaneously asking what other political forms race takes beyond questions of life and death.

17 Although many political commentators and historians mark the 1957 election as inaugurating apaan jaat, there is still a debate about what caused the internal PPP party split between Jagan and Burnham in the first place. I attribute this debate to issues of historiography and power-knowledge. On the one hand, in the early 2000s files on the preindependence state of emergency, constitutional crisis, and labor disputes were declassified in the British and American archives. (For a fascinating analysis of British archival policy and decolonization in British Guiana, see Cobain 2017.) Since then, there has been a renaissance of sorts in Guyanese studies and Caribbean historiography that reconsiders the significance of preindependence British Guiana and early Guyana in the Cold War and the British Empire. Much of this literature corroborates the memoirs and personal accounts of political figures of the period. On the other hand, there are discussions about whether an individual political figure or the collective body politic should be held accountable for apaan jaat (see, for example, Kissoon 2012). Did Jagan first invoke the term to rally support from Indo-Guianese, or was it Burnham, in an effort to further marginalize Jagan within the ranks of the PPP? How does the phrase index the reproduction of gendered political relations and opportunities? Given these concerns, I characterize apaan jaat as situated within what Lee Drummond (1980) calls a "cultural continuum," or the *uneven* processes of communicative exchange that shape power relations. Specifically, one could argue that in its initial use, during the 1957 electoral campaign, apaan jaat was informed by metadiscourses about imperialism, colonialism, sovereignty, and political legitimacy. Further elaboration on the origins of apaan jaat is beyond the main concerns and scope of this book, but for a discussion on sentiment, race, and language, see McElhinny 2010.

18 I recognize that the word *racism*, similar to the terms *racial bias* and *discrimination*, takes on varied meaning and value given the context of its use. This being said, I follow Mullings's (2005, 668) point that *racism* is a relatively new term that came into popular use (at least within Western English-speaking contexts) during World War II. Mullings's periodization would fall in line with broader readings of raciology and biological sciences used as tools for the reproduction of nationalism and bare life. Nonetheless, other processes of racism more broadly conceived as racial bias or racial discrimination have similar origins and effects. This point is made in Cedric Robinson's (2000, 2) interpretation of the term *racialism*, which he argues has had a longer historical presence within discourses of state formation: "Racialism is the legitimatization and corroboration of social organization as natural by reference to the 'racial' components of its elements. Though hardly unique to European peoples, its appearance and codification, during the feudal period, into Western conceptions of society was to have important and enduring consequences." Finally,

I also take seriously David T. Goldberg's (2015) point that racism should be theorized as a tension between stand-alone events and long-term historical structures (longue durée) through which people learn to articulate claims to dignity, rights, and social possibility because of one's perceived race.

19 For instance, given that Guyana's national census counts people of Mixed descent as a distinct race, the national census challenges the national motto "the land of six peoples" (inclusive of African, Amerindian, Chinese, Indian, Portuguese, and European). Taking into account this distinction between the national census and the national motto, the Guyanese state enacts a form of liberal multicultural governance that is distinctive to the Caribbean. Specifically, the state acknowledges the various historical moments of migration that brought about the displacement of Amerindians from the coast for the labor of enslaved Africans. It highlights the role of indentured labor on racial identity formation, particularly the identity of Mixed Race, which in recent decades most often refers to someone of Afro- or Indo- descent (see chapter 4; for other examples, see Crosson 2020; Munasinghe 2001 on Trinidad). In addition, the Portuguese census category is not counted as inclusive of the census category *European* because of the historical role of Portuguese indentured laborers, alongside those of Indian and Chinese descent, in settlement after slave emancipation.

20 Apaan jaat is either uttered or invoked in everyday discourse to reference one's *indifference* or *dissatisfaction* with a politician, an election outcome, or state activity. In most instances, people go out of their way to avoid invoking the phrase by abruptly ending a conversation or staying silent when "politics" or "parties" are mentioned (see also Rickford 2019).

21 I do not dispute, for instance, the cross-cutting ways in which concepts such as "Black geographies," "Indigenous geographies," and "Black ecologies" highlight the plural modalities of race that characterize environmental and climate change awareness. Collectively, these concepts challenge White subjectivity as the norm of environmental action and thought. Moreover, I would interpret these concepts as in line with the democratic ideals of the New Left and intellectual traditions such as Black radical thought, intersectionality, and queer theory. At the same time, I worry about these concepts' modes of disciplinary and epistemic address, particularly in their reference to literary and environmental humanities as emancipatory fields, at the expense of considering the sciences' emancipatory potential. Instead, I look to problematize the modernist underpinnings of race concepts by treating the humanities and the sciences as always already co-constituted domains of knowledge. In doing so, I highlight the geohistorical contingencies of their formations and susceptibility to being co-opted by both racist and antiracist projects.

22 For a broader discussion on the investments of the social sciences and the humanities in varied theories of new materialism and specifically debates about posthuman epistemologies, see Braidotti 2019.

23 I draw on a long tradition in the subfield of historical anthropology that centers the relation between ethnography and history in the conditions of