SUSTAINABLE FUTURES, WATER INFRASTRUCTURE LEGACIES AND RACIAL CAPITALISM: A CASE STUDY OF THE MID-MISSISSIPPI RIVER REGION

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ABSTRACT

Over the past several decades, flooding events in the United States have become the most frequent and costliest natural disaster. In the U.S., city and regional leaders are planning new water and flood mitigation infrastructure in response to the challenges of flooding, uneven urbanization, and racialized exclusion. Historically, projects to keep water out have never been universal or evenly applied. Yet, 'learning to live' with water, a key tagline in current sustainable development paradigms, masks how histories of racialized land development are entangled with contemporary water infrastructure projects and are productive of regional planning power. This dissertation centers racial capitalism in analysis of how contemporary water infrastructure projects are entangled with, and informed by, histories of racialized land development in the mid-Mississippi River Region. Through two case studies on flood mitigation infrastructure in eastern Missouri, I trace the historic development of infrastructures that shape the ongoing racialization of space, infrastructure (re)development and community vulnerability to flooding today. The case studies draw from a range of data, including archival research on histories of land and infrastructure development, participant observation of planning meetings, professional conferences, and local neighborhood initiatives, and field observations of the built environment. I argue that 1) scholarship concerned with social-environmental inequities should engage racial capitalism as a framework to "provincialize" urban theory and environmental racism as a means to theorize uneven infrastructural provisioning as a mode of urbanization that (re)produces social difference and value creation under racial capitalism, 2) the historical development of flood control in the Mississippi region was fundamental to the development of racial capitalism because it consolidated regional

planning power through methods of social and environmental domination, and 3) contemporary infrastructural redevelopment and flood mitigation projects must contend with the path dependencies of structural racism to disrupt existing cycles of marginalization across social differences to deliver meaningfully on equity goals. Ultimately, this study finds that flood-mitigation infrastructures, including levees, floodways, and dams, on the Missouri River and gray and green stormwater infrastructure (GSI) in the City of St. Louis are embedded in broader social-environmental networks and regional power blocs, whose regional history and dynamics have created distinct patterns of uneven urbanization and vulnerability to flooding disasters. Because infrastructure projects are embedded in the built environment for decades, the social relations comprising their implementation, or lack thereof, reach into present and future development considerations. Thus, when planning projects fail to grapple with path dependencies of past infrastructure projects, they may reproduce structural racism and re-create patterns of uneven urbanization and vulnerability to flooding disasters.

This dissertation is dedicated in loving memory to

Joel K. Cornell

Thomas V. Stockdale

John M. Call

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TABLE OF CONTENTS

LIST OF TABLES

Table Page

LIST OF FIGURES

Figure Page

CHAPTER 1

INTRODUCTION

1.1 Purpose and Significance

The objective of the research is to examine how historic water infrastructure investments, policies, and projects in the Mid-Mississippi River region continue to shape water infrastructure projects with implications for social and environmental equity. Specifically, this research uses a case study approach to examine both the ongoing development of remedial water infrastructure via EPA consent decree in St. Louis and the historical development of infrastructure designed to keep water out in the mid-Mississippi River Region. Historically, projects to keep water out have never been universal or evenly applied. Yet, 'learning to live' with water, a key tagline in current sustainable development paradigms, masks how histories of racialized land development are entangled with contemporary water infrastructure projects. By investigating how the politics of flooding and the distribution of risk under water infrastructure projects are entangled with and informed by histories of racialized land development, this research unpacks how attempts to control and contain where water flows, how it flows and what flows with it are constitutive of relations and constructions of social and environmental difference that shape the contours infrastructure development projects and are constitutive of racial capitalism. Finally, by bringing together theoretical approaches to studying the political economy of infrastructure and racial capitalism, this research addresses questions of who is made to live with water and who can choose to live with

water which are paramount in the context of contemporary issues of infrastructure redevelopment, risk prevention, climate change and social justice.

1.2 Background

Over the past several decades, flooding events in the United States have become the most frequent and costliest natural disaster. The 2018 report of the Intergovernmental Panel on Climate Change (IPCC) issues a dire warning of the immediate consequences of a warming planet. The report argues that in order to give humanity 'room to adapt', the global economy must be transformed at a speed and scale that has 'no documented historic precedent' (IPCC, 2018, p.4). At its core, the IPCC report makes clear that climate change means reckoning with the profound degree of uncertainty in the socio-material relations of the planet. Flood risk management approaches including regulatory practices (flood insurance, structural changes to the built environment), gray infrastructure (pipes, cisterns, pumps, levees, and channels) and more recently green infrastructure (rain gardens, floodways, permeable paving, and green roofs), illustrate how uncertainty is calculated, anticipated and reckoned with. These systems have distributed risk in ways that reproduce uneven vulnerability to flooding. This research examines how inequality and inequity shape infrastructure development projects as it relates to flooding risk management in the Middle Mississippi River Region in order to address and avoid such consequences in the future as we reckon with the uncertainty of climate change.

Post-industrial metropolitan areas across the eastern half of the United States are increasingly forced to reckon with under maintained and outdated infrastructures. Most post-industrial cities are facing budget shortfalls, significant populations loss, environmental hazards resulting from their industrial past, and demands to make the city globally competitive in attracting and retaining public and private investment (Akers, 2015; Hackworth, 2014, 2015, Safransky, 2014, 2017; Silverman, 2018). Under this context, urban and regional leaders are increasingly looking for creative ways to address social, ecological, and economic challenges in meeting regulatory compliance in the redevelopment of aging infrastructure (Finewood et. al., 2019; Pearsall and Pierce, 2010). One relevant example of how this is being accomplished, is through an emerging emphasis on green infrastructure. The EPA defines green infrastructure as follows:

> Green infrastructure is a cost-effective, resilient approach to managing wet weather impacts that provides many community benefits. While single-purpose gray stormwater infrastructure—conventional piped drainage and water treatment systems—is designed to move urban stormwater away from the built environment, green infrastructure reduces and treats stormwater at its source while delivering environmental, social, and economic benefits. (EPA, 2018)

While green infrastructure is gaining popularity as a cost-effective measure that provides an array of 'co-benefits', there remains a crucial need to establish the best frameworks in which to evaluate the environmental and social equity dimensions that emerging approaches to infrastructure redevelopment purport (Safransky, 2017). This is especially urgent in St. Louis which, as a result of urban uprisings in 2014 around the murder of a young Black man by a white police officer and sustained activism around racial justice, has signaled a willingness to consider conversations of racial equity in processes of

planning and governance (Ferguson Commission, n.d.). Given that the sewer redevelopment project is the most expensive investment in the region in decades, it is worth asking to what extent these projects are realizing racial justice and equity.

Emerging research on water infrastructure under racial capitalism argues that race matters more than class in explaining lack of or inadequate household water security in the U.S. (Dietz and Meehan, 2019), in understanding the role of the municipal bond market in financing infrastructure redevelopment in predominantly Black cities (Ponder, 2017), and in understanding water insecurity in peri-urban fringes (Ranganathan and Balazs, 2015; Ranganathan, 2018). These studies, while incredibly valuable, focus predominantly on drinking water and sanitation, less studied are water infrastructure for flood mitigation, especially in non-coastal places. It is paramount that we understand the ways conversations about racial equity have or have not been incorporated into fluvial and surface flood management projects as they are informed by priorities set forth by urban and regional development blocs. Asking questions about flood mitigation infrastructures through the framework of racial capitalism opens up space to interrogate the ways in which the production of social difference is central to the production of value under capitalism. While regional power blocks have been understood as a key component of infrastructural development, little attention has been paid to how these power blocks can be seen as part of the broader processes of racial capitalism. Here, regional development blocs are understood as "dynamic regional power structures that consist of diverse segments but are united in their efforts to gain control over resources and

ideological and distributive institutions governing their allocation" (Woods, 2017). In doing so, this research contributes to calls to provincialize urban theory by relinquishing colorblind urban theory which refuses to consider racialization as a prime analytical category in which to understand urbanization (Leitner and Sheppard, 2016; Roy, 2017) and it advances conversations about how best to conceptualize the social and environmental equity dimensions of infrastructural redevelopment projects under increasingly uncertain socio-environmental futures.

The St. Louis region offers a unique vantage point in which to explore the research questions for several reasons. First, as discussed above, flooding is emerging as a major social concern and threat, especially on an increasingly warmer planet with shifting precipitation patterns. A majority of the research on the social and ecological risks resulting from flooding events is focused on coastal communities and the damage and devastation resulting primarily from hurricanes (Cutter and Emrich, 2006; Montgomery, 2014). Less studied are inland flood-related risk mitigation projects, both from fluvial (river) flooding and surface (urban) flooding. Second, the literature on flood prevention and recovery generally looks at individual behavior, institutional programing, and sustainable planning initiatives and incentives in mitigating or exacerbating flooding risk and flood plain development, (Cutter and Emrich, 2006; Hersher and Benincasa, 2019; Kunreyther et al. 2018). While this work is valuable in understanding, assessing, and intervening in processes that create and perpetuate uneven vulnerability to flooding, there is an opportunity to rethink some of our key assumptions about vulnerability and

resilience through the lens of racial capitalism that sees processes of social and material differentiation as integral to production of value (property, persons or otherwise) that existing risk management policies and projects purport to protect. Finally, despite numerous studies showing that adverse impacts of flooding events are unevenly distributed resulting in poor and minority communities suffering disproportionately (Hersher and Benincasa, 2019; Mohai et al. 2009; Montgomery, 2014; Morse, 2008), the literature generally does not focus on developing frameworks through which to better understand the uneven social production of flooding risk.

This project is a regional study of water infrastructure in the Mid-Mississippi region that explores how the mitigation of flood-risk produces racially stratified protection from unwanted water, whether through the cutting edge of green infrastructure or more historically familiar methods like levee construction. I sought to understand the historic and contemporary interplay between flood management practices, policies, and infrastructures and the uneven social production of flooding risk and where interventions should be made. In 2012, the City of St. Louis and the Metropolitan St. Louis Sewer District (MSD) negotiated a $4.7 billion-dollar consent decree with the EPA, the most expensive in the continental U.S., over its under maintained and overburdened sanitary and storm water and sewer system. Project Clear, as it is known locally, is a 23-year plan to address the region's aging sewer and wastewater system through gray infrastructure (sewer lines, storage tanks, tunnel expansion, etc.) improvements in the southern half of the city and green infrastructure (bioswales, permeable pavement, rain gardens, etc.)

interventions in the northern half of the city. Given that decades of racial segregation persist in the city of St. Louis, this approach raises questions about the role of infrastructure redevelopment in processes of uneven urbanization. Given the St. Louis region's history and coevolution with water infrastructure projects on the Mississippi, the second site of this research will focus on conflicts surrounding the Birds Point-New Madrid floodway. This case study offers a different and unique lens because it demonstrates how historically black communities have borne the brunt of flood management decisions by local levee boards and the Army Corps of Engineers to inundate these places during peak flow events. These two cases offer interesting entry points into studying the role of public works projects in the uneven social production of flooding risk.

In summary, questions of the uneven social production of flooding risk, or who is made to live with water and who can choose to live with or without water are paramount in the context of water infrastructure development, risk prevention, climate change and social justice. Using qualitative and archival data, this research (1) investigates the history of water infrastructure development in the region and how public works projects are productive of regional power blocs; (2) applies the theoretical framework of racial capitalism to understand the role of regional power blocs and infrastructure projects in processes of uneven development; and (3) develops a framework of racial capitalism and regional power specific to the Mid-Mississippi River Region to understand the wider

implications of historic and contemporary water infrastructure projects for social and environmental equity.

1.3 Research Questions

Using qualitative data and archival data, this research addresses the following questions:

RQ1. To what extent do historic water infrastructure projects shape contemporary water infrastructure projects in the St. Louis region?

RQ2. What is the relationship between histories of racialized land development and regional power blocs in processes of uneven development as it relates to protection from unwanted water?

RQ3. What are the implications for social and environmental equity?

1.4 Research Design and Methods

This research is concerned with analyzing how historic water infrastructure investments, policies, and projects in the southeastern Missouri region continue to shape water infrastructure projects with implications for social and environmental equity. Using historical and qualitative methods, I engage water infrastructure projects in the St. Louis region both as an object of inquiry, seeking to understand infrastructure projects as a material form of urban and regional transformation and contestation, and as a methodological entry point to study these same processes (Björkman, 2015). In order to better understand these complex and abstract processes, my study examines two case studies of water infrastructure in the St. Louis metropolitan region and its surrounding

hinterland. Instead of selecting cases for comparison, I conceptualized my cases as two domains of water infrastructure development in an effort to draw linkages across multiple domains (Gilmore, 2008). I conceptualize my two case studies, one in an urban center and the second in the rural hinterlands, as domains rather than cartesian sites because I am interested in a historical and regional geographical analysis of the development of contemporary racial capitalism as it relates to flood mitigation. I do not understand these cases as bounded entities, but rather as a bundle of relations and flows which more correctly mimics the physical properties of water. Each domain focuses on water infrastructure redevelopment project/s that address a specific type of flooding whose management is overseen by different federal agencies. My methodology is guided by work in Black Geographies and critical human geography that critiques the naturalization of the effects of racism or take them to be the end point of analysis (McKittrick & Woods, 2007). I heed Van Saint et al.'s (2020) call for "a rejuvenation and extension of approaches to historical-geographical scholarship which are inspired by direct engagement with problems in the present, and which intend to do something about them" (p.169). Thus, in both my case studies I approach history as a means to understand present-day problems and evaluate contemporary solutions.

This dissertation is based on fieldwork I conducted in June - December 2019 and during the summers of 2020 and 2021. I would be remiss if I did not mention how the COVID-19 pandemic impacted my research. During the first phase of my fieldwork in 2019 I had engaged in participant observation and developing research connections with

residents and stakeholders in St. Louis. I attended events and conferences in the region related to racial equity and flooding (see Table 1.1) during the fall of 2019. I had begun to make headway with interview participants as well. Upon the conclusion of phase 1 of my fieldwork in December 2019, I returned to Philadelphia with intentions to continue my research virtually until I could return to the field during the summer of 2020. However, this plan was cut short following the onset of the pandemic when life as we knew it came to a sudden halt. The pandemic had profound impacts on my research both because I could not return to the field and found it very difficult to pursue interviews virtually during this time. The pandemic also impacted my archival work because I was only able to access digitally available collections. To redress these shortcomings, I engaged with secondary historical sources on development and flooding in the region.

1.5 Overview of Articles

This dissertation consists of three articles that explore and answer the research questions above. The first article, "Urbanization, Racialization, and Water Infrastructures Under Racial Capitalism" responds to recent debates in urban geography concerning how best to understand processes of urbanization across urban-rural geographies. This article introduces the theoretical framework that has guided this research and analysis. I engage with calls to "provincialize" urban theory by foregrounding social difference as potent terrain through which to theorize the changing geographies of urbanization. Using water infrastructure (re)development as a lens, I argue that applying the powerful concept of racial capitalism to "provincialize" urban theory and environmental racism opens up the

Table 1.1 Research Activities

Method	Activity	Location	Timeframe
Participant Observation	STL Racial Equity Summit	St. Louis, Mo	Fall 2019
	MO Governor's Flood Recovery Advisory Working Group monthly meetings (reoccurring)	Jefferson City, Mo	Fall 2019 and virtually Spring 2020
	Stormcon Conference	Atlanta, Ga	Fall 2019
	Maryland Heights Floodplain TIF meetings	St. Charles, Mo	Fall 2019
	STL MSD Board Meetings and webinars	St. Louis, Mo	Fall 2019 and virtually in Spring 2020
	Land Bank monthly meetings	St. Louis, Mo	Fall 2019
Interviews	Resident of St. Charles, organizing against proposed floodplain development	St. Charles, MO	Fall 2019
	Water policy director for the Missouri Coalition for the environment	St. Louis, MO	Fall 2019
	Energy policy director for the Missouri Coalition for the environment	St. Louis, Mo	Fall 2019
Archival	National Archives at St. Louis	St. Louis, Mo	Fall 2019 and digitally accessed in Summer 2020 and 2021
	State Historical Society of Missouri	St. Louis, Mo	Fall 2019 and digitally accessed in Summer 2020 and 2021
	National Archives	Washington, DC	Digitally accessed in Summer 2020 and 2021

possibility of theorizing uneven infrastructural provisioning as a mode of urbanization that (re)produces social difference and value creation under racial capitalism. In order to understand the processes and implications of uneven development (Smith, 2010), racial capitalism provides a powerful and insightful framework for analyzing the ways in which infrastructure provisioning is shaped by and shapes social and environmental relations of power. Furthermore, through the lens of racial capitalism, the paper highlights the need to theorize environmental racism relationally, understanding how the underdevelopment of infrastructural provisioning in one place is materially tied to more robust infrastructural provisioning in another. Research on environmental racism and justice has demonstrated the myriad ways in which racial disparities pattern urban and rural geographies, but further insight into the historical processes and power relations that (re)produce environmental racism are needed. This paper concludes with a call to center questions of historical and regional planning and power relations in understanding processes of urbanization and environmental (in)justices.

The second article, "Greening the Color Line: Historicizing Water Infrastructure Redevelopment and Environmental Justice in the St. Louis Metropolitan Region" presents my first case study of the St. Louis Metropolitan Sewer Districts (MSD) geographically bifurcated green-gray approach to redeveloping aging sanitary and stormwater infrastructure. Contrary to scholarship that identifies nature-based solutions to aging urban infrastructure as an unquestionable social good[1], I demonstrate how St.

[1] This isn't to say there are not important bodies of research that question the normative assumptions underpinning urban green projects. For example, Pearsall and Eller (2020)

Louis's approach to wastewater redevelopment relies on geographies of racial capitalism to save costs, subjecting marginalized communities to cost-saving approaches with no measures or plans to measure benefits beyond stormwater retention. Utilizing archival and secondary sources, I trace the historical urban infrastructural development in St. Louis during the twentieth century, demonstrating how the underdevelopment of North St. Louis, whose residents today are majority Black and who suffer from unequal exposures to environmental hazards, was possible because it enabled development elsewhere in the region. I then apply my historical analysis to analyze the MSD's legally mandated sanitary and stormwater redevelopment plan which assigns green stormwater infrastructure (GSI) to North St. Louis, and gray infrastructure to the rest of the city and surrounding metro region. The MSD's justification for siting green-infrastructure exclusively in North St. Louis which suffers disproportionately from land vacancy, demonstrates a contemporary retooling of this centuries-long process, even with the important environmental benefits beyond stormwater retention offered by GSI. This paper demonstrates what an historical and geographic approach to infrastructure (re)development can add to understandings of equity in the urban greening scholarship because when nature-based solutions are not tied to a broader agenda that redistributes resources and power to marginalized communities they reproduce a racist spatial order.

and Anguelovski et al., (2019) demonstrate how urban greening contributes to displacement pressures that negatively impact marginalized communities and limit equitable access to the benefits of these projects and spaces.

In the third article, “Regional Power Blocs and Differential Vulnerability to Flooding: Exploring the Consolidation of Power and Racial Capitalism Through Land Reclamation and Flood Control in Southeastern Missouri”, I present my second case study which first begins by examining the state-led response to the 2011 Mississippi River Floods and detonation of the Birds Point New Madrid Floodway. The response was mired in controversy that pitted prime agricultural land against an economically struggling Black town despite a clear legal mandate to operate the floodway. The floodway was eventually detonated but it was a smaller rural Black village located within the floodway that bore the ultimate price - the loss of their beloved town. I situate this story in the broader history of the development of land reclamation and flood control infrastructure in southeastern Missouri. I draw from the work of geographer Clyde Woods (2017) whose work on the political economy of Delta plantation regimes and African American freedom struggles demonstrates the centrality of racialization to capitalism and regional development. I examine how nineteenth century efforts to *keep water out,* a phrase I use to describe infrastructural projects designed to drain water and control flooding, were central to creating the conditions of racial capitalism that impact differential vulnerability to flooding today. In doing so, this paper demonstrates that hazards research into the differential production of vulnerability should engage with the development of racial capitalism.

In the conclusion, I outline the contribution of this dissertation and the “histories of and for the present” (Van Saint, 2020) that are presented for questions of social and

environmental equity. I discuss three key aspects of my contribution. First, my work demonstrates how histories of racialized place-making inform flood mitigation infrastructure planning and (re)create powerful social hierarchies, deepening existing socio-environmental inequities. Second, this dissertation demonstrates the need for an expanded understanding of the impacts of flood mitigation infrastructure planning on cities and urban regions. Third, my work contributes to important debates in urban geography and hazards literature on theorizing regional development, racialization, and environmental justice through processes of racial capitalism and social difference. By applying the lens of racial capitalism to research on infrastructure designed to *keep water out*, we can uncover the processes of structural injustices that perpetuate patterns of racial disparities in mitigation and recovery and emphasize the need for transformative solutions addressing the root causes of vulnerability. This framework encourages co-production as a research and policy strategy that considers not only the physical and material aspects of flood mitigation, but also the historical-geographical social, economic, and political dimensions that intersect with race and capitalism. Such an approach is crucial for developing more equitable and just strategies to mitigate and adapt to flooding under climate change, ensuring not only that marginalized communities are not further marginalized in the process but that processes of marginalization are meaningfully disrupted through hazard mitigation, recovery, and economic development.

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CHAPTER 2

ARTICLE 1: URBANIZATION, RACIALIZATION, AND WATER INFRASTRUCTURE MARGINALIZATION UNDER RACIAL CAPITALISM

2.1 Abstract

Theorizing infrastructure marginalization, including lack of access or inadequate access to critical water infrastructure in the global North, requires an expanded understanding of the drivers of inequitable water infrastructures in order for contemporary infrastructure redevelopment projects to deliver on their promise of more sustainable and equitable futures. In this paper, I argue that applying the powerful concept of racial capitalism to "provincialize" urban theory and environmental racism research opens up the possibility of theorizing uneven infrastructural provisioning as a mode of urbanization that (re)produces social difference and value creation under racial capitalism. Using the example of water infrastructure, I argue that for contemporary infrastructure redevelopment projects to deliver on their promise of more sustainable and equitable futures, they must contend with the embedded material interests and modes of domination that have shaped uneven infrastructure and development patterns. Specifically, geographers need to determine to what extent and at what scale do historic water infrastructure projects shape contemporary water infrastructure projects. What is the relationship between histories of racialized land development and regional power blocs in processes of uneven development as it relates to protection from unwanted water? What are the implications for social and environmental equity? Without analyzing the historical accumulation of power in infrastructure planning projects, we undervalue the possibilities of infrastructure as a potent terrain of struggle for sustainable and just futures.

2.2 Introduction

From the emergence of hookworm in Lowndes County, Alabama,(Pilkington, 2017), to water insecurity in HUD housing complexes (Pereira, 2018), to the systemic lack of piped water on Native Reservations (Tanana et al., 2021), infrastructure marginalization in the United States is a pressing issue. Contrary to assumptions that infrastructure in the global North delivers universal access, recent scholarship on water infrastructure in the US has highlighted the under-theorization of water marginalization in peri-urban fringes of US cities (Ranganathan and Balazs, 2015) and the significant role of race in mediating access to adequate services (Meehan and Dietz, 2019) including drinking water and sanitation infrastructure. This research is significant because it demonstrates how access to water resources, mediated by uneven infrastructural connections, works to reproduce social differences with implications for environmental justice. There are many explanations for water infrastructure marginalization in the global North such as a lack of regulatory compliance, a lack of maintenance for critical infrastructure and enduring patterns of residential segregation. Implicitly, there is an assumption that infrastructure marginalization results from a lack of capital and/or a lack of government regulation. While true, this characterization misses the important role of processes of social differentiation, particularly racialization, in theorizing uneven infrastructural access.

One framework for examining uneven infrastructural development is by *provincializing* urban infrastructures through an assessment of how historical infrastructural development mutually constitutes urban and rural places. "Provincializing" urban infrastructures is a response to the *planetary urbanization* thesis

which argues that processes of urbanization are universally reshaping planetary relations, most potently by extending the global reach of extractive urban infrastructures (Arboleda, 2016; Brenner, 2014). A "provincializing" critique of planetary urbanization calls for a situated approach to urban infrastructure that can focus attention to the production of difference as a mode of infrastructural provisioning (Gutierrez-Velez et al., 2022). However, to adequately provincialize infrastructure in the global North, an analysis of racial capitalism is necessary because the land and resource acquisitions needed to materialize infrastructural projects unfold through and invigorate relations of social and material difference.

A second framework for examining uneven infrastructural provisioning is environmental justice, which has gone to extensive lengths to demonstrate that poor and minority communities bear a disproportionate burden of exposures to environmental hazards and lack equitable access to environmental amenities. This scholarship has identified persistent socio-spatial patterns of what Pulido (2016) calls the 'environmental racism gap' but has lacked sustained interrogation of what drives inequitable environments. Building from Pulido (2016), the failure to understand environmental injustice as an element of racial capitalism means missing the point of why environmental racism exists (Seamster and Purifoy, 2021). While urban environmental justice scholarship looks at the distributional, procedural, and to an extent the recognitional inequities in urban environmental infrastructure provisioning, it would be strengthened by an analysis of racial capitalism that foregrounds the production of social difference in creating value through uneven environments.

Using the framework of racial capitalism to address the shortcomings of scholarship on urbanization, infrastructure, and environmental justice is urgently needed because under capitalism, the production of human difference is integral to the realization of value which allows the accumulation of power (Gilmore, 2002). Said differently, racial capitalism is an analytic with the power to describe historical and contemporary methods of domination that are part of the process through which economic value and environmental difference is derived through the devaluing of the geographies and bodies of racialized groups of people (Robinson, 2000; McKittrick, 2006). Instead of discourse that positions capitalism as color-blind or slavery as a feudal mode of production which capitalism supplants, proponents of racial capitalism argue that processes of racialization comprise the social and material workings of capitalism (DuBois, 2017). Building on the work of South African scholars theorizing the apartheid state, Cedric Robinson (2000) argues that racial hierarchies existed in Europe long before the first industrial factories emerged. He locates the belief in Anglo-Saxon superiority during feudalism as the basis for Irish and Slavic oppression. These historically located practices or domination and beliefs of racial superiority have endured over many centuries. Robinson traces the evolution of racisms that have evolved to produce the modern capitalist order, dependent on violent practices of domination and erasure. Modes of domination including colonialism and chattel slavery derive value by creating and then exploiting binaries of social difference (settler/native, black/white). These modes of domination persist today in uneven infrastructural provisioning, including water infrastructure. Communities of color face challenges such as inadequate water infrastructure, contaminated water sources, unaffordable utility costs and protections from unwanted water.

In this paper, I argue that applying the powerful concept of racial capitalism to "provincialize" urban theory and environmental racism opens up the possibility of theorizing uneven infrastructural provisioning as a mode of urbanization that (re)produces social difference and value creation under racial capitalism. Using the example of water infrastructure, I argue that for contemporary infrastructure redevelopment projects to deliver on their promise of more sustainable and equitable futures, they must contend with the embedded material interests and modes of domination that have shaped uneven infrastructure and development patterns as a potent terrain of struggle for sustainable and just futures. Specifically, geographers need to determine to what extent and at what scale historic water infrastructure projects shape contemporary water infrastructure projects. What is the relationship between histories of racialized land development and regional power blocs in processes of uneven development as it relates to protection from unwanted water? What are the implications for social and environmental equity? Without analyzing the historical accumulation of power in infrastructure planning projects, we undervalue the possibilities of infrastructure as a potent terrain of struggle for sustainable and just futures.

2.3 Provincializing Urban Theory in the Global North

Recent debates in urban theory characterized by *planetary urbanization* and *provincializing urban theory* are instructive in order to expand theoretical perspectives that are applied to conceptualize urbanization and infrastructure as both a driver and mediator of social-environmental change. In critical urban theory scholarship, orthodox Marxist geographers have developed the concept of "planetary urbanism" arguing for reconceptualizing urban places as outcomes of the capitalist global economy where

processes of urbanization are driven by flows of capital and urban consumption patterns transforming ever distant socio-spatial environmental relationships (Brenner and Schmid, 2014; Merrifield 2013). Building on Henri Lefevbre's (1970) thesis of 'the complete urbanization of society', planetary urbanization characterizes the co-constitution of capitalism and urbanization by redefining non-urban spaces and resources as zones of urban infrastructural extraction enrolled in circuits of capital accumulation serving urban places (Arboleda, 2016; Brenner, 2018; Brenner and Schmid, 2014; Merrifield, 2014). Calls to "provincialize" urban theory have argued that rather than seeing urban and rural places and processes as co-constituted, planetary urbanization epistemologically privileges *urban*-economic processes when theorizing the drivers of global capitalism and socio-environmental change. (Derickson, 2015, 2018; Gutierrez-Velez et al., 2022; Ruddick et al., 2018). The result is that class-dynamics are analytically privileged over other structural power relations including but not limited to gender, race, and sexuality and that these identity-based power relations are not sufficiently theorized as modalities through which class is lived. Feminist, critical race, postcolonial, and queer scholars have argued this focus is partial and often sidelines questions of subjectivity, identity, and lived experiences as central relations shaping processes of urbanization (Reddy, 2019). Scholars critiquing planetary urbanization call for a focus on social difference making and everyday life as a way for understanding processes of urbanization that can be linked to broader structural configurations, including global capitalist logics, but also logics of colonialism, heteropatriarchy, anti-Black racism, white supremacy, and imperialism (Buckley and Strauss, 2018; Oswin and Pratt, 2021). This debate speaks to the heart of what is at stake in urban theory: what are the most productive epistemological positions

from which to know the urban? The central concern should not be if urbanization is occurring in unprecedented ways, but rather what are the political stakes in how knowledge about urban places and processes of urbanization are produced and towards what ends.

The provincialization of urban theory is part of a broader Southern turn in the humanities and social sciences where theoretical and empirical attention to places, processes, and lived experiences in the global South call into question the theoretical, conceptual, and analytical norms of urban studies more broadly (Robinson, 2016). Southern scholars have shown how a range of urban processes are shaping cities in the global South, including but by no means limited to industrialization and neoliberalism (Parnell and Robinson, 2012). While scholars of the global North have sought to explain differential urban processes by theorizing the hybridity of urban neoliberalism (Peck, 2015), postcolonial urban scholars argue for theorizing processes like religion and coloniality in their own right. As Reddy (2019) demonstrates, this requires working from an epistemological position that foregrounds the production of social difference, such as caste, as integral to and not merely subsumed by relevant economic processes. While it may be apparent how Northern theoretical orientations are less well equipped to theorize southern phenomena, scholars have argued that the South is not merely a location but also a relation (Escobar, 2011; Roy, 2018). Asking questions typically posed in the context of the global South, around issues of marginalization and informality for example, in the context of so-called 'developed' countries offers an opportunity to foreground how processes of social difference are integral, not merely subordinate to the functioning of well understood processes of capital accumulation in the global North. For

example, Schindler's (2014) study of the political economy of land in deindustrialized Flint, Michigan, builds from Roy's (2011) work on subaltern urbanism to show how subaltern spaces emerge in the global North marked by informality within regimes of state-sanctioned property arrangements. Methodologically, provincializing urban theory calls for a comparative approach that stresses thinking across difference as a way to build not a single generalizable theory but a set of generalizations about urban form, processes and experiences (Robinson, 2016). One example of what this can mean is that rather than selecting places for comparison with similar characteristics (historical, geographical, demographic, etc.), researchers widen their scope for comparison with more diverse and divergent contexts. As Ranganathan and Balazs suggest, this helps to "build a more cosmopolitan sense of our rapidly urbanizing world" and deepens our understanding of processes involved in uneven development and marginalization (2015, p.404). With respect to access to municipal drinking water services, Ranganathan and Balazs (2015) theorize a range of factors mediating water marginalization in peri-urban fringes across global North / South divides that trouble conventional explanations of water infrastructure marginalization in both contexts.

It is essential to recognize that urban experiences and dynamics vary throughout the world, and that universalizing frameworks cannot fully explain them. As such, there are four key aspects involved in provincializing urban theory including; 1) challenging and dismantling the colonial roots that have allowed Western and universal thinking to triumph over other forms of knowledge (Chakrabarty, 2009; Roy, 2016), 2) employing a situated and partial approach to knowledge production that centers the production of social difference dialectically, not as an additive, to key concepts in Marxist urban theory

(Buckley and Strauss, 2016; Lawhon et. al., 2016; Peake et. al., 2021), 3) attending to the role of historical contexts and local specificities shaping multi-scalar urban processes and interconnections with distant 'elsewheres' (Gutierrez-Velez et. al., 2022; Roy, 2016), and 4) centering diverse every-day lived experiences which are key for an informed understanding of various modes and processes of urbanization (Loftus, 2018; Reddy, 2019). The aim of provincializing geographic urban theory is to promote an inclusive, equitable, and nuanced understanding of urbanization that reflects the diversity and complexity of urban experiences around the globe.

2.4 Provincializing Infrastructure Redevelopment in the Global North

A fruitful focus for provincializing urban theory in the global North has been infrastructure development which looks at inequality, poverty, informality, and marginalization as particular modes of urbanization (Roy, 2011). Precisely because infrastructure projects entail 'improving' and 'modernizing' the basic physical and/or organizational structures that make something else (society, enterprise, circulation, etc.) possible (Graham and McFarlane, 2014; Star, 1999), they offer an entry point into these theoretical discussions. Provincializing infrastructure redevelopment projects enables us to trouble representations of the North as the modern, developed norm, to identify 'unusual suspects' (McFarland 2011) involved in the production of infrastructural marginalization, and identify 'counter topographies' (Katz, 2001) of risk mitigation towards different urban futures. While Marxist critical urban geography has a long history of taking urban infrastructures as an object of analysis to understand the dynamics of capital accumulation, engagement with processes and relations of social difference have received less theoretical weight. For example, deindustrialized cities in the global

North have experienced a hollowing out of their urban cores. Scholars have shown how in these cities, decades of demographic changes, shrinking local tax bases, and neoliberal urban policy are shaping new urban austerity measures. For example, in Cleveland, Ohio and Detroit, Michigan, plans to 'right-size', or more aptly 'ruralize' shrinking urban cores include amputating gray infrastructural services in neighborhoods where demand is low and promoting less costly urban green infrastructure projects like green reuse and urban forestry (Akers et al., 2020). While it is true these greening policies are operationalized by urban austerity under neoliberalism, there are other, older power relations at play. For instance, Sanfransky's (2014) study of urban redevelopment in Detroit, MI shows how state-led urban forestry projects, a form of green infrastructure, unfold through settler colonial rationales of land acquisition and productive property. Assuming the normative goal of critical analysis is to contribute to efforts to transform oppressive power relations, how we theorize and what we prioritize matters. Crucially, Sanfransky (2014) shows how grassroots organizations are creating alternative forms of land tenure to counter state expropriation fundamental to capitalism. Her work demonstrates how contesting oppressive relations can be productively animated through lived experiences saturated with relations of social difference making.

This article argues that one way to adequately provincialize infrastructure in the global North, is through an analysis of racial capitalism because the land and resource acquisitions needed to materialize infrastructural projects, from green stormwater infrastructure to hydro-electric dams, unfold through and invigorate relations of social and material difference. Scholarship on racial capitalism foregrounds how racially uneven patterns of development in the US comprise the social and material workings of

capitalism in which value is derived in part by exploiting social differences (DuBois, 2017; Robinson, 2000). For example, recent scholarship in urban geography has explored the social relations of power vested within water infrastructures, demonstrating how municipal finance and governance is dependent on uneven racialized geographies to solve budgetary crises (Phinney, 2022; Ponder, 2021). Through a comparative analysis of Baltimore, Detroit and St. Louis, Phinney (2022) demonstrates how the financialization of water infrastructure shapes municipal governance strategies such that household water and sewer debt is mined to generate revenue to repay municipal bondholders. Debt collection practices such as "late penalty charges, water shut offs, liens on property, garnishing wages, and housing foreclosure" are unevenly imposed because water debt is disproportionately borne by communities of color, particularly in Black-majority cities (Phinney, 2022, p.9). Relatedly, Ponder (2021) demonstrates how Black-majority cities, including Jackson, Mississippi whose water infrastructure systems are quite literally crumbling, are charged "more [interest] than their white counterparts to produce their built environments" (p. 2112). Urban geographers have long studied both debt-led and financialized infrastructure development (Furlong, 2020) but what makes this work new is a focus on the racial logics, not just effects, of municipal finance under urban austerity. As Derickson (2015) has argued, the use of racial profiling as a primary revenue stream to fund municipal services in urban areas like St. Louis, points to a 'blind spot' of urban theory that failed to predict racial profiling as a mode of urbanization and urban governance and raises key questions about the usefulness of neoliberalism, on its own, as a framework for understanding urban transformations.

One of the clearest examples of the practices at work in the reproduction of racial capitalism through infrastructure is the case of systematic lead poisoning through the municipal water system in Flint, MI, a majority Black and poor city (Pulido 2016, Ranganathan 2016). Operating in the context of fiscal austerity, the deadly decision to switch the primary water supply to the industrially polluted Flint River was justified as a cost-saving measure. The decision to switch the water supply caused lead to leach out of the old and under maintained pipes, delivering poisoned water to residents. Pulido (2016) argues that Flint demonstrates the structural nature of environmental racism and demands a more intersectional conception of capitalism in which "its deeply racialized nature is fully recognized" (2016, p. 1). Pulido argues that Flint's water was allowed to be poisoned because the residents of Flint "are so devalued that their lives are subordinated to the goals of municipal fiscal solvency" (Pulido, 2016, p.2). Phinney's (2022) work on Detroit demonstrates a similar phenomenon where the city's municipal bankruptcy crisis resulted in mass water shutoffs in the Black-majority city. Both Flint and Detroit's water crises were initiated by Michigan's controversial emergency manager position. State legislation authorizes the governor to appoint an official allowing the state to intervene in local governments experiencing financial emergencies. While literature from the State of Michigan's website explains how emergency managers help to minimize the "likelihood that a local government would be unable to provide basic services," both the Flint and Detroit cases show how emergency financial managers work to subordinate resident well-being to the needs of municipal finance (*Emergency Manager Fact Sheet,* n.d.). Pulido and Phinney's work demonstrate that a central feature of global capitalism is the devaluation of Black bodies as surplus such that entire places can become racialized and

considered disposable (Gilmore, 2007; Ponder, 2017). Thus, human difference and place entwine such that racism is best understood as a material and discursive formation that produces differential human value through the production of uneven infrastructures and landscapes.

Scholarship on racial capitalism, infrastructure, and municipal finance is asking important questions about the relationship between social difference and urbanization. This work shows there are several ways municipal finance perpetuates racial capitalism through the unequal allocation of resources (Lipsitz, 2007), gentrification and displacement dynamics (Dantzler, 2021), predatory municipal fees and fines (Ponder, 2020; Phinney, 2022), and economic development policies that create surplus populations and places (Fields and Raymond, 2021; Gilmore, 2002). Still, there remains a need to put in conversation theories of infrastructure and theories of racial capitalism in the US in order to produce provincialized urban theory adequate to grasp the complex production of inequality and power through infrastructure redevelopment projects in the global North. Here, the work of Woods (2017) on neo-bourbon plantation power blocs is instructive. In *Development Arrested*, Woods argues that the plantation power bloc in the Mississippi Delta region has been a fundamental force shaping regional and national development in the United States since its founding. He demonstrates that the roots of austerity governance can be traced through twelve regional-economic transformations of the Mississippi Delta plantation regime in which dominant plantation blocs repeatedly mobilized against working class African Americans and other subjected peoples to wrestle control over economic and social crises successively concentrating planter power and ideology at regional and national scales. Before, during and after Reconstruction,

planters adapted and expanded their monopoly over agriculture, labor, manufacturing, banking, land development, and local, county, and state finances and often subsidized by the federal government. Public works levee construction projects have defined Delta capitalism, especially following the historic 1927 Mississippi flood. As Woods demonstrates, levee projects, funded primarily by the federal government, increased the value of delta land and the power of delta planters primarily through the creation of regional development coalitions and levee boards which concentrated planter power in enduring ways (2017, p121). By bringing together insights from critical infrastructure studies and racial capitalism, geographers have shown how water infrastructure redevelopment projects in the Global North represent what DuBois (1947) discussed as 'the story that the West tells itself about itself' (i.e., stories about power, modernity, rationality, development) by focusing on how exposure to environmental hazards materializes through discourses of universal access to infrastructures that unfold over and reinforce geographies of uneven development.

2.5 Provincializing Research on Environmental Justice Through the Lens of Racial Capitalism

Another framework for conceptualizing infrastructure marginalization in the global North is scholarship on environmental justice, specifically work that investigates the relationship between environmental racism, the state, and the production of social difference. Scholarship on environmental justice in the global North has gone to extensive lengths to demonstrate that poor and minority communities bear a disproportionate burden of exposure to environmental hazards and lack equitable access to environmental amenities (Heckert and Rosan, 2016; Sister et. al., 2010; South et al 2018). Researchers have argued environmental racism explains the unequal distribution

of environmental burdens in non-white communities (Pulido, 2000). Environmental racism has been located in the siting of polluting industries, toxic hazards, and waste infrastructures in marginalized communities where air pollution, water contamination, and hazardous material exposures contribute to and exacerbate health disparities between white communities and communities of color (Agyeman et. al., 2016; Bullard, 2000; Cutter 1995; Davies 2022; Jbaily et. al., 2022). Despite decades of focused activism, policy initiatives, and institutionalization, environmental racism and inequality continue to persist between white and nonwhite communities. Recently, scholars have begun to articulate an urgent need to expand environmental justice frameworks by using new analytical tools for understanding the production of environmental injustice, including environmental racism (Pulido, 2016). For example, Anguelovski et al. (2020), argue for emancipatory and anti-subordination frameworks to assess urban greening projects because there is a need to ask questions about the "durability and adaptability of racialized processes" in environmental justice literature. Pulido (2017) has argued for greater attention to the state and state practices in the global North because racial capitalism produces environmental racism and is facilitated by the state. This paper argues that provincializing environmental racism through attention to local-historical context and the role of state practices under racial capitalism offers one such way to expand and deepen our understanding of the drivers of environmental (in)justice.

Environmental justice scholarship has identified persistent socio-spatial patterns of infrastructure inequities but has lacked sustained interrogation of what drives inequitable environments, what Pulido (2016) calls the 'environmental racism gap'. Inequities in water infrastructure provisioning, particularly in the global North, are often

attributed to a lack of distributional and procedural equity in the development, policies, and practices of municipal and private water infrastructure entities (Travaline et. al., 2015). For example, scholarship has shown how infrastructure development in the US unfolded via geographies of racial segregation in urbanizing areas, commonly denying sewage trunk-line extensions and electric powerlines to majority Black settlements following the Great Migration (Gordon, 2019; Harrison, 2016). Historical policies such as redlining and urban renewal further structured racially uneven investments in urban environments, what Wilson calls “race-connected practices"(2000), and what Jenkins calls “segregated infrastructures"(2020) that help explain why distributional inequities in urban environments persist. For example, Bullard’s (1990) foundational work shows how lack of zoning and institutional racism were responsible for Houston’s racialized pattern of solid waste facility locations. While this work is foundational in calling attention to racialized patterns of environmental inequities undergirding water marginalization there is a tendency to assume that environmental racism can be overcome by a stronger regulatory state (for a critique, see McCreary and Milligan, 2021; Pulido, 2016; and Ranganathan, 2016).

Along such lines, scholars have begun to articulate that much of the environmental justice literature in the global North characterizes the state as a “unitary regulatory actor” (Ranganathan and Balazs, 2015) and could benefit from insights from environmental justice literature in the global South which conceptualizes the state as “everyday” as a means to attend to state-society relations. Such a theoretical move might entail moving from conceptualizing infrastructure marginalization as stemming from a lack of adequate regulations, such as lack of access to piped water in unincorporated

counties or in *colonias* on the Texas-Mexico border (see Seamster and Purifoy, 2020; Ranganathan and Balazs, 2015; Ward 1999), towards an appreciation for the quotidian and messy negotiations between the state and society that can be characterized as discretionary, selective, and encountered (McFarlane, 2012). For example, scholarship on urban informality in the global South characterizes marginalization as a multifaceted process that stems not from a lack of governmental reach but from a range of enabling and disabling forces and relationships that allow the state to act as an instrument of accumulation and authority for particular types of development (Roy, 2009, p.80). Anand's (2017) research on water infrastructure in Mumbai demonstrates how a range of actors including residents, engineers, and politicians negotiate access to water across relations of social difference, blurring boundaries of formal and informal / legitimate and illegitimate access to water services. Similarly, while scholars have demonstrated how majority Black towns in the US South struggle to meet regulatory compliance for drinking water and sewer infrastructure regulations because of a lack of capital to match federal grant programs, there is also reporting of selective enforcement and regulatory discretion by state actors who may understand the structural position faced by poor communities but have limited power to reverse regulatory compliance mechanisms. For example, in Lowndes County, Alabama, environmental justice advocate Catherine Coleman Flowers (2020) exposes how some state regulators and legal representatives use discretion in determining when to cite residents for inadequate sewage infrastructure and are aware of how state regulatory policies can encourage speculative developers to report raw sewage violations resulting in aggressive punishment for households who cannot afford compliance (p.110). This insight is crucial because in Alabama individuals can be

jailed for failure to comply with septic-tank regulations (Flowers, 2020). This points to a much messier, more complex, and more flexible understanding of the state and its associated practices in producing, legitimizing, sanctioning, and ignoring environmental injustices.

This suggests that research on environmental inequities needs a different framework for analysis, such as racial capitalism, to help clarify and provincialize the role of the state in mediating environmental injustices. There is a small but growing directive in environmental justice literature to theorize the relationship between the state and environmental racism (Miyake, 2021; Kurtz, 2008, Pulido, 2016). For example, Miyake (2021) advances the notion of the environmental racial state to theorize the relationship between race, the environment, and the state's capacity to facilitate the conditions of racial capitalism. The work builds from Kurtz (2008) and Goldberg (2002), who have argued that the state plays an important role in shaping processes of racialization. While pointing to specific inequities of infrastructural provisioning in the built environment is helpful for clarifying the path-dependencies set forth by historical policy, a more urgent question is why environmental racism persists, or as Seamster and Purifoy phrase it, "what is environmental racism for?" (2021). Through historical ethnographic research in Houston, Texas's suburbs, Seamster and Purifoy show how municipal development policies, including tax policy, water and sewage infrastructure development, and land values are harnessed to extract resources and value from one Black suburb for the purpose of over-developing neighboring white suburbs (2021). Similarly, Ponder's research on the municipal water crisis in Jackson, Mississippi demonstrates how urban municipal debt facilitates the underdevelopment of the majority

Black city (2021). This work argues for a relational understanding of environmental racism that foregrounds how the underdevelopment of Black towns, neighborhoods, and spaces are intimately co-produced with the overdevelopment of white spaces (Jenkins, 2020; Seamster and Purifoy, 2021). This work troubles conventional assumptions that underdeveloped places lack resources and capital for development by pointing to the role of state-sanctioned theft in the maldevelopment of non-white places. By the same token, Harrison's (2016) work on the historical development of energy infrastructure in the US South shows how grid development entrenched racial segregation in energy landscapes benefitting white power brokers in North Carolina.

In sum, a focus on illuminating how state actors unevenly facilitate processes of infrastructure marginalization enables us to clarify the processes that shape, in part, the state's capacity to (re)produce socially uneven environments. This work builds from Pulido's (2016) argument that environmental racism is a mode of racial capitalism because it drives capitalist value production through processes - which can be facilitated by the state - that appropriate resources, deny services, and devalue marginalized communities as a means to supply resources, provide services, and valorize majority white communities (Pulido, 2016; Seamster and Purifoy, 2021). What these scholars demonstrate is that racial capitalism matters to environmental racism because it demonstrates how municipal and infrastructural development, including water infrastructure but also housing dynamics, and labor markets, structurally advantages white Americans through the creation of environmental sacrifice zones. Without such an analysis, these zones will persist because they produce social difference driving value creation under racial capitalism.

2.6 Conclusion: Consideration of How Urban Geographic Research on Infrastructure, Race, and Environmental Justice Might Advance.

Emerging research on water infrastructure under racial capitalism argues for the urgent need to address the systemic inequities that perpetuate environmental injustices within marginalized communities. A review of the literature on urbanization, environmental racism, and water infrastructures within the context of racial capitalism is presented here to better understand the drivers of inequitable water infrastructures in the global North. Taking water infrastructure as an example, I argue that current infrastructure redevelopment projects need to deal with the embedded material interests and dominant modes of development that shape uneven development patterns and infrastructure in order to deliver on their promise of more sustainable and equitable futures. Uneven infrastructural provisioning needs to be understood as a mode of urbanization that produces socio-environmental inequities which create value under racial capitalism. Although geographic literature on urbanization, infrastructure, and environmental justice has shown how racialization occurs through histories of uneven development which impact infrastructure provisioning, there is an urgent need to understand these processes as part of the broader processes of racial capitalism enabled by an environmental racial state (Miyake, 2021). Doing so contributes to calls to provincialize urban theory because it embeds the production of social difference within processes of infrastructural development and urbanization.

Advancing this research agenda requires analyzing how the historical accumulation of state and planning power via infrastructure projects impacts the

realization of social and environmental equity in contemporary infrastructure projects, including water infrastructure. This requires asking three key questions: To what extent and at what scale do historic water infrastructure projects shape contemporary water infrastructure projects? What is the relationship between histories of racialized land development and regional power blocs in processes of uneven development? What are the implications for social and environmental equity? Crucially, geographers need to foreground a dynamic and relational approach to studying uneven environments that goes beyond conceptualizing inequities and disparities apolitically. Rather, provincializing uneven infrastructure provisioning under racial capitalism and the environmental racial state points to how the production of social difference produces social power and holds implications for redressing social and environmental injustice. In the absence of a critical analysis of the historical accumulation of power in infrastructure planning projects, we undervalue the potential of infrastructure as a powerful arena for the struggle for a sustainable and just future.

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CHAPTER 3

ARTICLE 2: GREENING THE COLOR LINE: HISTORICIZING WATER INFRASTRUCTURE REDEVELOPMENT AND ENVIRONMENTAL JUSTICE IN THE ST. LOUIS METROPOLITAN REGION

3.1 Abstract

In 2011 the St. Louis Metropolitan Sewer District developed a geographically bifurcated gray and green approach addressing aging sanitary and stormwater infrastructure in the region. This approach maps tightly to the region's persistent patterns of racial segregation allocating green infrastructure exclusively to areas of North St. Louis which is majority Black and where significant disinvestment has taken place. While green infrastructure often is hailed as a more equitable way to address urban flooding, a crucial question remains as to how urban greening strategies grapple with persistent urban inequities. This article examines the relationship between geographically uneven infrastructural investments and persistent urban inequities. Drawing on six months of ethnographic and archival fieldwork on St. Louis's wastewater redevelopment project, I argue that racial capitalism must be incorporated as a framework through which to analyze the equity dimensions of infrastructure redevelopment projects. I found that rather than contend with path dependencies of structural racism, St. Louis's approach to wastewater redevelopment relies on geographies of racial capitalism to save costs, subjecting marginalized communities to cost-saving approaches with no measures or plans to measure benefits beyond stormwater retention.

3.2 Introduction

In deindustrializing cities of the global north, green approaches to infrastructure redevelopment have become pragmatic solutions to de-growth policies and a means to promote equity in infrastructure planning within the context of austerity governance (Carlet et al., 2017; Schilling & Logan, 2008). Critical scholarship on urban greening has called for a re-politicization over the uses, forms, and meanings of urban greening projects (Angelo, 2019; Connolly, 2019; Rosol et al., 2017). The post-political consensus that urban greening initiatives lead to socio-environmental equity and thus escape debate, belies crucial questions concerning how infrastructure projects are entrenched within the processes and relations that shape existing urban inequities, particularly extractive and institutionalized forms of racial oppression. While urban greening scholarship has centered equity in evaluating the socio-environmental impacts of green stormwater infrastructure (GSI) projects, these efforts are limited by a failure to grapple with the deep histories and social relations embedded within existing infrastructural geographies including the state sanctioned devaluing of Black neighborhoods and legacies of organized abandonment (Gilmore, 2008). This is not to say that greening itself is the problem, rather that uneven green investments into the built environment raise critical questions about the relationship between urban greening agendas and wider processes of racialization that shape urban development in the twenty-first century. How do uneven green infrastructure investments reflect histories of racialized land development?

This paper addresses this question through analysis of St. Louis's wastewater redevelopment initiative, Project Clear, the largest public investment in the region's-built environment in decades. Through qualitative and archival analysis of the development of the city's wastewater infrastructures, I argue Project Clear's geographically segregated investments in green infrastructure is entrenched within institutionalized and extractive forms of racial oppression. I apply the framework of racial capitalism to call attention to the historic relationship between municipal service provision and racialized land development to examine how historical context shapes contemporary green infrastructure redevelopment patterns. I demonstrate that when GSI projects are used to reduce the overall cost of municipal wastewater redevelopment projects with no clear and measurable equity targets, institutionalized racism is reproduced through the uneven allocation of resources and narrow technical measures of success. While well maintained GSI programs can reduce the harm brought on by combined sewer overflows and increase green amenities, even the most ambitious public investment in fifty years fails to consider the embedded histories of uneven municipal resource allocation in shaping environmental inequalities in the region.

In the sections that follow, I examine how equity is conceptualized and critiqued in the urban greening and green infrastructure literature and argue for incorporating racial capitalism to expand how equity is typically conceptualized in urban green scholarship. Next, I provide background information for my case study and discuss my methods and materials. The fourth section outlines my findings in two parts. First, I provide a brief

background of stormwater infrastructure redevelopment in St. Louis and apply the framework of racial capitalism to trace the historical causes and consequences of uneven infrastructural investments. Following, I outline my findings highlighting how the use of green infrastructure in underserved neighborhoods constitutes a form of environmental racism where histories of residential segregation and denial of adequate city services have laid the ground for the use of GSI in Project Clear as a cost-saving approach to infrastructure redevelopment. In the final section, I offer some closing thoughts on the potential and possibilities for expanding conceptualizations of equity, infrastructure, and environmental justice in urban sustainability scholarship.

3.3 Frameworks for Sustainable Urban Infrastructure: Equity vs Racial Capitalism

Post-industrial metropolitan areas across the eastern half of the United States are increasingly forced to reckon with under maintained and outdated sewer and stormwater infrastructure. Most post-industrial cities are facing revenue shortfalls, significant population loss, environmental hazards resulting from their industrial past, and demands to make the city globally competitive in attracting and retaining public and private investment (Akers, 2015; Hackworth, 2015; Silverman, 2018). Within this context, green approaches to aging infrastructure re-development have become a popular program within many cities of North America, especially those with legal agreements with the Environmental Protection Agency (EPA) addressing violations of the Clean Water Act (Finewood et al., 2019; Pearsall & Pierce, 2010). GSI is gaining popularity as a cost-saving approach to infrastructure redevelopment able to offer additional social, economic,

and environmental benefits. For these reasons, scholarship on green infrastructure has emphasized the potential for GSI to deliver benefits beyond infrastructural improvements including increasing ecosystem services, economic development, and social equity (Burley, 2018; Davis et al., 2012; Jayasooriya et al., 2017; Meenar et al., 2018; Meerow & Newell, 2017; South et al., 2018). While this scholarship has successfully centered the question of equity in evaluating greening projects, it has been less successful in reckoning with the deep histories of institutionalized and extractive forms of racial oppression in which GSI projects are embedded. This suggests a need to expand how equity is typically conceptualized in urban greening scholarship.

Conceptualizations of equity through the lens of distributional justice dominate scholarship on urban greening and green stormwater infrastructure. Green infrastructure, including rain gardens, bioswales, green roofs, and improvements to the tree canopy, can be a viable way to redress the inequitable distribution of environmental hazards through increasing the equitable distribution of environmental amenities to neighborhoods with the most need (Bullard, 2000; Heckert & Rosan, 2016; Zhu et al., 2019). Studies have shown that targeting green investments in underserved communities is more equitable than ensuring everyone has access to the same level of benefits (Garcia-Cuerva et al., 2018; Heckert & Rosan, 2016; Mason et al., 2019; Porse, 2018; Sanchez & Reames, 2019; Zhu et al., 2019). The possibility of a more equitable distribution of environmental amenities is offered as one way in which green infrastructure is more just than traditional 'gray' infrastructure approaches. However, there is a concern that a focus on distributions

of environmental benefits and harms may miss larger inequitable development patterns and lead to unintended consequences deepening existing inequalities (Anguelovski, Connolly, & Brand, 2018; Anguelovski, Connolly, Masip, et al., 2018; Anguelovski et al., 2016, 2020; Checker, 2011; Immergluck & Balan, 2018; Pearsall & Anguelovski, 2016).

A second key dimension of equity frameworks in urban greening literature concerns who shapes urban greening agendas. Procedural equity focuses on the planning process, especially in the context of multi-stakeholder and non-profit driven planning processes. Green infrastructure planning processes are argued to be more decentralized and engaging for a range of stakeholders than traditional gray municipal infrastructure projects (Carmichael et al., 2019; Rigolon & Németh, 2018). Although engaging the public in infrastructural decision-making can increase public education and buy-in for novel nature-based infrastructure projects while offering opportunities for residents and stakeholders to have their voices heard, a crucially under-theorized dimension of procedural equity concerns who has the power to meaningfully determine the scope of potential benefits a project may bring to a underserved community and the power to refuse access if agreements around these benefits are not met (Rigolon & Németh, 2018). Many studies document residents' exhaustion with being over-researched in green equity projects, especially when these projects fail to meaningfully redress existing inequities beyond the narrow scope of green stormwater initiatives or speak to residents' mistrust of city planners and redevelopment initiatives (Finewood et al., 2019; Travaline et al.,

2015). Implementing equity goals in urban greening projects through a distributional or procedural lens may improve some amenities and increase community input, but these efforts are ultimately limited in that they are unable to attend to the larger dynamics that produce inequities in the first place.

Given the popularity of GSI projects in contexts of municipal austerity, the way equity is conceptualized and evaluated holds important implications for socio-environmental justice. While a focus on distributional and procedural equity can improve access to environmental amenities and decision-making processes, these evaluations of equity, on their own, are not enough to repair and prevent ongoing harm. Moreover, recognitional equity, a third prong of conventional equity frameworks that emphasizes mutual respect for intersecting group identities and experiences, is used less frequently to evaluate equity in the GSI literature (for an exception see Meerow et al., 2019). Current equity frameworks often fail to consider how identities are shaped by historical and structural inequities. Integrating racial capitalism in equity frameworks may help address this gap, by illuminating historical contexts shaping these processes and experiences. This research applies the framework of racial capitalism as a means to integrate deep histories of extractive forms of racial oppression in the St. Louis region as a means of conceptualizing a broader understanding of equity and GSI programming.

Recent work in geography and elsewhere has advanced racial capitalism as an analytic that renders social difference and uneven development as productive of value creation under capitalism. Foregrounding anti-black racism as the result of historical

relations that structure and restructure the "practice of abstraction, a death dealing displacement of difference into hierarchies that organize relations within and between the planet's sovereign political territories" (Gilmore, 2002, p. 16), the framework of racial capitalism illuminates how value generation, prosperity, and relative safety for white communities has been accomplished through a variety of techniques that are ultimately extractive of Black communities (Gibbons, 2016). In a recent study of discriminatory municipal service provision in Texas, Seamster and Purifoy (2020) found that environmental racism was integral to white place development where majority white communities used municipal incorporation, denial of basic public services, and political exclusion of an adjacent black community as a means to generate resources for exclusionary local development. The extractive relationship between white and black places are effects of what Wilson (2000) terms race-connected practices, or practices resulting from racism such as redlining, restrictive covenants, racially segregated public housing, and exclusionary zoning and annexation practices which shaped metropolitan areas in the U.S. resulting in a massive and enduring racialized wealth gap.

Emerging research on water infrastructure under racial capitalism argues that systemic racism best explains infrastructure inequality (Deitz & Meehan, 2019; Ponder, 2018; Ponder & Omstedt, 2019; Ranganathan, 2016; Ranganathan & Balazs, 2015). Accordingly, the theory of racial capitalism illuminates how the mechanisms of capitalism are intertwined with the social and material aspects of processes of racialization because value generation is dependent on violent practices of domination

and erasure (DuBois, 1999; Robinson, 2000). Methods of domination from genocide, slavery, legal geographies of segregation and exclusion, and techniques of finance (i.e., subprime lending) derive value through the devaluing of the geographies and bodies of racialized groups of people (McKittrick, 2006; Pulido, 2016). One of the clearest examples of the practices at work in the reproduction of racial capitalism through infrastructure is the case of Flint, Mich. and the systematic lead poisoning borne by the city's majority Black and poor residents through cost-saving measures implemented in the municipal water system. The poisoning of residents in the name of municipal fiscal solvency highlights the central feature of global capitalism where Black life is rendered surplus such that entire places are considered racialized and disposable (Pulido, 2016; Ranganathan, 2016). For these reasons, scholars have called for expanding conceptualization of equity through frameworks that foreground redressing past wrongs and preventing future harms (Anguelovski et al., 2020). Given that race, or rather the effects of racism, are salient predictors of environmental inequity in the United States, a focus on the processes and mechanisms productive of racialized spatial difference is necessary to repair ongoing legacies of environmental injustice (Wright, 2018). This paper seeks to answer this call by demonstrating how an historically grounded approach can foreground institutionalized and extractive forms of racial oppression shaping the built environment in St. Louis that may remain unaddressed in contemporary redevelopment projects.

3.4 Methods and Materials

St. Louis, MO, is a mid-sized U.S. city with over 300,000 residents of which 45.3% are Black, 48.1% are white (U.S. Census Bureau, 2010). Using The Racial Dissimilarity Index, the St. Louis Federal Reserve designates St. Louis as one of the top ten most segregated cities (U.S. Census Bureau, 2009). The consequences of racial segregation are starkly illuminated by Delmar Boulevard, an east-west thoroughfare that bisects the City of St. Louis and demarcates racial inequities in almost all measures of health and wellbeing including income, health outcomes, environmental hazards, educational attainment, employment, home values, and homeownership. Take for example two census blocks straddling Delmar Boulevard between North Kingshighway Boulevard and Taylor Street. South of Delmar 68.9% of the residents are white, 71.7% have attained a bachelor's degree or higher, the average income is $45,361 and the average home is valued at $335,600. North of Delmar 99.6% of the residents are Black, 7.2% have attained a bachelor's degree or higher, the average income is $15,227 and the average home is valued at $77,100 (U.S. Census Bureau, 2010). The same patterns repeat in the suburbs of St. Louis where a majority of the region's African American population lives in North County while South County boasts some of the most prosperous municipalities in the region (see Figure 3.1). A 2014 report on racial equity in the region found that life expectancy rates in the prosperous western suburbs were as much as 15 years longer than in northern suburbs (Purnell et al., 2015). Black children in St. Louis are more than twice as likely as white children to test positive for lead, ten times more

likely to visit emergency rooms for asthma, and have higher exposure to mold, air pollution and illegal dumping (IEC, 2019). Stark socio-environmental disparities in economic, environmental, and social opportunities structure all facets of life along the Delmar Divide.

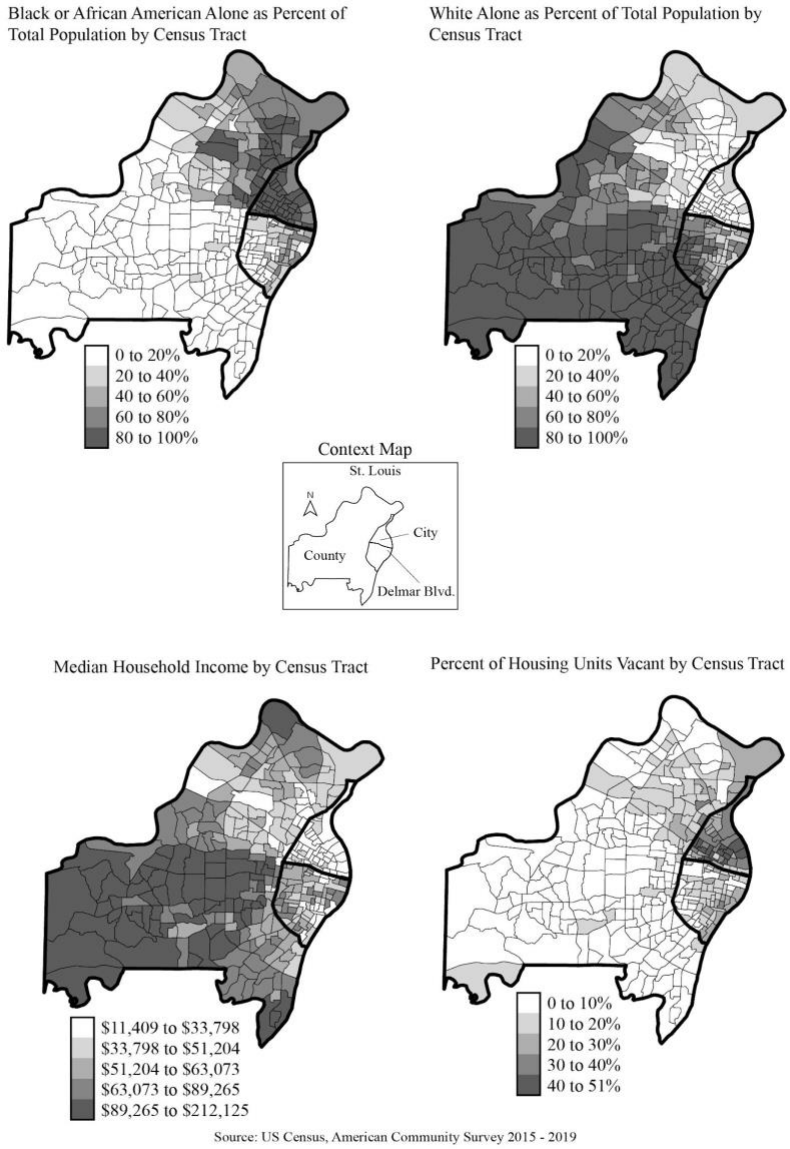

Figure 3.1. Socio-economic Geographies in the St. Louis Metropolitan Region. Data Source: U.S. Census, 2019.

In 2011, the St. Louis Metropolitan Sewer District (MSD) negotiated the largest consent decree with the EPA in the continental U.S. over the region's persistent problem of combined sewer overflows (CSO), a form of flooding caused by wastewater infrastructure (*EPA v MSD*, 2011). The MSD is one of the few regional organizations in the St. Louis metropolitan area and manages the fourth largest sewer system in the U.S., serving over 1.3 million residents in 524 square miles. To meet the terms of the

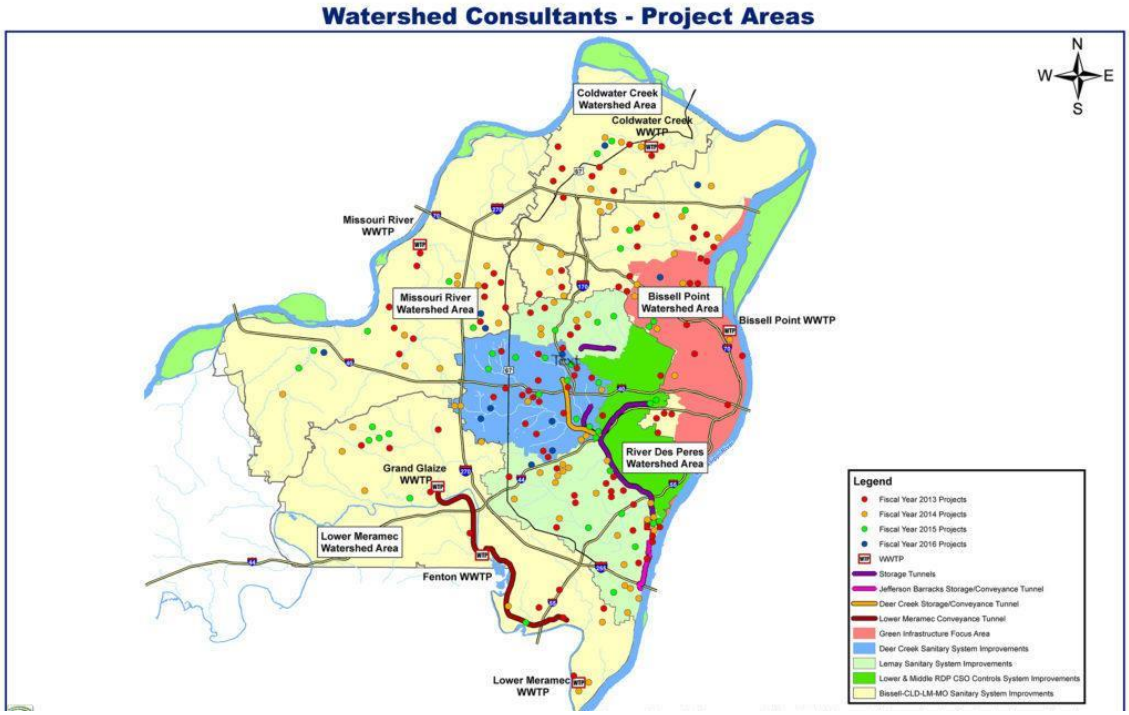

Figure 3.2. Metropolitan Sewer District Project Clear. Source: St. Louis Metropolitan Sewer District, 2016.

settlement, the utility formed Project Clear, a three-pronged approach addressing Clean Water Act violations by keeping the rain out of the sewer system, repairing and maintaining existing systems, and building new system improvements (see Figure 3.2).

The use of green infrastructure to keep rain out of the existing system is a key cost-saving strategy, reducing the original price tag of $6 billion to $4.7 billion. The MSD has allocated $100 million for GSI projects to reduce the likelihood that excess rainwater will overwhelm the aging pipes and storage tanks leading to combined sewer overflows. From 2011 – 2015, MSD allocated $3 million to conduct a pilot program as a means to better understand the technical, regulatory, and financial dimensions of green infrastructure implementation and inform the roll-out of the remaining funds. The pilot program was designed to test the success of green infrastructure at curbing unwanted water from the city's aging sewer and stormwater system.

Despite the existence of CSO outfalls in other areas of the city, the GSI pilot program targets green infrastructure projects in a 43 square mile portion of the city north of Delmar Boulevard where water flows directly into the Mississippi River (see Figure 3.3). In this project area, vacant structure demolition and GSI will be used in lieu of underground system improvements. A majority of the projects improving the pipes, trunks and storage tanks are scheduled for the southern half of the city and suburbs where water flows into more highly regulated recreational tributaries of the Mississippi River.

Data for this research was collected during six months of fieldwork in 2019 including participant observation, archival research, policy analysis, and secondary source analysis. I observed six MSD Board of Trustee Meetings and two professional conferences on themes of stormwater best practices and regional racial equity planning

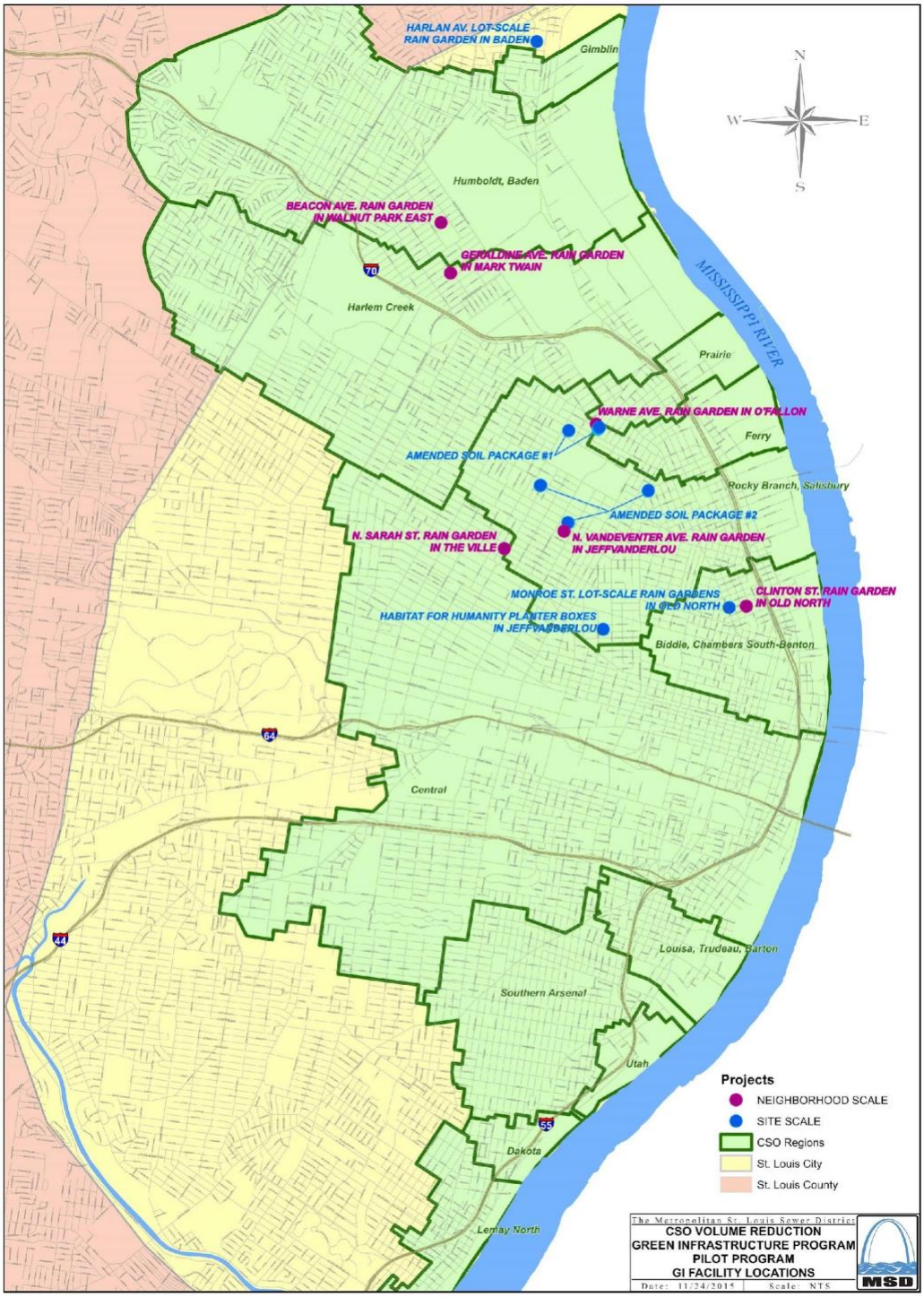

Figure 3.3. GSI Pilot Facility Locations. Source: St. Louis Metropolitan Sewer District, 2016.

initiatives respectively. Additionally, I attended public forums on water quality issues and economic development initiatives in the region and spoke informally with attendees including community residents, local journalists, and environmental advocates. I sought interviews from key informants involved in the consent decree negotiations, but none returned my request for an interview. To address this gap, I collected and analyzed publicly available project materials, including the official report documenting the outcomes of the GSI pilot plan, EPA consent decree documentation, and newspaper coverage of Project Clear from 2011 – 2019. Lastly, I paired ethnographic and document data with archival data on the history of economic, environmental and infrastructure development in the region since early European settlement in the mid-1700s (Van Sant et al., 2020). I sought archival collections at the Library of Congress, The Missouri Historical Society, and The State Historical Society of Missouri and relied on secondary historical texts written in the modern era to aid my understanding and analysis.

3.5 Case Study

Failing sewer and stormwater infrastructure abounds in the St. Louis region. Yet, the sewer utility is addressing the problem differently in different places (see Figure 3.2). As mentioned in the previous section, the utility negotiated with the EPA to reduce the overall cost of the redevelopment mandate by $1.3 billion through eliminating the need to improve existing sewer and stormwater infrastructure in areas of the city where GSI projects can be implemented to keep unwanted water out. To better understand these prospects the utility designated a 43 square mile program area in North St. Louis within the Bissell Point watershed (see Figure 3.3). The justification for the program area cites

lower water quality standards in the Bissell Point watershed, a high rate of vacancy, and a high rate of economic distress (MSD, 2016). This choice reduced common barriers to GSI implementation, including property acquisition (Heckert & Rosan, 2016; Zhu et al., 2019), and provided the utility with the means to learn and define successful GSI implementation. While the utility has approved the use of GSI outside the initial pilot program area following the pilot program, discussed in more detail later, the utility's justifications for the pilot area obscures how the processes of racial capitalism are at work in the redevelopment project. In this section, I trace how justification for the pilot program is made possible by a history of racialized land development which Project Clear, as a whole, relies upon to save costs. I highlight zoning and blight as two key historical race-connected practices (Wilson, 2000) that produce and maintain North St. Louis as 'zones of sacrifice' (Holifield & Day, 2017) with respect to public policy and public works projects.

3.5.1 Racialized histories of land development in St. Louis, MO. Implementing green infrastructure requires land and in North St. Louis, vacant land in the neighborhoods north of Delmar Boulevard have vacancy rates greater than 40% (See Figure 3.4). A majority of vacant properties are owned by the city's landbank, the Land Reutilization Authority (LRA) and the utility is partnering with the LRA to fund demolitions and acquire property for GSI implementation. However, *why* vacancy is so concentrated in the neighborhoods of north St. Louis remains obscured in official

documents. In newspaper coverage and government reports on vacant housing in the city, the most common reason given to explain why vacancy plagues North St. Louis locates

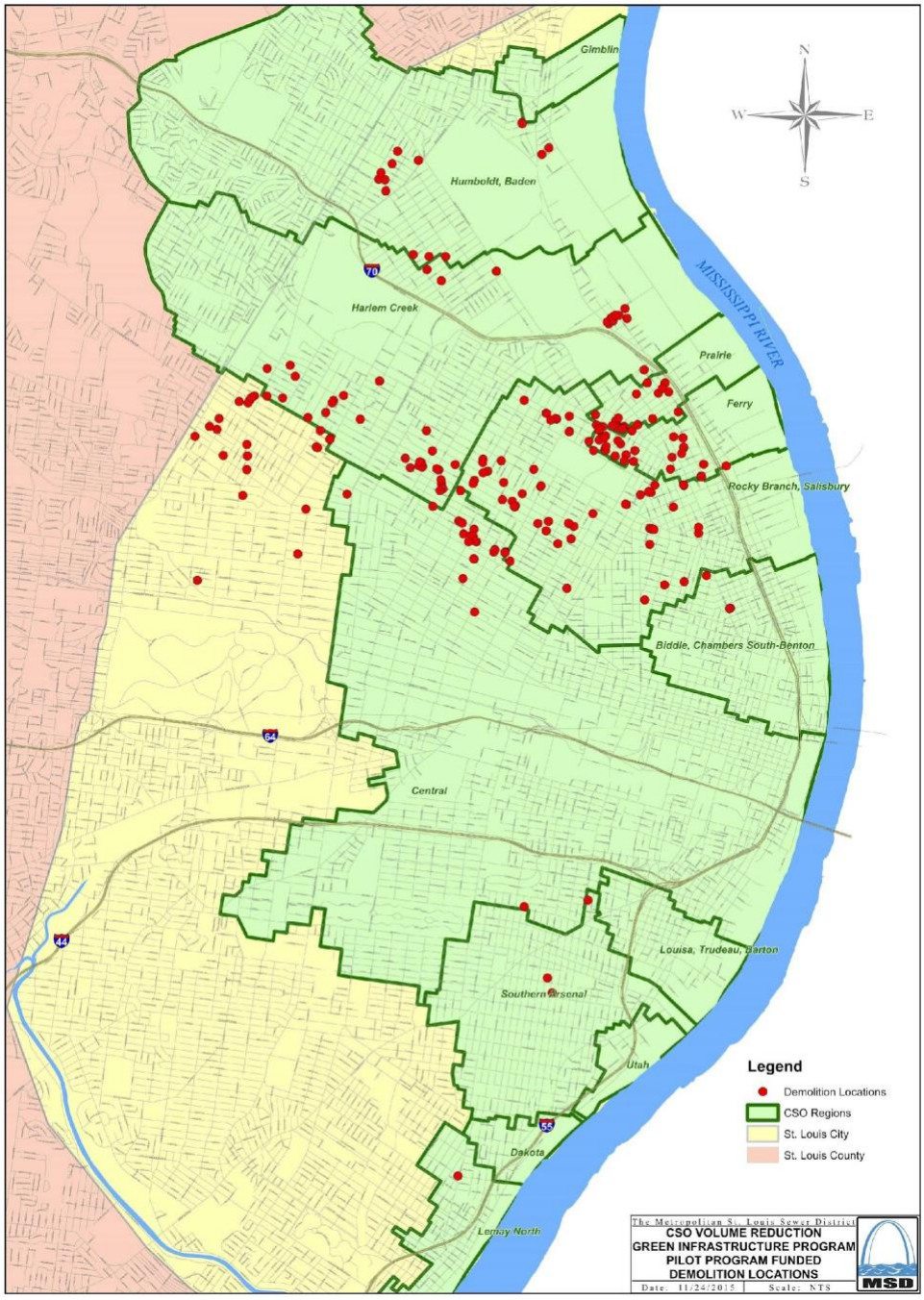

Figure 3.4. MSD Funded Demolition Properties Owned by LRA. Source: St. Louis Metropolitan Sewer District, 2016.

suburbanization as the culprit. “The LRA became the city’s biggest owner of abandoned property because of forces unleashed in the 1960s, as people and businesses left for the suburbs — and unpaid real-estate taxes piled up in the city” (Bott & Barker, 2018). The common framing of white flight as proxy for individual racist behaviors obfuscates the specific *public* policies that have enforced segregation in the region and relationally developed white wealth accumulation in the county and adequate public services in historically white neighborhoods. Although scholars have written on the causes and consequences of metropolitan segregation, here I focus on the historical public policies including residential zoning and blight that have created and maintained St. Louis’s racialized geography and in turn, infrastructural provisioning.

Techniques of racial capitalism have created surplus land on the northside that are integral to reducing the overall cost of Project Clear. Following the 1917 U.S. Supreme Court decision *Buchanan v Warley* which struck down overt racial zoning ordinances and deed covenants, The City of St. Louis employed City Planning Commissioner Harland Bartholomew to develop municipal zoning practices that created and preserved “segregation by other means” (Johnson, 2019; Rothstein, 2017). Bartholomew is credited for creating the first comprehensive zoning plan for a major metropolitan region that relied on existing knowledge of the city’s demographic geography, known, in part, through surveyors employed through the Works Progress Administration. In both the 1919 zoning ordinance plan and 1947 Comprehensive City Plan, Bartholomew developed and refined zoning rules to separate single-family housing

from multi-family buildings and industrial development by categorizing land use through designations such as “first-residential” which relied on the existing geography of property deeds prohibiting Black residents from moving in or buying the property. Areas zoned first-residential were blocks consisting of single-family homes. Multi-family, commercial, and industrial land uses were prohibited in first-residential areas. Zoning rules for industrial land uses were designated through their proximity to neighborhoods with substantial Black populations (Rothstein, 2017).

At the height of the Great Depression the federal government addressed housing insecurity by creating the Homeowners Loan Corporation (HOLC) in 1932 and the Federal Housing Administration (FHA) in 1934. Between 1934 and 1962, the FHA and later the Veterans Administration insured over $120 billion in home mortgages, 98% of which went to white borrowers (Lipsitz, 2018, p. 6). To aid risk analysis in lending decisions, the HOLC commissioned a series of maps, known colloquially as redlining maps, which graded neighborhoods, in part, on neighborhood racial demographics and closely matched the 1919 zoning designations. While public policies, built on legacies of racial discrimination, enabled working class whites to move to the suburbs, racial wealth gaps were deepened as Black residents in redlined neighborhoods were subjected to private contracts with clauses preventing the accumulation of equity with shorter payback periods and an increased risk of eviction (Rothstein, 2015). Renters in neighborhoods classified by C and D grades were subjected to more crowded dwellings and landlords charged rents at rates higher than FHA mortgages, in part due to higher insurance rates

because of less than adequate fire protection. In redlined neighborhoods of North St. Louis, residents who could afford to leave the city in search of better opportunities and schools in suburban municipalities including Ferguson. The federally sanctioned practice of redlining, built on an already existing geography of restrictive covenants and racial zoning ordinances, contained and deprived particular areas of the region of publicly subsidized homeownership, particularly neighborhoods north of Delmar Boulevard where war-time industrial activity was clustered. Residents living in these areas today have some of the highest rates of lead poisoning and asthma (IEC, 2019).

In St. Louis, the techniques of racial capitalism shaped Black enclaves through local labor and housing markets but also through physical infrastructure and public service provision, or lack thereof. In 1970 the U.S. Commission on Civil Rights (USCCR) heard testimony from residents living in the St. Louis region on the racial implications of uneven development and equal protection (USCCR, 1971, p. 3). Resident testimony indicated that, despite municipal authorities claiming universal access to basic city services including trash collection, street lighting, paved roads and sidewalks, and sewer and stormwater connections, the provisioning of basic public services was socially uneven. Black residents testified that despite paying taxes their neighborhoods suffered from inadequate street lighting, absence of road and sidewalk maintenance, infrequent garbage collection, lack of sewerage connection, and unenforced anti-dumping ordinances (USCCR, 1971, p.304 -343). Similarly, the Kerner Commission report documenting the origins of the 1967 riots across U.S. cities found that Black residents

experienced less than adequate municipal services and viewed, for example inadequate sanitation, as racial discrimination (United States. et al., 1968, p. 148). Both reports documented resident frustration with the poor provisioning of municipal services with the exception of policing; (UCCR, 1971, p.304).

It was precisely the poor provisioning of municipal services that later codified redlined neighborhoods as blighted and targeted these areas for federal urban renewal programs. Rather than an objective and measured condition, blight is inconsistently and often expansively defined in public policy ranging from concerns over public health and safety to local economic development. The 1947 *Comprehensive Plan* categorized more than one-third of the city as blighted where "total clearance and redevelopment" was prescribed to 'obsolete' neighborhoods to prevent blight from encroaching to stable neighborhoods (cited in Cooper-McCann, 2016, p. 152). These are the same neighborhoods in central and North St. Louis, zoned red by the FHA for the supposed risk in lending to non-white residents.

In 1970, the Missouri Supreme Court redefined blight to include properties that were not yet blighted but were nearby blighted properties. Premised on stopping the spread of blight, this new definition had the effect of using proximity as a means to condemn properties and abate property taxes for future development. Because blight was seen as contagious, city leaders and public opinion favored the prioritization of large clearance and redevelopment projects including the clearance of historical riverfront developments and the 454-acre working class Black neighborhood, Mill Creek (Lang,

2009). Mill Creek was considered blighted because of overcrowding and unsanitary conditions caused by racial and spatial techniques of segregation. The redevelopment of Mill Creek was conditioned on providing housing to displaced and disposed residents in the newly built Pruitt-Igoe complex on the city's northside. The 33 11-story apartment buildings built on 57-acres of land were assembled and managed by the Land Clearance and Housing Authority, a predecessor of the LRA tasked with managing public housing and clearing blighted land for future development. In 1972, less than two decades after opening, the modernist public housing experiment was demolished after falling into disrepair. The Pruitt-Igoe site is now a medium growth forest.

In 1971 the city created the LRA, the nation's first municipal land bank. The LRA was created to acquire, maintain, and sell tax delinquent land for redevelopment. Over twenty years the LRA became the largest landowner in the city, owning over half of the city's vacant properties, a majority of which are in the city's northside and are now slated to be demolished to achieve greater CSO volume reduction. Black neighborhoods, including Mill Creek Valley, Maline Creek, Kinlock, North Webster Groves and Elmwood Park, were blighted through state tax legislation which gave the municipal authority to blight property and grant property tax abatements and amnesty to private developers (Johnson, 2019). Since the LRA's existence, poor Black homeowners in North St. Louis lost their houses for unpaid taxes while much of the neighboring commercial development is tax abated (Johnson, 2019).

These public policies aligned with private development interests have produced vacancy on the northside in part, through the poor provision of municipal public services seen too costly to justify, a lack of public support for resolving code violations, residents dispossessed of their homes through tax delinquency, and wide latitude in defining blight to justify demolitions and property tax abatements. As we can observe in the placement of new GSI projects on vacant land, the racialized geography of today's St. Louis matches the discriminatory visions set forth in Bartholomew's 1947 City Plan. Over the course of the twentieth century North St. Louis was effectively triaged and made vacant through redevelopment programs following logics of market efficiency over social need. Techniques of racial capitalism, including zoning and blighting, have created surplus land on the northside where block after block of emptied lots where homes once stood are now grassy parcels and overgrown forests. Given the racialized geography of St. Louis where deep histories of institutionalized and extractive forms of racial oppression are embedded in the built environment, how might we grapple with the utility's geographically bifurcated approach to sanitary and stormwater infrastructure redevelopment?

3.6 Evaluating Project Clear through the lens of Racial Capitalism

In St. Louis, as in many U.S. cities, institutionalized and extractive forms of racial oppression shape the built environment. As the previous section establishes, discriminatory planning practices and unequal infrastructural provisioning plays an important role in shaping this geography. Project Clear's approach to stormwater infrastructure redevelopment prioritizes different areas of the region for different types of

infrastructure redevelopment and in doing so relies on the region's racialized geographies to reduce the overall cost of the redevelopment initiative. In analysis of reports, documentation, and news coverage of Project Clear, two key themes emerged to explain differential infrastructure investments. First, differing water quality regulations and second, the concentrated availability of surplus land on the city's northside. Together, these justifications obscure how the logics of racial capitalism are at work in the redevelopment of the city's waste and stormwater infrastructure.

In planning reports submitted to the EPA, the cost-saving benefits of GSI were used to justify lowering EPA-mandated spending from $6 billion to $4.7 billion and thereby reduce taxpayer burden (MSD, 2016). While increased utility rates would have a higher impact on low-income households, the final agreement is premised on saving taxpayer's money by eliminating plans to build wastewater storage and improved tunnels in North St. Louis and building green infrastructure instead. The EPA is said to have allowed this geographically bifurcated approach because North St. Louis drains directly into the Mississippi River which has lower water quality standards than the River des Pere, the recreational tributary draining South St. Louis and where a significant number of resources to improve and build new wastewater management infrastructure is taking place.

In justifying where green infrastructure projects will be targeted, only the MSD's partnership with the LRA is mentioned. As argued earlier, the majority of the LRA's holdings are in the redlined neighborhoods of North St. Louis demonstrating path

dependencies of institutionalized and extractive forms of racial oppression. The LRA is notoriously underfunded and has insufficient resources to maintain its vacant and foreclosed properties, many of which have sat untouched for decades creating a plethora of hazardous structures. While demolishing these structures is a high priority for the city and residents, the city's strategic land use plan emphasizes consolidating LRA-owned parcels to make large-scale land acquisition more desirable for potential redevelopment projects. In the pilot program, the MSD allocated $1.5 million to the LRA's demolition program for pre-identified 219 properties resulting in 9.4 acres of impervious surface removed (see Figure 4.1). Although the LRA and MSD collaborated on new deed restrictions for these properties to ensure CSO volume reduction targets are maintained if the lot is redeveloped in the future (MSD, 2016, p. 31), the logics guiding GSI site selection favor turning entire vacant blocks into GSI "where there is little market activity and redevelopment pressure" (Robinson, 2017, p. 20). The legacies of dispossession and neglect that define this area now justify further expropriation of land deemed uninhabitable.

Finally, despite promoting green stormwater infrastructure as a win-win-win solution for taxpayers, the utility, and the environment for providing benefits, beyond stormwater retention, including increased biodiversity, reduction in heat stress and increased economic development, Project Clear measures program success on one metric: CSO volume control. Apart from commissioning a local university to produce a report on potential community benefits afforded through green infrastructure, Project Clear has no

mechanisms to measure these benefits, nor programs or partnerships to ensure long-term success. This signals a willingness to subject distressed neighborhoods to cost-saving approaches to environmental hazard mitigation but not measure the degree to which co-benefits of GSI are achieved. Throughout the pilot program, the MSD characterizes North St. Louis as "one of the most economically distressed portions of the St. Louis community" (MSD, 2016, p. 4), yet establishing long-term job opportunities through, for example green-infrastructure maintenance work, or exploring alternative property arrangements such as land trusts, remains beyond the scope of the project. Instead, the sole measure of success for this historic investment in the region's public provisioning of waste and stormwater infrastructure is impervious surface reduction achieved via demolition. In this way, GSI in north St Louis can be understood as an experimental austerity tool for managing urban decline made possible by legacies and path dependencies of racial capitalism and inequitable municipal resource allocation.

Finally, the implementation of GSI and demolition strategies to address CSOs in north St. Louis served as a learning process for the utility and city to better understand how GSI projects can be rolled out elsewhere in the city. A significant outcome of the pilot program was the MSD's stated preference for indirect projects moving forward due to complications with vandalism, property acquisition and upkeep costs. While direct projects are designed, constructed, and maintained by the MSD, indirect projects are owned and maintained by a private property owner. Indirect projects are funded through grant programming designed to reimburse grantees for costs associated with implementation and monitoring. The funds cannot be used for maintenance. The

reimbursement model requires applications to demonstrate past success with similar projects, and the necessary capital on hand to fund the project. This policy serves to limit awards to organizations and private landowners with significant organizational and financial capacity. There is no apparent accounting for the equitable distribution of grant funds increasing the potential for public funds to reify patterns of relative investment and divestment while maintaining market-driven logics that may reproduce wealth accumulation for white landowners and private developers. Lastly, the lack of funding for maintenance devolves the provisioning of city services to the responsibility of private property owners and volunteers (Akers et al., 2020). While paid labor will be used to maintain new trunks and storage tanks elsewhere, the reliability of GSI maintenance schemes remains in question.

3.7 Conclusion

In 1903, W.E.B. DuBois famously stated, "the problem of the Twentieth Century is the problem of the color-line" (DuBois, 2015). Sixty-five years later the opening pages of the 1968 Kerner Commission stated, "What white Americans have never fully understood – but what the Negro can never forget – is that white society is deeply implicated in the ghetto. White institutions created it, white institutions maintain it, and white society condones it" (p.1). The color line has endured well into the twenty-first century and Americans continue to grapple with the ongoing production of racialized socio-environmental differences in the face of climate change and white supremacy. This paper demonstrates what an historical and geographic approach to infrastructure (re)development can add to understandings of equity in the urban greening scholarship. Attending to the ways unequal cities have been produced through racialized and violent

logics and infrastructures attunes scholars concerned with socio-environmental justice to the ways in which historical social relations are embedded within infrastructural legacies. Because infrastructure projects are embedded in the built environment for decades the social relations comprising their implementation, or lack thereof, reach into present and future development considerations. For this reason, a historical approach to studying green infrastructure is not just about delineating the context of contemporary projects, rather it is a means to contend with these infrastructural legacies in the present moment.

In working towards sustainable infrastructure solutions for pressing socio-environmental problems, this paper has argued that Project Clear exploits historical socio-spatial inequities to reduce the overall cost of the public works project. This is possible through the racialized geographies created through techniques of racial capitalism. The path dependencies and legacies of structural racism are obscured through austerity driven urban green strategies and a lack of measurement and monitoring of GSI's co-benefits. Because urban greening projects are largely understood as progressive and unquestionably good, the disparate allocation of municipal resources is obscured. The historical public and municipal practices and policies that have created and maintained racialized segregation and organized abandonment in North St. Louis demonstrate how GSI on its own will never be sufficient to deliver meaningfully on equity goals, especially when new projects remain embedded within landscapes of institutionalized and extractive forms of racial oppression (Wright, 2018). Technocratic best practices that fail to contend with the effects of these social and spatial legacies may reproduce a racist spatial order. Residents in North St. Louis face structural and

institutional barriers with regard to labor markets, land ownership, environmental pollution, unequal municipal services, and burdensome debt to name a few. Acknowledging and reckoning with deep histories of racial violence requires recognizing the limitations of current GSI projects when not tied to a broader redistribution of resources and power. Centering insights into the production of uneven development and social difference via racial capitalism in GSI underscores the opportunity public works projects offer to combine social, economic, and environmental justice goals into municipal infrastructure redevelopment made more equitable through a reckoning with recent history.

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CHAPTER 4

ARTICLE 3: REGIONAL POWER BLOCS AND DIFFERENTIAL VULNERABILITY TO FLOODING: EXPLORING THE CONSOLIDATION OF POWER AND RACIAL CAPITALISM THROUGH LAND RECLAMATION AND FLOOD CONTROL IN SOUTHEASTERN MISSOURI

4.1 Abstract

In this paper, I argue that the historical development of flood control in the Mississippi region was fundamental to the development of racial capitalism because it consolidated regional planning power through methods of social and environmental domination. Furthermore, these historical processes continue to shape state-led responses to contemporary flooding events in ways that perpetuate racial inequity. To do so, I trace the ongoing production of uneven vulnerability to flooding in the Mid-Mississippi River Region through nineteenth-century flood control projects including land reclamation and the formation of drainage districts in southeastern Missouri. I demonstrate how the controversies surrounding the state's response to the 2011 Mississippi floods are vestiges of what Woods' (2017) terms the Mississippi Delta Plan, twelve mobilizations launched by the Delta's plantation power blocs that shaped regional, and by extension national, development in profoundly enduring, but not inevitable, ways. In doing so, this paper contributes to calls to center questions of the state in environmental justice scholarship through demonstrating how the state contributes to the historical and ongoing production of uneven vulnerability to flooding that impacts communities today. Furthermore, it demonstrates that hazards research into the differential production of vulnerability should engage with the development of racial capitalism.

4.2 Introduction

Decades of environmental justice research has documented grave racial disparities in the distribution and exposure to environmental harms and hazards. Many studies have shown that racialized communities suffer disproportionate damages from flooding hazards (Hartman & Squires, 2006; Knighton et al., 2021; Messager et al., 2021; Zahran et al., 2008). The study of hazards, pioneered by geographer Gilbert White's classic research on disaster mitigation, has long acknowledged the role that social and political processes play in producing vulnerability to so-called 'natural' disasters (White, 1973) White's work has shaped decades of scholarship and policy on hazards and vulnerability, which has sought to explain the processes that shape differential vulnerability (Blaikie et. al., 1994; Cutter, 1996; Cutter et al., 2000, 2003; Macdonald et al., 2012; Tierney, 2006). For example, Blaikie et al. (1994) conceptualize the production of vulnerability to hazards through a compilation of root causes (social, economic, and political structures determining the unequal distribution of wealth and power), dynamic pressure (i.e., lack of infrastructure, or unsustainable development), and unsafe conditions (i.e., lack of resources). Cutter's (1996) hazards of place model theorizes vulnerability to hazards through an explicit focus on locality such that vulnerability is shaped by both biophysical and social conditions which intersect in place. These models are useful in conceptualizing the dynamic interaction of processes that produce vulnerability to hazards. While this work has considered the role of historical development in the production of vulnerability, recent work on the socio-historical drivers that continue to shape contemporary patterns of vulnerability need further refinement (Hardy, 2023). Moreover, scholars are increasingly calling for more focused attention to the "environmental racism gap" which

describes a central paradox in environmental justice scholarship and action: despite a litany of work documenting racially uneven environments and vulnerability to hazards, little has been done to substantially reverse these patterns over time (Pulido, 2017). This suggests a need to continue clarifying why differential vulnerability exists in the first place and what sort of multi-scalar power structures dynamically (re)produce inequitable outcomes in particular localities following hazardous events (Thomas et al., 2019).

One such dynamic socio-historical driver that can help explain the persistence of the environmental racism gap is the role of historical regional development blocs under processes of racial capitalism (Woods, 2017), which have shaped the root causes, dynamic pressures, and unsafe conditions that produce contemporary burdens (Blaikie 1994). Here, regional development blocs are understood as "dynamic regional power structures that consist of diverse segments but are united in their efforts to gain control over resources and ideological and distributive institutions governing their allocation" (Woods, 2017, p.26). In *Development Arrested*, Woods demonstrates how the ideological and material struggles between the despotic plantation power bloc and working-class African Americans in the Mississippi Delta have shaped regional development in the Delta and consequently, the development of the United States writ large (2017). Regional development blocs in the Delta have been sustained and enriched by the pillage and plunder of African Americans' lives and labor, facilitated by the government at local, state, and national scales. Furthermore, as this paper shows, regional power blocs that emerged in the mid nineteenth century in the Mississippi Delta region reshaped landscapes through land reclamation and drainage, and flood control projects such that they increased biophysical and differential social vulnerability to flooding in the region.

Regional power blocs remain a significant and resilient force conditioning social, economic, and racial inequality including but not limited to the production of flooding vulnerability.

Building on recent work at the intersections of environmental justice, racial capitalism, and landscapes of uneven flood risk, I argue that the historical development of flood control in the Mississippi Delta was fundamental to the development of racial capitalism because it consolidated regional planning power through methods of social and environmental domination. Furthermore, these historical processes continue to shape state-led responses to contemporary flooding events in ways that perpetuate racial inequity. To do so, I trace the ongoing production of uneven vulnerability to flooding in the Mid-Mississippi River Region through nineteenth-century flood control projects, including land reclamation and the formation of drainage districts in southeastern Missouri and the emergence of federal flood policy in the early twentieth century. I demonstrate how the controversies surrounding the state's response to the 2011 Mississippi floods are vestiges of what Woods' (2017) terms the Mississippi Delta Plan, twelve mobilizations launched by the Delta's plantation power blocs that shaped regional, and by extension national, development in profoundly enduring, but not inevitable, ways. In doing so, this paper contributes to calls to center questions of the state in environmental justice scholarship and understand how the state contributes to the ongoing production of uneven vulnerability to flooding that impacts communities today.

In this paper, I begin by telling the story of the 2011 floods in the mid-Mississippi river region where key decisions to operate a designated floodway were delayed because of place-based racial conceptions of human worth. I take the story as a starting point for

thinking through what the framework of racial capitalism offers for a deepening our understanding of the drivers of social vulnerability to flooding by engaging scholarship on critical hazards and racial capitalism. Then I engage scholarship on the social production of hazards in conversation with the work of Clyde Woods who has shown how plantation power blocs are an enduring pillar of racial capitalism. I build from his scholarship to understand the development of flood control infrastructure in the upper Delta region of the Mississippi River during the nineteenth century and its role in the development of local histories of racialized land development, which I argue co-produce regional power blocs and infrastructural landscapes impacting community vulnerabilities to flooding hazards today. The story of the 2011 floods in the upper Mississippi Delta offers a compelling entry point to analyze the social and material workings of infrastructure, particularly processes of racialization and regional development regimes that have produced stark inequality and uneven vulnerability to flooding disaster.

4.3 A Tale of Two Black Communities and the 2011 Mississippi River Floods

On May 2nd, 2011, after weeks of record rainfall and early snowmelt, Major General Michael Walsh, Commander of the Mississippi Valley District of the U.S. Army Corps of Engineers and president of the Mississippi River Commission ordered the detonation of the Birds Point-New Madrid floodway, a 130,000-acre area designated for conveying flood waters in the Bootheel region of southeastern Missouri (see Figure 4.1). Under Maj. General Walsh's command, Corps personnel detonated the Birds Point levee (Figure 4.2), making room for the swelling Mississippi River to flood the area at a rate of 550,000 cubic feet per second.

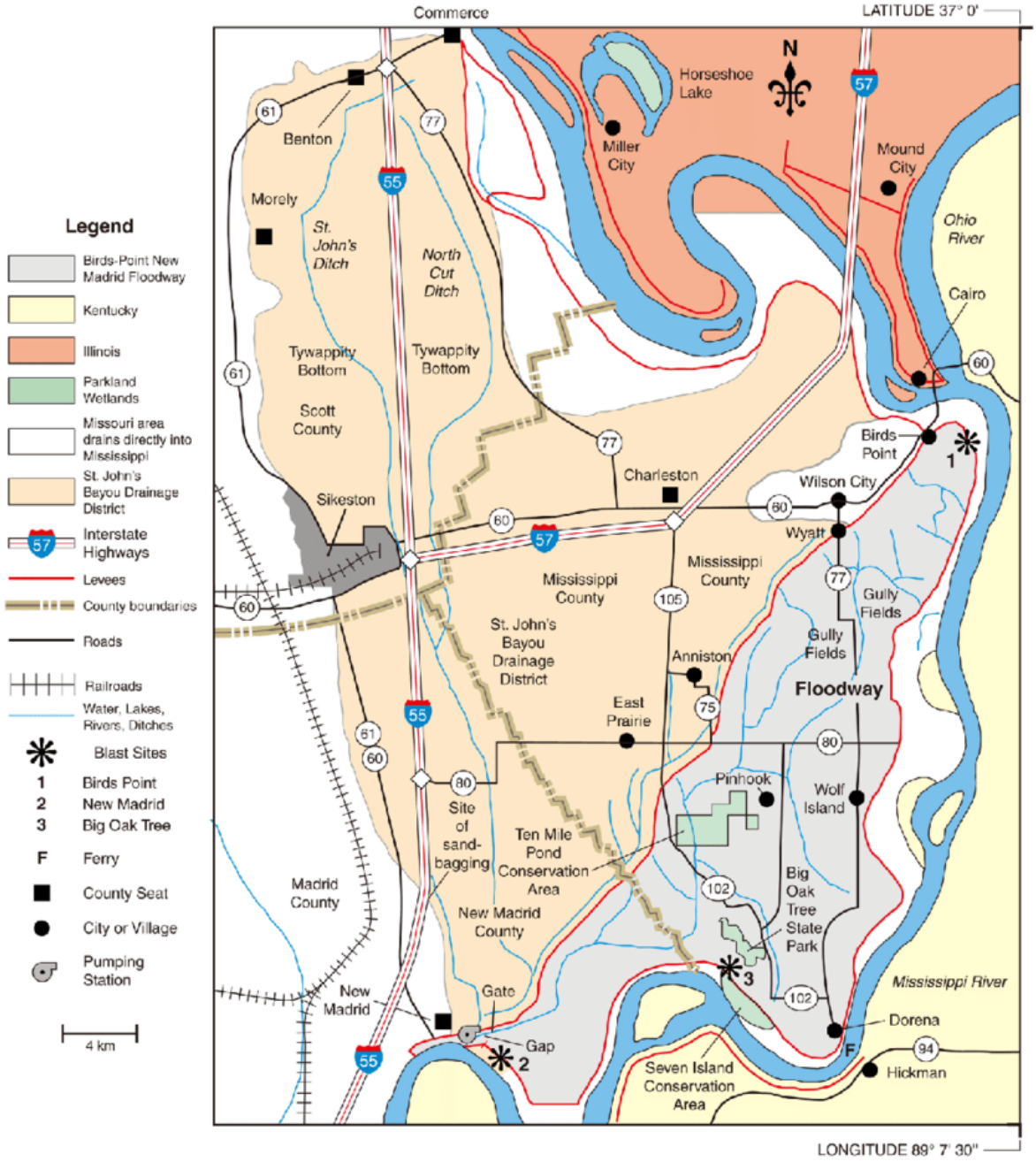

Figure 4.1. Map of the Birds Point New Madrid Floodway. Map showing the Birds-Point New-Madrid floodway and the two blast sites where the levees were detonated to operationalize the floodway during the 2011 Mississippi River floods. Source: Morton & Olson, 2014.

The intentional breaching of the levees in the Birds Point-New Madrid floodway was a planned response to extreme flooding under the 1928 Flood Control Act, which followed the devastating Mississippi River flood of 1927 that flooded millions of hectares

of urban and rural land, killing over 1,000 people and displacing over half a million people (Parish, 2017). To reduce the damages from future flooding, congress authorized

Figure 4.2. Detonation of the Birds Point New Madrid Floodway in May 2011. Detonation of the middle fuse plug which, along with the detonation of two additional fuse-plugs, operationalized the Birds Point-New Madrid Floodway during the 2011 Mississippi River floods. Source: Camillo, 2012.

the U.S. Army Corps of Engineers (USACE) to obtain easements from landowners in the newly designated floodway, giving the Corps the right to operationalize the floodway when the flood stage reached a height of 58 ft at the Cairo, Il gage (Camillo, 2012). Despite the Cairo gage surpassing 58ft on April 28th, the Corps waited a dangerous five days before detonating the levees that would allow the floodwaters to be temporarily held in the floodway, alleviating the swelling Mississippi River's force on levees both north and south of the floodway and importantly around Cairo, which was experiencing near-levee collapse. While the flooding of the Birds Point-New Madrid floodway resulted in the evacuation of homes and damage to land, there was no loss of life prompting officials to declare the induced breach a success (Camillo, 2012).

Yet, the operation of the floodway, and the Corps response to the 2011 floods were mired in controversy. In the days leading up to the floodways activation, landowners inside the floodway pleaded with the Corps to avoid activating the floodway out of fear that the floodwaters would ruin highly productive and profitable farmland for years to come. Repeating a common refrain since the floodways' inception, farmers, and state and local elected representatives tried to stop the Corps from taking action to save others at their expense – this is despite the facts of available tax-payer subsidized crop insurance that can cover crop loss due to flooding and that overtime, land may become more fertile from organic material and mineral deposits (National Park Service, n.d.). The 'others' in question are the residents of Cairo, Illinois, a majority Black (69.5%) and deeply impoverished town where almost 80% of the population lives at or below 200% of the poverty line (U.S. Census Bureau, 2010). According to the Corps official account, many landowners who owned some of the most productive and highly valued farmland inside the floodway objected to the idea that their farmland should be intentionally flooded, despite the area's designation as a floodway since 1928 and the subsequent easements purchased by the government giving the Corps permission to flood the land when necessary (Camillo, 2012). On April 26th, one week before the floodway was activated, the Attorney General of the State of Missouri filed an injunction[2] to stop the Corps from operating the floodway, which was denied by a U.S. district judge three days later. Local reporting during the historic flood suggests that local and state leaders were

[2] The injunction was based on the premise that the operation of the floodway would violate the Missouri Clean Water Act by polluting the waterway, the only legal recourse the state could argue since the farmland was legally allowed to be flooded as a measure of flood mitigation.

furious at the prospect of losing highly productive Missouri farmland to save the territorially stigmatized town of Cairo, Illinois. Famously, Missouri state representative Steve Tilley responded to a question pitting the farmland against Cairo by saying, “Cairo. I've been there, trust me. Have you been to Cairo? OK, then you know what I'm saying then” (quoted in Song & Michels, 2018). Tilley would later apologize for his insensitive remarks about the majority Black (69.5%) and deeply impoverished town where almost 80% of the population lives at or below 200% of the poverty line (U.S. Census, 2010). Despite efforts to stop the detonation of the Bird’s-Point Levee, Major General Walsh finally made the call to activate the floodway, more than a week after the measure was first considered in accordance with the Flood Control Act of 1928. The delay in the decision cost towns up-river from the floodway unnecessary damage as the levees directly protecting these towns - including Cairo, IL - faced near-structural collapse (Song and Michels, 2018).

Furthermore, the opposition pressure resulting in the delayed decision to open the floodway threatened another Black community located inside the floodway. Following the successful activation of the floodway it became known that the Corps had not done their due diligence to inform all residents in the floodway of the notice to evacuate. Despite County Sheriff evacuation orders for the 230 residents living in the floodway, the residents of the small village of Pinhook, a rural Black community founded by sharecroppers in the 1940s and located in the center of the floodway, were never consulted (Lawrence & Lawless, 2018). The town was destroyed when the floodway was activated and, as David Todd Lawrence and Elaine Lawless’s (2018) research has thoroughly demonstrated, residents were never notified of the Corps intent to breach the

levee, nor were they included in discussions or legal actions concerning the floodway's activation that destroyed their town (Figure 4.3).

Figure 4.3. Pinhook, Missouri Following the Activation of the Birds Point-New Madrid Floodway in May 2011. Source: Jeff Roberson for the Associated Press.

When Major General Walsh finally made the call to activate the floodway after more than a week of deliberation, residents of Pinhook, Missouri had already fled their homes with only a few of their possessions. They had been monitoring the rising Mississippi River waters and assumed it would be best to evacuate after hearing from one of the resident's relatives in New York about news of the potential activation of the floodway (Lawrence & Lawless, 2018, p. 89). Pinhook residents are no strangers to

living with the frequent backwater flooding[3], but they took precious little of their belongings having assumed they would be able to return in a few days. However, this flood was unlike any flood residents had experienced since the founding of the village in the 1940s - after the last operation of the floodway in 1937. For over a week, forecasts in the region had predicted the Cairo gauge would reach 61 feet by early May, yet the official evacuation order wasn't given until April 27th. The order should have included directives for state personnel to go door-to-door and relay the evacuation news, but it wasn't until three days later that the National Guard showed up to assist evacuees. By then, Pinhook residents had already self-evacuated, organizing their own caravans and making sure everyone in their community was accounted for. According to resident oral histories collected by Lawrence and Lawless (2018), no official at the county, state, or national level contacted residents of Pinhook, nor answered their calls as they tried to understand the fate of their beloved town (p. xxi).

The story above does not reflect the complete story of the 2011 Mississippi River flood, which was among the largest and most damaging flooding event on a U.S. waterway since the great floods of 1993 and 1927 (NWS, 2011). However, I take the story as a starting point for thinking through what the framework of racial capitalism offers for how we might understand the production of differential vulnerability to flooding by engaging critical hazards scholarship and scholarship on racial capitalism. As the story above illustrates, key decisions made by decision makers were delayed because

[3] The term backwater flooding describes regular induction by the river due to the levee cut out at the south end of the floodway that allows the floodway to slowly drain back into the main channel when activated.

of anti-Black racism that stigmatized Cairo, Il as a town whose inhabitants lives' were considered less valuable than agricultural land (Wright, 2018). When the decision was finally made to activate the floodway, as constitutionally directed, it was the residents of a small Black freedom town who lost their homes and community infrastructure (Lawrence and Lawless, 2018). While reporting on this story has asked why the decision to operate the floodway was delayed, this paper asks a different question. Responding to Cowen's (2020) call to trace infrastructure across the makings of empire, I ask how differential vulnerability to flooding can be understood as a socio-historical and material process that is shaped by histories of racialized land development, what Dillon (2022) terms 'settler ecologies.' These histories demonstrate how the building of flood control infrastructure contributed to the consolidation of plantation bloc interests at regional and national scales such that today, agricultural land values drive key flood mitigation decisions.

4.4 Differential Vulnerability to Flooding Under Racial Capitalism

Geographers have long sought to explain the differential vulnerability of communities to floods by considering a range of social, economic, and environmental factors (Blaikie et. al., 1994; Cutter, 1996, 2005; Hewitt, 2019; Knighton et al., 2021; Pearsall, 2009; Pearsall, 2010; Saguin, 2017; Tate et al., 2021; Thomas et al., 2019; Tierney, 2006; White, 1973). Gilbert White's foundational work on hazards was developed during the early twentieth century, a period addressed in this paper when federal intervention into hazard mitigation was minimal. White's dissertation argued that economic losses to flooding hazards were shaped by human encroachment into floodplains and that comprehensive efforts to reduce flooding losses through a suite of

adjustments were necessary (White, 1945). White's work has shaped decades of scholarship and policy on hazards and vulnerability and has become known as the dominant approach to hazard mitigation and planning (see Macdonald et al., 2012). The dominant approach to hazards frames disaster loss first resulting from geophysical processes, and secondly from societal characteristics including belief systems, psychological factors, memory of past disasters, and distribution of resources (Chester & Duncan, 2010). These factors inform what kinds of adjustments, or responses, a given society will adopt. In the 1980s, White's work was extended by colleagues to focus more forcefully on "developing" countries in the Global South who faced disasters such as famine resulting from long term social and political factors including poverty, deprivation, and lack of disaster preparedness, in addition to geophysical factors (Hewitt, 2019). This work stressed the importance of place and historical under-development for understanding human vulnerability to hazards, which continues to be important in recent literature.

Research on differential vulnerability to flooding has shown that non-white and Black communities in the United States face higher rates of flood exposures or proximity to flooding threats (Cutter et al., 2003; Knighton et al., 2021; Linscott et al., 2022; Miller Hesed & Paolisso, 2015; Selsor et al., 2023; Zahran et al., 2008). Vulnerability to flooding is understood as a multidimensional and dynamic social and political process where the potential for harm is a function of exposure, sensitivity, and adaptive capacity (Hardy, 2023; Thomas et al., 2019; Turner et al., 2003). Thomas et al (2019) argue that differential vulnerability to environmental hazards is shaped by issues of power and social difference such that access to resources, governance decision-making, and cultural

frames and the politics of knowledge production are shaped by "social hierarchies based on racial, caste, and gender discrimination; poverty; and power differentials" (p.4). Thus, inequitable outcomes to flooding events can be understood as resulting from complex interlinkages between social, economic and political structures, which mediate access to resources and crucial support structures, which in turn shape communities' differential ability to respond, cope, adapt, and recover from flooding events (Blaikie et. al., 1994; Cutter 1996; Cutter, 2005).

Importantly, scholarship in hazards has long valued understanding the socio-historical drivers that have systematically shaped differential vulnerability (Macdonald et al., 2012). For example, Cutter's research on flooding hazards in South Carolina demonstrates that historical development processes, what she terms the 'local government paradox', greatly inform the historical development of flood risk by altering hydrological systems and human development patterns to favor rapid urban development (Cutter et al., 2018). Analyzing the role of systemic flood risk in Nashville, TN, Linscott et., al show how historical processes of segregation and marginalization concentrate adverse flooding impacts in socioeconomically and racially marginalized communities (Linscott et al., 2022). The same is true in Atlanta, GA, where a deep history of land dispossession and a local political structure that re-produces white supremacy greatly informs racial disparities in urban flooding exposures (McCreary & Milligan, 2021). Collins (2010) shows how unequal flood risk is produced along the U.S.-Mexico border in Paso Del Norte, where elite property owners have powerfully enlisted state and market institutions to redirect social surpluses to reduce their flood risk and by extension increase flood risk elsewhere. Collins (2010) connects the ability for white elites to

overdevelop protection of their assets and environments from flooding risk while under protecting low-income communities of color to processes of capital accumulation where public resources are redistributed to reduce or intensify flood risks unevenly across landscapes inscribed with social difference.

Importantly, Collins' (2010) demonstrates what Seamster and Purifoy (2020) term 'creative extraction', wherein public and environmental resources are siphoned from racially marginalized places to facilitate investment in white places. This work addresses what Pulido terms the "environmental racism gap", which describes the inequalities between nonwhite and white communities in the United States that persist despite decades of scholarship, policy, and action (Pulido, 2017). This work speaks to the imperative of understanding differential vulnerability to flooding relationally by examining how social, economic, political, and historical processes actively marginalize and expose the least powerful people to hazards while simultaneously empowering and privileging white and elite communities with the tools, resources, and access to power to reduce their risk of potential harm (Pulido, 2000). Pulido has argued that this requires understanding differential vulnerability to hazards through frameworks that engage specifically with the (re)production of racial inequality, including white privilege and white supremacy which offer two different, yet connected, explanations for why and how racism constitutes vulnerability (Pulido, 2000, 2015). More recently, Pulido has advocated for a third framework, racial capitalism, which foregrounds the central role of racialization in the accumulation of capital and social power (Pulido, 2016, 2017). A focus on processes of racial capitalism helps us understand how people and places become vulnerable, not just because they lack access to resources to cope and recover,

but because of racism, as defined by geographer Ruth Wilson Gilmore as, “the practice of abstraction, a death dealing displacement of difference into hierarchies that organize relations within and between the planets sovereign political territories" (2002 p.16). This means that under racial capitalism, racism functions to abstract and categorize people and places as disposable and expendable. “This disposability allows both capital and the state to pursue policies and practices that are catastrophic to the planet and its many life forms because much of the cost is borne by ‘surplus’ people and places” (Pulido, 2016, p.8). Foregrounding racism and racialization in understanding the persistence of differential vulnerability to hazards offers a powerful lens into producing transformative responses to disaster mitigation.

Below I expand on scholarship exploring the relational production of differential vulnerability to flooding under racial capitalism. The framework of racial capitalism offers a lens to connect contemporary flood mitigation infrastructures with racialized histories of land development to reveal the entanglement between capital accumulation, racialization, and uneven protection from unwanted water. I build from Woods’ (2017) historical materialist study of plantation power blocs in the Mississippi Delta to show how whiteness and white supremacy operate through flood control infrastructures.

In *Development Arrested: The Blues and Plantation Power in the Mississippi Delta,* Woods (2017) demonstrates how the plantation power bloc in the Mississippi Delta region has become a fundamental force shaping regional development in the Delta and consequently, the development of the United States writ large. Tracing twelve transformations of the Mississippi Delta plantation regimes over 300 years of regional development history, Woods convincingly argues that rather than fading into the

background of history with the end of chattel slavery, the plantation economy, sustained and enriched by the pillage and plunder of African Americans lives and labor, remains a significant and alarmingly resilient force conditioning social, economic, and racial inequality with the assistance of the federal government.

Like Woods, scholars of racial capitalism have demonstrated how "slavery and the plantation are not anathema to capitalism but are pillars of it" (Woods, 2017, p. 6). Against a litany of writing on the historical development of capitalism that has cast the plantation South as semi-feudal and non-capitalist, scholarship on racial capitalism insists the development of industrial capitalism was intimately tied to the plantation system and racialized enslaved labor (Beckert, 2015; Du Bois, 2017; Johnson, 2019; McKittrick, 2006; Robinson, 2000; Woods, 2017). Indeed, scholars of racial capitalism argue that capitalism requires inequality to generate value.

> Capital can only be capital when it is accumulating, and it can only accumulate by producing and moving through relations of severe inequality among human groups–capitalists with the means of production/workers without the means of subsistence, creditors/debtors, conquerors of land made property/the dispossessed and removed. These antinomies of accumulation require loss, disposability, and the unequal differentiation of human value, and racism enshrines the inequalities that capitalism requires. (Melamed, 2015, p. 77)

As Woods demonstrates, plantation regimes "create, institutionalize and manage extreme conflict … and are responsible for the coexistence of great poverty besides great wealth" (Woods, 2017, p. 40). Woods's study of regimes of inequality in the Delta demonstrates how planter monopoly over "agriculture, manufacturing, banking, land, water and local, county and state finances" generated the South's comparative advantage via "a labor force disorganized through terror and natural resources opened to uncontrolled exploitation" (2017, p. 5), suggesting that industrial capitalism emerged on plantations in

the South first. While common stereotypes of the South cast the region as backwards, the extreme inequality evidenced in Southern states is a result of too much, not too little, capitalist development. However, plantation blocs – a term Woods deploys to describe the political, economic, and ideological domination of state institutions by planters and their accomplices – are not inevitable nor a static historical formation. Rather, Woods traces how regional plantation blocs, while resilient, are a dynamic and crisis-prone configuration of state and capital interests built on white monopolies of state resources and state institutions and articulated in opposition to Black political power and development ethics.

While work in geography and political ecology has applied the framework of racial capitalism to analyze pesticides (Williams, 2018), urban agriculture (Croog, 2020), and drinking water infrastructure (Ponder, 2017), I build from this emerging scholarship to understand the role of, what I term *keeping water out,* as one lens to understand the social and material grounds for the reproduction of racism and a terrain of power that shapes vulnerability to flooding. Keeping water out includes projects designed to drain wetlands, erect structures to control flooding, and engineer landscapes to temporarily hold and convey floodwaters at a slower rate. While these various projects are distinct, I categorize them as infrastructural projects designed to keep water out as a conceptual tool to understand the larger socio-environmental patterns they engender overtime. To do so, I trace historical regional transformations in southeastern Missouri, colloquially termed the Missouri bootheel, or the bootheel for short. I focus my analysis on the ongoing production of uneven vulnerability to flooding in the Mid-Mississippi River Region

through nineteenth-century flood control projects, including land reclamation and the formation of drainage districts in southeastern Missouri.

4.5 Extracting Land and Disciplining Water: Land Reclamation and Flood control in the Missouri Bootheel 1830s – 1920s

The Mississippi River watershed drains roughly forty percent of the continental United States. The Lower Mississippi River, designated south of the confluence of the Mississippi and Ohio rivers at Cairo, Illinois, is characterized as a historically dynamic disturbance regime. Geologically, the Lower Mississippi River is best characterized, not as solid and stable riparian land, but as an expansive not-water-but-not-land where periodic flooding brought rich sediments southward, nourishing ecologically rich habitats across the rivers' vast and shifting riparian land and waterscape.

At the northern reaches of The Lower Mississippi River's alluvial plain sits the Bootheel region of southeastern Missouri. The Bootheel region includes Mississippi, New Madrid, Pemiscot, and Scott counties, which are located adjacent to the Mississippi River, and Dunklin, Stoddard, and Butler counties, located inland and to the west of the Mississippi River adjacent counties (Figure 4.4). Following the Indian Removal Act of 1830 whereby Indigenous peoples were violently expelled from their lands, the Federal Government controlled large swaths of unruly swampland and bottomland hardwood forests in the Delta region (Woods, 2017, p.42). This land was treacherous to navigate and had been bypassed by European settlers who had migrated westward.

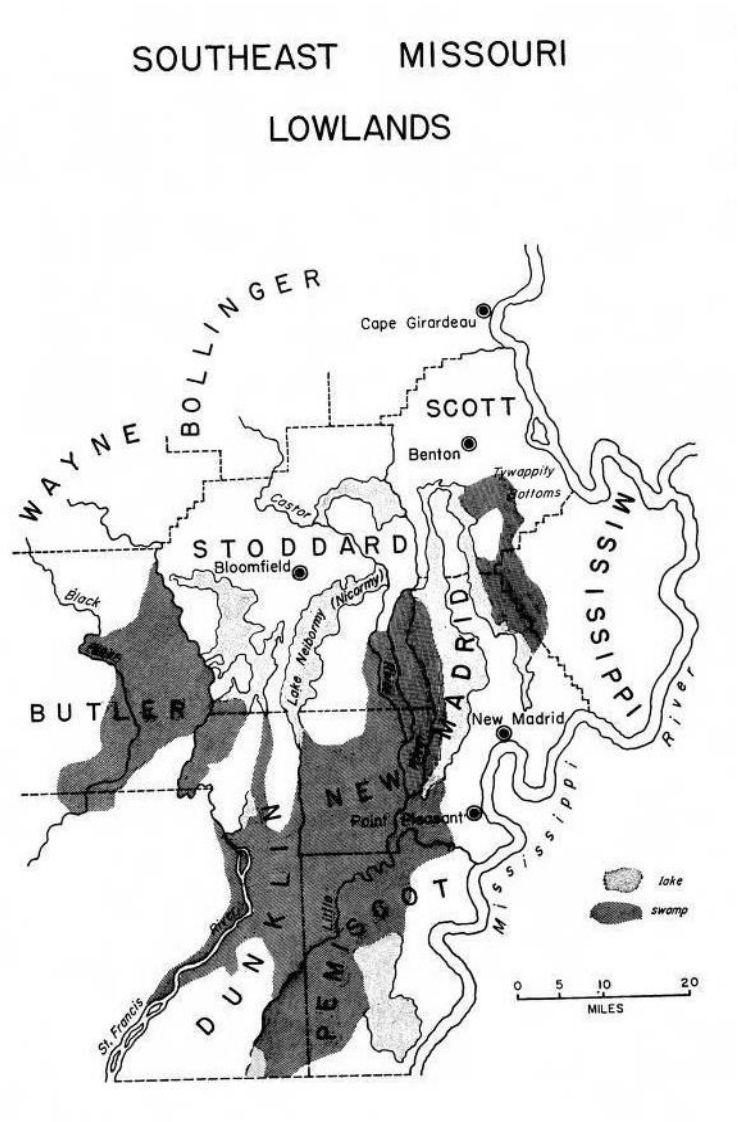

Figure 4.4. Southeast Missouri Lowlands. Swamplands existing prior to 1850 are shaded. Source: Ogilvie (1970, p. 157).

The area today is known for its rich and productive farmland, particularly for commercial cotton production which is concentrated in the region (Missouri Department of Agriculture, 2019). However, this land has not always been farmland or really land at all. Settlers initially bypassed the area as they expanded westward because the landscape was considered unhealthy and prone to disease from being frequently submerged under swamps and ponds as the Mississippi River meandered. Prior to European settlement, the

land was covered in dense old-growth cypress, oak, gum and hickory forests whose roots tangled and mingled over the stagnant water. Indigenous nations including the Osage, crafted canoes from Bald Cypress and navigated the Mississippi River and tributaries to support farming, hunting, and trading in the region (Davis & Whitfield, 2020; Johnson, 2019). The rich ecosystem supported numerous threats to human habitation including mosquitoes carrying malaria, bears and panthers, but also provided a form of flood control, capable of storing excess waters and slowing the river's rise, according to historian John Barry (1998). Today, extensive drainage projects and flood control infrastructure mitigate flooding risk in the area that is now one of the most agriculturally productive areas in the United States.

Drainage, land reclamation, and flood control have been an important part of capitalist agricultural expansion in the United States. Between 1870 and 1920, efforts to drain swamp and wetlands tripled available agricultural land (McDowell, 1965). Scholars have shown how land reclamation and drainage projects during the 19th century were both a racial and economic project informed by European ideologies of improvement and health (Dillon, 2022; Phillips & Soederberg, 2023; Urban, 2005; Vickers, 2022). Dillon's (2023) study of 19th century land reclamation in the American West demonstrates that drainage projects were motivated by anxieties about the health of white settler bodies, were accomplished by a racialized labor force, and were facilitated by government subsidies that benefited settler ecologies while disenfranchising Black, Chinese, and Indigenous residents and immigrants. Dillon argues that early land reclamation projects in central California worked to fuse capitalist and colonial expansion with whiteness, citizenship, and property regimes (2022). Relatedly, Woods' (2017) study of delta

capitalism in the Mississippi Delta demonstrates that prior to the Civil War, Planters designed infrastructure projects to drain swamps and control riverine flooding as a means to resolve capital crises by creating new agricultural land that would increase property values and finance a burgeoning southern cotton empire (p.59).

In southeast Missouri, Historian Leon Parker Ogilvie (1970) has shown how the development of agricultural land in the bootheel was made possible through extensive drainage and land reclamation efforts. However, these efforts to transform swampland into productive farmland were born of reluctant and often conflicting efforts by local and national governments and regional boosters leading to an uncoordinated and patchy approach to drainage and reclamation (Fisher, 2017, p. 94). Following the 1803 Louisiana Purchase, the federal government owned much of the swamp land but refused to fund efforts to reclaim the swampland, a result of political conflict[4] at the federal level over whether and how to fund internal improvements (O'Neill, 2006; Shallat, 2013). Despite commissioning reports on the cost and scope of reclamation projects, Congress never approved a federally coordinated approach to drainage and reclamation (Ogilvie, 1970, p. 159).

[4] In the early 1800s, conflicts about the scope of the federal government's legislative powers were shaping how rivers were treated – as a public resource or commodity. Federalists believed that the federal government had broad authority to create institutions authorities to finance and tax projects vital to the general welfare. Although navigational works – engineering activities aimed to increase the navigability of waterways - were not explicitly mentioned in the constitution, Federalists argued Congress had the power to fund these projects to regulate commerce. Democratic Republicans, on the other hand, argued against an overreaching federal government insisting that states should have the power to regulate commodities and resources within their borders (O'Neill, 2006; Shallat, 2013).

In 1847, local leaders and boosters in the region held a swampland convention in Bloomfield, Mo, where they implored congress to undertake extensive reclamation and flood control measures. In order to unlock the value of the land by making it fit for cultivation, boosters argued reclamation projects were needed to provide timber companies better access to forest resources and to drain the land for cultivation. According to Ogilvie (1970), the convention was dominated by interior interests, those landowners and boosters from the western counties of the bootheel argued for the federal government to build canals that would drain inland areas and improve navigation in the areas the tributaries (p.160). Inland farms sold their crops locally and wanted access to commercial markets via the Mississippi River (Fisher, 2017, p. 59) In conflict with canal boosters were landowners from the eastern bootheel counties who wanted levees to protect the area from frequent flooding. Both agreed that if Congress were to continue to do nothing to improve the land, then Congress should cede the lands to the states so that they may "reclaim them and fit them for market" (Ogilvie 1967 p.160).

In 1850, Congress decided to cede to states all public land deemed unfit for cultivation by passing the Swamplands Act. As a result, fifteen states were given 63,983,742 acres of public land of which Missouri, particularly southeast Missouri received 3,346,936 acres (Ogilvie 1967, p.162). Within the historical purview of land policy, the Swamp Act is seen as a massive give-away. The idea was that states could sell the land and use the revenue to finance land reclamation projects. In southeastern Missouri, the state ceded swamplands to individual counties, passing the task of draining the lowlands to more local governmental units (Fischer, 2017, p.94). Instead of a federally coordinated approach to determining what land should qualify as unfit for

cultivation and was in need of reclamation projects, the General Land Office permitted states to appoint their own commissioners to determine what land qualified, so long as any proceeds from the sale funded reclamation projects (Ogilvie 1967).

The Swamp Act of 1850 turned out to be a bigger giveaway than anticipated because of the wide and expansive ideas about what made land unfit for cultivation. In the southeast lowlands, almost all of the land was deemed unfit for cultivation and thus eligible for reclamation (Fisher, 2017, p.92). The category 'unfit for cultivation' was used liberally to designate over one million acres in the lowlands, swamp and overflow land by the General Land Office (Fisher, 2017, p. 93). In 1867, Nathan Parker wrote in the Illustrated Historical Gazetteer of Missouri, a publication reporting on the geography and environmental resources of every county in the state, that the,

> complaint has been made, by the people of Southeastern Missouri especially, that the surveyors were incorrect – that a great proportion of land had been returned as swamp or overflowed land is really dry or arable land. The schedules furnished by State agents have been examined, and as the following table shows that of the 1,031,803 acres reported as swamp lands, there are really, upon careful examination, 968,712 acres of dry, tillable land. (Parker, 1867, p. 174)

Under the Swampland Act of 1950, states and counties had to fund reclamation and flood control measures internally using the profits generated from the sale of land. The liberal designation of swampland meant land that was not boggy, as implied, but heavily timbered and could be sold to private landowners to raise money to fund internal infrastructural improvements and improve the regions comparative advantage. This occurred during what Clyde Woods (2017) terms the Mississippi Delta Plan 2: The Rise of Capitalist Slavery, where Delta planters faced a credit and capital drought and cotton prices collapsed. The massive land giveaway by the federal government supports Dillon's

(2022) assertion that land reclamation was an economic and racial project during the 19th century by facilitating the transformation of swamps as alienable property through government subsidies that benefited white settlers while disenfranchising non-white communities. During the same year that congress passed the Swampland Act, the Fugitive Slave Act was passed, which required all public officials to return escaped African Americans to their enslaver. Scholarship in Black geographies has shown how swamps served as spaces of refuge and marronage for escaped African Americans (Bledsoe, 2017; Hyman, 2019; Sayers et al., 2007; Vickers, 2022; Winston, 2021; Wright, 2020). Vickers uses the term *swampification* to describe the "process whereby governments, corporations, and the press socially (re)invented swamplands as spaces of death, disease, and 'uninhabitability' to justify their destruction" (2022, p.1). During the nineteenth century and into the twentieth century, the imperatives to drain wet land and protect the newly dried land from repeated flooding in order to make it more profitable relied on racialized ideologies of white supremacy to protect white settler bodies and eradicate what Winston (2021) terms "Black spatial acts of struggle and survival" (p. 2185).

Furthermore, reclamation was both an economic and racial project because anxieties about the health of white settlers and the white race were projected onto land considered insalubrious, or unhealthy. Scholars have argued that projects to tame landscapes emerged hand in hand with ideologies about the health of privileged bodies, the nation, and ideals of progress (Carlson, 2010; Dillon, 2022). Swamps were seen as a dangerous source of miasma, or bad air, giving way to illness and disease. In colonial New England, early European settlers associated wetlands and swamps with Native

Americans who they saw as ungodly and sinful, and their racism against indigenous peoples shaped their view of the landscape, justifying the destruction of both native landscapes and peoples (Carlson, 2010; Cronon, 2011; Dillon, 2022; Urban, 2005). As Urban's (2005) study of the transformation of midwestern prairies into agricultural land demonstrates, in the late 19th century doctors and sanitary engineers increasingly called for wetlands to be drained by opining that racial degradation can result from exposure to the 'poisonous atmosphere' with generational consequences (p.653). In southeastern Missouri, Fisher (2017) documents how malaria presented a real threat to workers who were employed in clearing timber from the swampy landscape. Water infrastructure projects in the 19th century often battled disease exposure impacting workforce shortages, including malaria and yellow fever in Panama and Egypt (Fisher, 2017; Mitchell, 2002). However, federal funding for drainage projects did not exist. At the turn of the 20th century, pleas from regional boosters and scientists at the United States Geological Society, part of the National Drainage Movement, urged Congress to fund swampland drainage in a similar manner as irrigation projects in the west (Mitchell, 1908). During a court battle in southeastern Missouri over the incorporation of a drainage district, the court rejected the argument from several prominent landowners that objected to the drainage district's ability to levy taxes to fund improvements. The court argued, "the right of the state, in exercise of its police power, to drain lands for the purposes of protecting the health of the people … it may also be invoked to make lands fit for use" (quoted in Fisher, 2017, p.110). This ruling demonstrates how anxieties about white settler health were grafted onto drainage projects to make land productive, linking the health of the regional and national economy with white settler bodies.

Scholarship on the history of improvement projects has shown how reclamation projects aimed at land categorized as 'waste' are linked to European colonial and imperial expansion through collapsing various landscapes - from forests, marshes, meadows, wet prairies, fens, wetlands and even deserts – into a single category of wasteland so that they could be re-made into profitable land (Bhandar, 2018; Dillon, 2022; Gidwani & Reddy, 2011; Goldstein, 2013; Ranganathan, 2018; Urban, 2005; Williams, 1970). Goldstein (2013), studying the enclosure of the English countryside during the 17th century, terms this process *terra economica* – a way of seeing the landscape as potentially, but not yet, profitable land. This term captures the process and purpose of reclamation in the Delta region. Indeed, following the creation of local drainage districts in Dunklin County, Missouri, average land prices rose 233% to 300% after drainage projects were approved (Fisher, 2017, p. 110). In southeast Missouri, much of the land was considered wasteland because of the difficulty of accessing the vast timber resources that existed prior to the development of railroads (Fisher, 2017). That soon changed after the passage of the Swampland Act in 1850, which gave counties the capital to aid the construction of railroads and drainage projects. While the price of Delta land was plummeting in state of Mississippi[5], in southeast Missouri, land sales were proving an economic force as newly formed railroad companies were competing to purchase land and build rail in order to access timber resources of upper Delta lands

[5] Woods argues that during the panic of 1837 when cotton prices and the price of Mississippi land plummeted, there was no new settlement for over a decade. During this crisis, Planters reorganized the labor process by turning to increased mechanization, crop diversification, soil conservation, and refined methods of managing enslaved labor, ultimately making the plantation more 'efficient' (Woods, 2017, p. 43).

(Fisher, 2017, p.69). Between 1890 and 1915, the bootheel counties led the state of Missouri in forest product production. According to Fisher, the difficult work of clearing timber from swamplands was done by Scots-Irish peoples from the Ozark hills and free African Americans laborers who lived in segregated quarters (2017, p.83). A racialized labor force was also utilized to build and maintain rails in the region (Figure 4.5). Despite a patchwork of railroads built by a slew of companies subjected to bankruptcy, bondholder forced sales, and consolidation, and by 1930 the forest resources of the bootheel were completely exhausted. Interestingly, the development of rail and extraction of timber resources increased the value of land only temporarily. Left behind were vast networks of tree stumps and underbrush, called 'cut over' land, that were too laborious to remove (Figure 4.6). To make land profitable and fit for cultivation, planters need a large-scale plan for drainage to make the land attractive to potential buyers. Thus far, local drainage districts had formed piecemeal within the bootheel counties where parcels were sold and purchased at a high acreage, concentrating control of drainage decisions into fewer and thus more powerful landowners (Fisher, 2017, p.105). Following the removal of the vast cypress swamps of southeast Missouri, regional boosters felt it imperative to scale-up drainage work that would turn the stumpy swamplands into valuable land that could be cultivated.

Scaling up drainage and flood control projects at the turn of the twentieth century were spurred by federal support following the Civil War. Because flooding worked to deter development in the bootheel, and the Delta writ large during the late 19th century, the increased property values that followed levee and drainage projects, despite how expensive they were, motivated the plantation bloc to become increasingly more

Figure 4.5. Black and White Railroad Tie Cutters in Grandin Mo. 1907. Source: Griffith, H.M. (1907). Black and White Railroad Tie Cutters in Grandin Mo. Missouri Lumber and Mining Company Photographs (C3875, folder 2). The State Historical Society of Missouri-Columbia.

Figure 4.6. Swampland with Evidence of Clear Cutting in Dunklin County. Source: Photographer unknown (1925). Marion C. Jones Photograph Collection (P0606). The State Historical Society of Missouri-Columbia.

motivated to drain and protect emergent land. Prior to the Civil War (1861 - 1865) in southeast Missouri, flood control measures such as levees were financed by individual land owners and built by enslaved labor and white settlers from the Ozark hills, the latter who were entitled to one acre of land for their labor (Fisher, 2017, p.94), while enslaved labor was conscripted on a much larger scale for levee work in the deep south (Davis, 2018). This patchy system of levees was largely destroyed during the Civil War. Following the Civil War and Reconstruction, planters faced economic and political crises in terms of labor and land shortages and launched aggressive efforts to pressure the federal government to rebuild levee systems. As Woods (2017) demonstrates, following the war, the federal response to protecting regional production and high cotton prices reinstated planter hegemony by returning confiscated land to planters, refashioning a brutal racialized labor regime, and redistributed public resources to rebuild decimated planter infrastructure, including levees (Inwood, 2022). If congress had been hesitant to fund internal improvements prior to the war, by 1879 the federal government established the Mississippi River Commission to fund and coordinate navigation and flood control (Cobb, 1992; O'Neill, 2006). The dominant approach to flood control along the Mississippi River was to (re)construct levees that had been destroyed by the war despite warning that a "levees only" policy would drastically reshape the river's hydrology (Shallat, 2013). Woods' (2017) argues that following the overthrow of Reconstruction, "levee and rail construction created a triple boom in land values, cotton production, and timber" (p.77). Levees protected land that rail could better access, allowing 'wastelands' to be brought into production. This new access along with the fertility of Delta soil opened new credit markets. "Now planters were able to finance production by

mortgaging the land instead of providing cotton merchants with a crop lien" (Woods, 2017, p.77). Expanding the acreage of land that could be cultivated coincided with new labor regimes based in sharecropping, gang labor, and debt peonage.

> [Those] men and women who drained the swamps, and who worked on the prison farms and in the levee and sawmill camps, faced death from working too hard and death for not working hard enough. African Americans continued to die building and shoring up the Lower Mississippi River levee system. The brutality used in levee construction was unsurpassed. (Woods, 2017, p.94)

These new labor and land regimes reinvigorated the plantation bloc into the so-called Alluvial Empire. "By the time of the Civil War about 90% of cotton bought and sold in New Orleans was shipped to market by water. By 1900, after the Corps opened long stretches of the Mississippi-Missouri system, most of the good farmland on the Great Plains was within 40 miles from a navigable channel" (Shallat, 2013, p.202).

The federal renewal of the capitalist agricultural economy, over and against efforts by landless and small farmers to resist the plantation regime, reshaped the relationship between large scale landowners, environmental transformations and the state. Prior to 1907, drainage and levee districts in southeastern Missouri were organized at the county level, devolving flood control activity to the smallest unit of government (Fisher, 2017). Scaling up and coordinating flood control required the creation of a new legal authority to direct projects across counties. In 1907, the Little River Drainage District was incorporated and along with the sale of bonds, a tax was passed to fund construction and maintenance costs. By 1910, over 900 miles of drainage ditches had been constructed in the bootheel (Figure 4.7). In Dunklin County, land prices rose from $12 to $20 per acre to $40 to $80 (Fisher, 2017, p.108). Drainage combined with levees and river channelization shortened trade routes and the relationship between northern industrial capital and the

southern agricultural economy (Woods, 2017). However, these measures did not prevent flooding from occurring and threatening production. Between 1882 and 1893, eight floods devastated the lowlands. Rebuilding ruined infrastructure proved too expensive for small districts to fund on their own, especially as many landowners failed to pay taxes as commodity prices declined throughout the early twentieth century (Fischer, 2017, p.135).

Failure to pay taxes put drainage districts in a financial crisis, which some boards resolved by consolidating land ownership. Fisher argues that the choice to seize land for tax delinquencies is,

> reflective in part of the makeup of the board. The board was composed of owners of large holdings of land which most had owned for long periods of time and on which they owed little … in contrast, small farmers who had recently purchased a few hundred or fewer acres of newly drained and cleared land on which to farm and support a family simply could not realize enough profit at the depressed commodity prices to make loan payments, provide [for their family] and pay property taxes (Fisher, 2017, p.147).

Furthermore, the loss of revenue caused districts to defer maintenance and cancel new projects (Fisher, 2017, p. 145). Following the 1927 flood of the Mississippi River, the largest and most deadly flood on record, the federal government responded by passing the 1928 Flood Control Act. Fisher (2017) argues that the 1927 floods changed the way flood control was viewed as the responsibility of the government. “The magnitude of the flood overall, multistage plan and without

Figure 4.7. Canals of the Little River Drainage District. Source: Masie, G.R. (1980). Gerald R. Massie Photograph Collection (P0016). The State Historical Society of Missouri-Columbia.

more money than could be raised locally" (Fisher, 2017, p.139). The Flood Control Act of 1928 allowed the Army Corps of Engineers to manage flood control projects and brought in more federal investment than ever before. After the flood, Congress appropriated $325 million for flood control, marking the first time the costs were borne by the federal government and not local tax dollars (Fisher, 2017, p.140). This is an example of how the federal government intervened massively in restoring plantation profitability following the flood, supporting Woods' assertion that the federal levee system, one of the largest public works projects, protected planters' profits but did not

largely benefit small farmers or sharecroppers, making it “one of the defining features of Delta capitalism” (Woods, 2017, p.59; Cobb, 1992). Underscoring the racial aspects of Delta capitalism following the flood, historical Susan Scott Parish (2017) argues that the plantation bloc’s reliance on a category of whiteness, as defined through protecting white health, was made manifest as planters conscripted Black labor to rebuild and reinforce levees as a “living buffer zone between whites and natures dangerous vagaries" (p.9).

Following the devastation by the flood, the federal government became aggressive in its effort to support the plantation bloc, following a crisis in the overproduction of cotton, with the passage of the Agricultural Adjustment Act (AAA) in 1932. The AAA was designed to rescue northern capitalists who had invested heavily in plantations and relied on cotton production to fuel manufacturing in the north. A series of foreclosures swept southern farms, where it is estimated that life insurance companies and banks owned 30% of southern cotton land (Woods, 2017, 122). In fact, by 1937, “over half of the nearly two million acres under cultivation [in southeastern Missouri] was owned in parcels of 200 acres or more. Two hundred thousand acres were owned by insurance companies, two companies held more than 40,000 acres each” (Cantor, 1969, p. 805). Furthermore, the AAA paid farmers to plow up to 30% of their planted acres, amounting to huge subsidies for large landowners. Land consolidation hurt the emerging labor regime because tenant farming was being replaced by a day labor regime. Instead of families living and farming the land for a landowner who provided a credit system for basic needs, the day labor regime shifted social reproductive responsibilities onto individual farmers (Cantor, 1969; Roll, 2010). Following devastating flooding in 1937, federal relief money that was earmarked for laborers was first given to planters by

extension offices who pocketed the funds (Roll, 2010). Roll's historical analysis of the sharecroppers strike of 1939 (Figure 4.8) points to the emerging regime of day labor from sharecropping and the appropriation of relief money following flooding disasters as a motivating reason for the sharecroppers strike (Roll, 2010; Cantor, 1969).

Figure 4.8. Evicted Sharecroppers Along Highway 60, New Madrid County, MO. Source: Rothstein, A. (1939). FSA-OWI Collection (LC-USF33-002927-M1). Library of Congress.

In effect, the Flood Control Act and the Agricultural Adjustment Act nationalized flooding relief resources to the benefit of large landowners.

If the nationalization of drainage and flood control projects represented a spatial fix by the federal government to protect the capitalist agricultural economy, it also aimed to spatially fix flooding losses through the creation of the Mississippi River and Tributaries Project with diversifying the "levees only" policy through a more

comprehensive approach to flood control and navigation through fortifying levees and floodwalls, channel stabilization, tributary basin improvements and by sanctioning four floodways. In southeastern Missouri, the Birds Point New Madrid Floodway was established through what became known as the Jadwin Plan. The Jadwin Plan rejected the proposal to build higher levees around Cairo, Illinois, in favor of designating an area 10-miles wide and 56-miles long for flooding when operated. The land inside the floodway was primarily agricultural at the time and landowners were paid a one-time indemnity to allow flooding on their properties (Fisher, 2017, p.141). Despite compensation for the right to flood their land, Jadwin's plan drummed up considerable controversy because landowners didn't want their land flooded, leaving "deep-seeded animosity between local farmers and the Corps of Engineers which has persisted" (Fisher, 2017, p.157). The floodway was operated as a relief measure during the 1937 Mississippi flood and until 2011 had not been operated since. Crucially, as the opening story of this article demonstrates, landowners in the bootheel continue to protest the operation of the floodway despite the now long-established legal mandate to activate the floodway when the Cairo gauge reaches 61.5 feet. Opponents of the floodway express dismay that Cairo, once considered the crown jewel of the Alluvial Empire but having since experienced a century of economic decline, is favored for protection from floodwaters over agricultural land within the floodway.

The story of the 2011 flood reveals that just because the community of Cairo was eventually saved by the prospect of major flooding, its future momentarily hung in the balance because the lives of Cairo residents were deemed less valuable than the subsidized agricultural fields located in the Birds Point New Madrid Floodway

(Schechinger, 2022). The decision to delay the detonation of the floodway points to the role of regulatory non-compliance, which Pulido (2015) identifies as a key tenant in the production of environmental injustice under racial capitalism. Indeed, the failure to act promptly according to the law put residents of Cairo in danger as their levees began to weaken. Furthermore, as one historically Black community was 'saved', another small Black freedom town located within the floodway was not. In Lawrence and Lawless's (2017) oral histories, Pinhook residents directly trace the origins of their town to the ability of descendants to purchase eighty acres of clear-cut land in the newly designated floodway in the early 1940s. This land was the only land available for them to purchase. Powerful landowners in the floodway were able to delay the decision to operate the floodway because of their connections to local and state leadership (Lawrence and Lawless, 2017). Yet residents of Pinhook, who lacked such connections, described their anger at being left out of key conversations before the flood and during recovery (Lawrence and Lawless, 2017). As one Pinhook resident explained,

> I had no say. For me that's been the hardest part. I know the Corps did what they thought they had to do, but put me at the table. Engage me in conversation. Let's talk about it. But everything there was a meeting with the farmers, the white farmers, those that owned so much land. When I read those articles now about the flood, it's all about the 180,000 or more acres of farmland that got flooded. They report about those big farmers losing so much and then there's mention of 'a few homes, crops ruined, and a few homes' - that was us! Those homes were us. That was Pinhook!…Never do they mention the village of Pinhook, a town that was destroyed. (quoted in Lawrence and Lawless, 2017, p.79)

As the quote above reveals, what Lawrence (2015) terms 'the rural Black nowhere", speaks to the ongoing racialization of space and the white spatial imaginary (Lipsitz, 2007) such that the existence of a rural Black town in the middle of a legally sanctioned floodway was figuratively erased before the 2011 flood and physically wiped away after

the floods. Lawrence's ethnographic work with residents of Pinhook and Cairo demonstrates that because Blackness has been so intimately and normatively associated with urbanity in the United States, Black rural communities "quickly lose not only their legitimacy to occupy space, but also their legibility as human bodies" (Lawrence, 2015, p. 232). Their vulnerability to flooding is a direct result of enduring white power structures that render the places and residents of Cairo and Pinhook invisible and lacking in value compared to the spaces of capitalist agriculture.

4.6 Conclusion

Scholars of hazards have argued that vulnerability to flooding is embedded into social, political, and environmental processes and is shaped by local histories of development and planning power in a multitude of ways (Collins, 2010; Collins et al., 2018; Cutter et al., 2018; Hardy, 2023). This article suggests the utility of racial capitalism as an important framework to aid analysis of flooding vulnerability because it helps us better locate the unjust processes that produce differential vulnerability to flooding. This paper has demonstrated that the historical development of infrastructures designed to keep water out, from drainage and land reclamation projects to flood control infrastructures, was *fundamental to the development of racial capitalism* because it consolidated regional planning power through methods of social and environmental domination. In southeastern Missouri and indeed in the Delta writ large, water infrastructure development was a mode through which regional development blocs powerfully shaped Delta environments, economies, and labor regimes in enduring, but not inevitable ways. Crucially, as Woods' (2017) argues, landless farmers and African American communities in the Delta resisted regimes of inequality prior, during, and after

the Civil War. Yet, key events, including major flooding events at the turn of the twentieth century, reshaped the relationship between the federal government and regional planning blocs as planters successfully reframed the threat of flooding and protection of capitalist agricultural land as a public and national problem (O'Neill, 2006). As Phillips and Soederberg (2023) argue, water infrastructure politics in the region can be understood through a central duality: "the state-led *mastering* of environmental threats in some places contributed to the *making* of environmental violence elsewhere" (p.228). Indeed, this history of water infrastructure development under racial capitalism reveals the entanglements between racialized histories of land development and regional planning power that contribute to differential vulnerability to flooding today.

By tracing the history of water infrastructure development in the Missouri bootheel during the nineteenth century, we can better understand how historical-geographical processes, including racialized histories of land development, structure contemporary patterns of flooding risk and differential vulnerability today. As this paper has shown, nineteenth century efforts to drain swamplands and erect infrastructure projects to keep water out were both economic and racial projects that fundamentally altered hydro-geographic landscapes and were productive of enduring regional power blocs. These projects were 1) predicated on notions of racial purity and the conflation of the health of white settler bodies with regional and national economic health, 2) relied on a racialized landless labor force, and 3) depended on generous government subsidies that facilitated the development of what Lipsitz (1995) terms 'the possessive investment in whiteness', and marginalized efforts by African American and other communities to build freedom futures (Woods, 2017). Projects to *keep water out* are part of the process

through which racial capitalism is produced. The outcome of these projects was the reorientation of the federal government's approach to flood control that while more diversified in its approaches, delivers benefits and subsidizes risks for elites even when their properties are flooded. This work demonstrates that vulnerability to hazards are configured within a spatial and historical context that is informed by long term and emergent processes of racialization. Racial capitalism and differential vulnerability have been mutually constituted. Any analysis of differential vulnerabilities to flooding in the U.S. context must start from this premise.

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CHAPTER 5

CONCLUSION

In the fall of 2019 and spring of 2020, as I was conducting research for this dissertation, I attended monthly meetings of the Flood Recovery Advisory Working Group (FRAWG), which was organized by Missouri Governor Mike Parson as a response to the significant flooding on the Missouri and Mississippi rivers in the spring and summer of 2019. The flooding was a result of complex factors including record snowfall and rapid snow melt in the upper Missouri River water basin under climate change (Almukhtar et al., 2019). The National Flood Services estimate that the 2019 floods impacted fourteen million people and totaled $6.2 billion in property damages (Powell, 2020). On July 19, 2019, Gov. Parson signed an executive order establishing FRAWG to give input on flood recovery priorities and appointed twenty-five stakeholders to serve on the committee. Committee members included representatives from the Missouri Department of Natural Resources, Missouri Department of Agriculture, Missouri Department of Economic Development, numerous representatives of agricultural organizations, two planning commissioners representing a handful of rural counties, and several local levee district representatives[6]. Missing from this advisory

[6]The following organizations were represented in the FRAWG. Numbers in parentheses indicate number of representatives from that organization: Missouri Department of Agriculture (2), Missouri Department of Natural Resources (2), Missouri Department of Economic Development (1), State Emergency Management Agency (2), Missouri Department of Transportation (1), Missouri Levee and Drainage District Association (3), Missouri Farm Bureau Federation (2), Missouri Corn Growers Association (3), Missouri Soybean Association (1), Coalition to Protect the Missouri River (1), Missouri and Associated Rivers Coalition (2), Clark County Commission (1), Green Hills Regional Planning Commission (1), AgriServices of Brunswick, Ursa Farmers Cooperative (1), Mississippi River Farmer /CoBank Lending (1), Atchison County Levee District 1 (1).

group are environmental organizations, many of whom testified during the public comments, as well as representatives from large urban areas, including St. Louis. In fact, during the meetings, urban flood protection was often discussed as being *too* robust, at the expense of rural flood protection (FRAWG, 2020). While the final report of recommendations called for increased coordination between various state and federal agencies, and more federal funding support for short-term and long-term repairs, the recommendations do not represent a break from the conventional approach to flood recovery. Moreover, the composition of the committee represents a snapshot of enduring regional power blocs in Missouri, which overwhelmingly represents the interests of capitalist agriculture. As this dissertation has argued, infrastructure projects are embedded in the built environment for decades such that the social relations comprising their implementation, or lack thereof, reach into present and future development considerations.

In this dissertation, I have demonstrated that histories of racialized land development are entangled with contemporary projects to *keep water out* in ways that reproduce racialized inequities in the built environment and in differential vulnerability to flooding. There are three key aspects to my contribution. First, my work demonstrates how histories of racialized place-making inform flood mitigation infrastructure planning and (re)create powerful social hierarchies, deepening existing socio-environmental inequities. In St. Louis, the predatory property relations that have dominated the political economy of urban development in the region are reinforced through the Metropolitan Sewer District's green infrastructure plan, which invests little of the $4.7 billion cost of improvements in the city's struggling North Side. In the Missouri bootheel, historical-

geographical development of regional power blocs, including drainage and levee districts, were key developments in the history of racial capitalism that continues to impact communities today. This study emphasizes the importance of considering path dependencies of past infrastructure projects when planning for the future. Failure to acknowledge and address the historical context of these projects can reproduce structural racism and perpetuate uneven urbanization, exacerbating vulnerabilities to flooding disasters.

Second, this dissertation demonstrates the need for an expanded understanding of the impacts of flood mitigation infrastructure planning on cities and urban regions. By conceptualizing efforts to *keep water out* to include drainage and land reclamation projects, as well as flood control in the form of levees and sewer and stormwater infrastructure, I have demonstrated the macro historical-geographical processes that impact the co-constitution of regions, environments, and social difference. Furthermore, by "provincializing" infrastructure redevelopment, I demonstrate that regional histories and specificities matter for understanding these processes. For example, Bullard's seminal work on the siting of hazardous waste infrastructures in communities of color in Huston points to lack of zoning as a key policy that allows structural racism to unfold (1983). While this is true in many places, in St. Louis it is not. Rather, as I demonstrate in Chapter 3, discriminatory zoning is a key mechanism through which racial segregation developed in St. Louis with the effect of concentrating low-income housing in and near areas zoned for industrial use. Through the method of provincialization, we can understand these findings not as in contradiction with research elsewhere, but as evidence

of the flexibility and durability of white power structures that condition vulnerability to hazards in various ways.

Third, my work contributes to important debates in urban geography that theorize regional development, racialization, and environmental justice through processes of racial capitalism and social difference. As such, this dissertation argues that uneven infrastructural provisioning needs to be understood as a mode of urbanization that produces socio-environmental inequities which create value under racial capitalism. For example, against understanding North St. Louis as underdeveloped, my research demonstrates how decades of inadequate municipal services condition practices which maldeveloped North-St. Louis by extracting wealth from the area to invest elsewhere in the city, for example through property tax collection and abatement techniques. In St. Louis, the activist organization Arch City Defenders has demonstrated how the municipality of Ferguson in North County rely on practices of municipal court fees and fines in Black-majority areas to fund budget shortfalls (Harvey et al., 2017), which Johnson (2015) connects to tax abatement policies for Fortune 500 companies headquartered in the town. These extractive practices position residents in differentiated relations to land and development, producing and organizing social difference and space into hierarchies, exploited for cost-saving measures under federally mandated sewer and stormwater infrastructure re-development.

Along these lines, this dissertation has argued for hazards literature to pay attention to processes of racial capitalism, which can help locate, more precisely, the systemic barriers to equity that can be re-invigorated through mitigation and adaptation planning if not taken into account. It is my contention that hazard mitigation and recovery

should disrupt existing cycles of marginalization across social differences to deliver meaningfully on equity goals. As such, this dissertation has demonstrated what the lens of racial capitalism offers towards these goals by identifying how processes of racialization and capitalist economic systems intersect and mutually reinforce each other. For example, contemporary research and journalistic reporting on inequitable exposures to hazards locates the historical practice of redlining as a key mechanism that has shaped patterns of socioeconomic disparities seen today. However, without understanding redlining through the lens of racial capitalism, this work has failed to adequately conceptualize the *processes* of racialization that underpin what redlining maps reflect. Hiller (2003) has long argued that redlining maps reflected practices of racial discrimination, particularly with respect to practices under the Federal Housing Administration. Furthermore, redlining took place in neighborhoods occupied by communities who are considered white today but who have not faced the same structural barriers and constraints building wealth. This doesn't mean we shouldn't take the implications of redlining seriously for marginalized communities, rather it underscores the argument that racialization is an active process that requires us to probe, deeply, the inequitable patterns we see today and evaluate proposed solutions for the degree to which they intervene meaningfully in dismantling processes of racial capitalism. Such an approach is crucial for developing more equitable and just strategies to mitigate and adapt to the impacts of flooding, ensuring that marginalized communities are not further marginalized or exploited in the process.

There are several important implications for policy that come from this work. First, the findings of this dissertation reveal that historical infrastructure projects can

perpetuate patterns of uneven urbanization and vulnerability to flooding disasters. The embeddedness of flood-mitigation infrastructures, such as levees, floodways, and dams, within broader social-environmental networks and regional power dynamics creates distinct patterns of vulnerability and exposes communities to ongoing risks. One example that I was unable to substantively engage within the confines of this dissertation is the Flood Control Act's current mandate that the costs of federal flood control and recovery does not outweigh the benefits. This provision means that federal funding for flood control projects continues to accrue to high value properties that are likely to reinvigorate existing power hierarchies, as was demonstrated in the history of flood control in Chapter 4. Communities with low-cost housing face more barriers in justifying mitigation projects or applying for adequate recovery funding, which research has shown disproportionately impacts low-income communities of color (Flavelle, 2021; News, n.d.). In the Missouri bootheel, this contributes to the advantage of large agricultural landowners. An expanded accounting for the costs, including for example crop insurance payouts, may be needed. Expanding the definition of benefits beyond monetary considerations may also be helpful such that the benefit of not displacing historically marginalized communities can be accounted for.

Relatedly, an interesting theme that came up in my dissertation work was the desire for historically marginalized communities who are exposed to flooding hazards be relocated together as a community. In oral histories collected by Lawrence and Lawless (2017), Pinhook residents detailed their difficult flood recovery journey following the decimation of their town. Not only were they unable to access immediate FEMA funds because they were in a federally mandated floodway, but they were also told by disaster

agencies that they would not be able to rebuild their community because future floods would likely destroy the town again. For several years following the flood, the remaining Pinhook community members continued to seek damages for the loss they had experienced. Seven years later, FEMA indicated they were willing to discuss buyouts, but Pinhook residents would have to find affordable land on their own. Recently with the help of funding from a faith-based organization, the nine surviving residents (out of the 30 who called Pinhook home before the 2011 floods) were able to relocate as a community. Similarly, in the neighborhood of Eastwick in Philadelphia, PA, residents who face recurring flooding threats have begun to advocate for community-based property swaps that would allow the majority Black and elderly community to relocate on higher ground together. While the community continues to work with various city and land agencies in the region to determine the feasibility of their desire, research in sociology has shown the importance of maintaining place-attachment and community networks following displacement with respect to resident health outcomes (Tester et al., 2011). This dissertation suggests that one way to understand residents' desires to be relocated as a community, despite the challenges under current policy and property regimes, is as an African American freedom mobilization (what Woods' terms the Blues Epistemology) against further consolidation of the planter bloc, suggesting alternatives to individualized property-centric flood recovery (Woods, 2017). Future research requires supporting co-production among marginalized and impacted communities, researchers, policymakers, and other stakeholders adopting a more holistic and inclusive approach to hazard mitigation, climate change adaptation, and infrastructure redevelopment. This requires engaging with historically marginalized communities, incorporating their

perspectives and needs into decision-making processes, and actively working towards rectifying past injustices. By addressing the entanglement of racialized land development and water infrastructure, future projects can contribute to more equitable and resilient cities and regions.

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