Race, Class, Ethnicity, and Disaster Vulnerability

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Bob Bolin and Liza C. Kurtz

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10.1 Introduction

On August 29, 2005 Hurricane Katrina made landfall along the United States Gulf Coast and rolled over New Orleans, a city poorly protected by levees and ill equipped to handle a storm the size and intensity of Katrina. The disaster that unfolded in its wake provided a stark example of the pervasiveness of racism and class inequalities in the US as well as the indifference to African American victims by those responsible for public health, safety, and well-being in the region (Bullard & Wright, 2009; Dyson, 2006). In some areas of the city, armed white militias attacked displaced African American. Thompson (2008), for example, carefully documents numerous cases of vigilante violence directed against black survivors in the immediate aftermath of the storm, actions unprecedented in US disasters. The widely broadcast media images constructed an unambiguous story: tens of thousands of mostly low-income African Americans were left to fend for themselves as the city of New Orleans flooded from breached levees on Lake Pontchartrain. Their only refuge was a large sports arena unequipped to serve as an 'evacuee center' and devoid of any resources to support the thousands of people who gathered, many arriving only after wading through toxic, sewage-contaminated flood waters. In a city with a 2005 poverty rate of more than thirty percent, where one in three persons did not own a car, no significant effort was made by government at any level to assist the most vulnerable people to escape the disaster (Alterman, 2005). Even a decade after the event there is substantial

B. Bolin (✉)
School of Human Evolution and Social Change, Arizona State University, Tempe, AZ 85287-2402, USA
e-mail: bob.bolin@asu.edu

L.C. Kurtz
Arizona State University, Tempe, AZ, USA

H. Rodríguez et al. (eds.), *Handbook of Disaster Research*, Handbooks of Sociology and Social Research, https://doi.org/10.1007/978-3-319-63254-4_10

variability in estimates of the number dead although evidence makes it clear that African Americans had up to four times the mortality rate of whites.[1] While Hurricane Katrina momentarily and unavoidably called attention to issues of race and class inequalities and their relationship to peoples' vulnerabilities, disaster research has clearly shown that social inequalities are foundational conditions that shape both disasters and environmental risks on a global scale. For disaster researchers, Katrina also marks a significant convergence between disaster studies and environmental justice research in the US (Bullard & Wright, 2009). Notably, Bullard (Bullard & Wright, 2009), one of the founders of US EJ research provides extensive justice-focused commentary and analysis on Katrina and its aftermath.

In the discussion that follows, our primary interest is on how recent hazards, disaster and environmental justice research have analyzed the relationship between race and class inequalities and social vulnerability in disasters. In the US and many other countries, the imbrication of race and class is deeply entrenched, a product of a long history of racist and exclusionary practices which have marginalized and spatially segregated groups of people deemed intrinsically inferior by those holding political and economic power (Goldberg, 2002). The state is a major agent in the production, transformation, and enactment of constructions of race, part of what Goldberg refers to as the 'racial state'. Through law, policy, and a complex suite of institutional arrangements, racial discrimination in myriad forms is shaped by state sanctioned practices in civil society (Haney, 1994). In spite of civil rights legislation, the chronic and corrosive effects of racism have produced deep and lasting social, political, spatial, and economic disadvantages for people in targeted racial categories (HoSang, LaBennett, & Pulido, 2012; Winant, 2001). Those disadvantages have historically expressed themselves in class position, primarily through their pervasive negative effects on employment, educational, residential opportunities, and health statuses for those in marked racial categories. Given that racial/ethnic minorities will form the majority of the US population by 2042[2] and already do so in California, this is an area, as we will argue, which should be of major concern for all those involved in hazards and disaster research and emergency management (e.g. Wilson, 2005). While people's vulnerability to environmental threats is shaped by a concatenation of sociospatial and biophysical factors, race/ethnicity and class have proven central in understanding social processes during hazard events (e.g., Bullard & Wright, 2009; Wisner, Blaikie, Cannon, & Davis, 2004).

In this chapter, we review some key theoretical and methodological issues in research on race and class in hazard vulnerability and disaster. While we will review recent research literature pertinent to the topic, this chapter is not intended to be a detailed review of the disaster literature, as those are available elsewhere (e.g., Fothergill & Peek, 2004; Tierney, 2007; Williams, 2008; Wisner et al., 2004). Nor will we be discussing human acts of collective violence, including war, genocide, humanitarian crises, or terrorism, as these raise complex and contested political issues beyond the scope of this chapter.

There are three main sections in the discussion that follows. We begin with a critical review of recent theoretically informed treatments of four key concepts covered here: social vulnerability, race and ethnicity, and class. This review is used to illustrate and problematize some of the conceptual issues invoked by these terms in academic research and includes a short discussion of relevant early US disaster studies. The second section presents a review of more recent studies that illustrate approaches to understanding the intertwining of race and class in disasters. We concentrate our discussion on studies that focus on people's vulnerabilities and the central role of ongoing social, economic, political, and sociospatial conditions that turn hazard events into disasters (see Cutter, 2003; Eakin & Luer,

[1] http://fivethirtyeight.com/features/we-still-dont-know-how-many-people-died-because-of-katrina/.

[2] http://www.nytimes.com/2008/08/14/world/americas/14iht-census.1.15284537.html.

2006; Wisner et al., 2004). Many of these studies use a vulnerability approach developed through critiques of the ahistorical and technocratic orientation of early hazards research. Vulnerability analysis grounded in political ecology, an interdisciplinary critical approach developed in geography, anthropology and development studies (Robbins, 2012). As part of our literature review, we highlight some representative examples from the Indian Ocean Tsunami (2004), Hurricane Katrina (2005), and other recent disasters that explore how race and class shape vulnerability and influence disaster processes.

In the concluding section, we discuss environmental justice research (EJ) which we argue is a rich source of observations on race, class, and environmental hazards across a range of spatio-temporal scales (e.g., Walker, 2012). The EJ literature examines the disproportionate allocation of environmental burdens and risks and how those risks too often fall on those least able to cope with them. EJ research also provides examples of studies which unpack the complex historical processes which racially structure space and differentially place vulnerable people in harm's way through a variety of overt and covert mechanisms (Boone, Buckley, Grove, & Sister, 2009; Collins, 2009; Cutter, Mitchell, & Scott, 2000; Mustafa, 2005). As part of our EJ discussion we review persistent radiation hazards and the experiences of those living on the Navajo Nation in the US Southwest to illustrate how race, class, indigeneity, and environmental risk intersect at multiple scales (Johnston, 2007; Kyne & Bolin, 2016).

10.2 Theorizing Inequalities

In what follows we review key theoretical treatments of class, race and ethnicity with a particular focus on how these factors can shape people's vulnerability to hazards of all types. In the hazards and disaster literature, vulnerability analysis is a broad theoretical approach for investigating hazards at the intersection of social and environmental inequalities and uneven geographic development (Cutter, 2003; Peet & Watts, 2004; Robbins, 2012). A 'vulnerability approach' works to identify an ensemble of sociospatial and political economic conditions and historical as well as current processes which can explain how specific hazard events become disasters. Beginning with the publication of Hewitt's foundational edited volume, *Interpretations of Calamity from the Perspective of Human Ecology* in 1983, vulnerability studies have shifted the analysis of disasters away from a focus on the physical hazard agent and a temporally limited view of disasters as 'unique' events separate from the ongoing social order (Hewitt, 1983a,b). Vulnerability researchers argue that environmental calamities are shaped by the already existing social, political, environmental, and economic conditions and thus should not be considered as 'natural' occurrences (e.g., Cannon, 1994; Collins, 2009; O'Keefe, Westgate, & Wisner 1976). Indeed, as Quarantelli noted (1992, p. 2) in this vein, "…there can never be a natural disaster; at most there is a conjuncture of certain physical happenings and certain social happenings."

Wisner et al. (2004, p. 11), in one of the most comprehensive statements on hazard vulnerability research in the last decade, define vulnerability as "*…the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist, and recover from the impact of a natural hazard*" (Italics in original). They go on to note that vulnerability is determined by a variety of factors, variable across space and time, that differentially put people and places at risk of loss from environmental hazards. Other scholars have similarly defined vulnerability as the combined effects of exposure to a hazard agent, susceptibility to harm from that exposure, and the ability to cope with or adjust to the effects (e.g. Polsky, Neff, & Yarnal, 2007; Turner et al., 2003). Thus, key components of people's vulnerabilities include a biophysical dimension (exposure to hazard agents) and a social dimension (their

ability to avoid or manage the effects of the hazard) (see Cutter, 1995).

People's vulnerabilities can be shaped by a number of factors, both social and biophysical (Cutter, 1995; Gentile, 2016). Among commonly noted social factors are class, race, caste, ethnicity, gender, age, poverty, disability, and immigration status, as well as a variety of community and regional scale factors (Cutter, Boruff, & Shirley, 2003; Wisner et al., 2004). In the last decade there have been various efforts to develop quantitative vulnerability indexes, the best known of which is Cutter et al.'s (2003) Social Vulnerability Index (SoVI). Quantitative indexes to measure vulnerabilities across scales using demographic data are useful planning tools to characterize regions at risk of major disaster events. The limitation of such quantitate approaches is that they tend to reify and essentialize vulnerability as a fixed condition inherent in a certain fraction of the population. In contrast, more qualitative approaches see vulnerability as shifting, contingent, and spatiotemporally variable rather than fixed (Hutanuwatr, Bolin, & Pijawka, 2012; Mustafa, 2005). Qualitative vulnerability case studies are, however, limited in scope and scale in contrast to quantitative studies, and may not fit the existing paradigms of disaster management institutions (Gentile, 2016; Tierney, 2007). It is well recognized in the literature that vulnerabilities, however they are measured, are variable by hazard type, contingent on a variety of multi-scale situational conditions, unevenly distributed across individuals, households, communities, and regions, and change over time (Bankoff, Frerks, & Hilhorst, 2003; Cutter, et al., 2000). Race and racial disparities figure prominently in many vulnerability studies and it is to that topic we now turn.

10.2.1 Race and Racism

To discuss race and racism, we draw off recent work influenced by critical race theory, an approach stemming from legal studies which dates back several decades (Kurtz, 2009). Critical race theory scholars have promoted a view that racism, rather than being individual acts of intentional discrimination, are in fact "…an endemic part of American life, deeply ingrained through historical consciousness and ideological choices about race, which in turn has directly shaped the US legal system, and the ways people think about the law, racial categories and privilege" (Parker & Lynn, 2002, p. 9). Omi and Winant's (1994) sociohistorical analysis of racism and racial formation remains one of the most influential critical works on race in the social sciences (HoSong, et al., 2012). They contend that postwar US sociology's treatment of race was deeply flawed by its attempt to equate race and ethnicity by applying a white ethnic immigrant framework to *racialized* minorities; that is groups who are essentialized as biologically and characterologically different than white Europeans. Racialized minorities in the US thus include African Americans, Latinos, American Indians, and Asians, each with its own distinct history of oppression and discrimination. Equating race and ethnicity led to the assumption that over time 'cultural assimilation' would erase so-called ethnic differences. Omi and Winant argue that this framework shifted attention away from the deeply structured ways such groups have been "racially constructed" in the US and obscured the complex class and cultural differences among people marked by these racial categories (Omi & Winant, 1994, p. 23; see also Omi & Winant, 2012).

As Young (1991, p. 126) notes, when a dominant group deploys a racist ideology which "defines some groups as different, as the Other, the members of these groups are imprisoned in their bodies. Dominant discourse defines them in terms of bodily characteristics and constructs their bodies as ugly, dirty, defiled, impure, contaminated, or sick." A white European immigrant can stop being 'ethnic' in ways that a person of color cannot stop being labeled black or Arab or Latino, however much the latter are assimilated into putative dominant cultural forms. Race (and racism) exists at the level of hegemonic ideology in the sense that one cannot escape the

marginalizing effects of racial categories and their historical constructions.

The way racial and ethnic categories in the US Census have changed over time is an example of this shifting and discursive terrain of racial constructions. For example 'Hispanics', a term dating to the 1980 census, may be 'white' (or another race), and all are ostensibly ethnically different from 'non-Hispanic whites' in unspecified ways. The unstable and changing census categories and attached cultural representations which 'move' people in or out of racial and/or ethnic categories over the decades hints at the ambiguities and fluxes of such identity markers and the ways that they reflect the racial state (Goldberg, 2002). Regardless, these categorical shifts should not obscure the fact that American Indians and people of Asian, African and Latin American ancestry have faced intense discrimination, marginalization, and dispossession as racially categorized minorities at various times and places in US history (e.g., Feagin, 2015; Feagin & Cobas, 2014).

Hazard studies that rely solely on census classifications leave unexplored the meaningfulness of racial labels for affected people in particular localities and the social diversity these static terms elide. They also support a static, ahistorical and essentialized understanding of race as a fixed social category rather than a complex social, historical, and geographic *process*. Indeed, as has been argued by critical race scholars, rather than being a neutral source of information on demographics "the Census is a tool of the racial state's effort to organize and discipline racial categories for human beings" (Kurtz, 2009, p. 691). How populations are categorized racially, by the census or by other means, can become deeply inscribed in lived experiences of people these categories (see Bolin, Hegmon, Meierotto, York, & Declet, 2005; Pulido, 2000). However, it is also important to recognize that, in spite of its limitations, census data have served a central role in both EJ and disaster studies, in identifying and mapping sociodemographic impacts and inequalities in exposure to and recovery from environmental hazards (Collins, 2010; Cutter et al., 2003; Gentile, 2016)

Further obscuring conceptual clarity is the frequent conflation of race and ethnicity in the sociological literature, although ethnicity too is an unstable concept that escapes easy definition (Omi & Winant, 1994). As with race, relying on shifting census categories omits any consideration of the instability of labels or the political struggles over the cultural identities they incorporate. Anthropology, beginning at least with Barth's classical statement on ethnic groups (Barth, 1969), has produced an extensive literature on ethnicity and ethnic groups, centering ethnicity as *the* key subject of contemporary cultural anthropology. At its (deceptively) simplest ethnicity implies an ensemble of cultural characteristics and social relations that distinguish one group from another (cf. Shanklin, 1999). Ethnicity shapes individual identities and group characteristics while at the same time drawing boundaries with others who ostensibly do not share a set of cultural characteristics. However, the cultural features and practices that either unify or divide groups are frequently difficult to identify, particularly in complex postcolonial and multicultural social formations (Gupta & Ferguson, 1997).

Two more key concepts are introduced by Omi and Winant (1994, 2012) which, in the context of this chapter, are useful in understanding the ways that racial categories and racism shape environmental inequalities and disaster vulnerability: racial formation and racial project. Racial formation, as alluded to above, refers to the historical process "by which racial categories are created, inhabited, transformed, and destroyed" (Omi & Winant, 1994, p. 55). Such formations incorporate specific 'racial projects' which represent and organize human bodies and social practices across space and time, privileging certain categories of people and the places they occupy over others (Pulido, 2000). Thus, racial formations are historically produced, hierarchical, and hegemonic, and are expressed materially, spatially and in discourse (Goldberg, 2002; Kurtz, 2009; Omi & Winant, 1994). For

hazards research, understanding racialized social processes requires a historically informed investigation into the particularities of racial formations in specific places and times and how those shape the environmental risks people face (e.g., Bolin, et al., 2005; Pellow, 2000). It also avoids the essentialist treatment of race found in quantitative studies, wherein racial/ethnic categories are treated as concrete attributes with ensembles of assumed but undocumented social characteristics.

In using race to explain observed individual differences in social research, Omi and Winant (1994, p. 54) claim that scholars too often treat "race as an *essence*, as something fixed, concrete, and objective." Against such essentialism, they contend that race should be understood as "an unstable and 'decentered' complex of social meanings constantly being transformed by political struggle… : *race is a concept which signifies and symbolizes social conflicts and interests by referring to different types of human bodies*" (Omi & Winant, 1994, p. 55 Italics in original). What types of bodies are included in what racial category reflect place-specific historical and political economic processes that produce distinct patterns of advantage and disadvantage based on such classifications (e.g., Bolin, et al., 2005; Boone et al., 2009; Hoeschler, 2003). Racialized groups, for example, may be spatially segregated, denied social services, excluded from work opportunities, and forced to occupy unsafe and hazard prone spaces that privileged groups can avoid (Maskrey, 1994; Wisner et al., 2004). Such racially and spatially marginalized groups can also be denied access to necessary resources to cope with disaster losses, deepening their vulnerability to future hazard events (Collins, 2010; Mustafa, 2005).

10.2.2 Class and Political Economic Crises

While an in-depth understanding of ethnicity may be more the domain of social anthropologists than sociologists (Oliver-Smith, 1996), the opposite holds for studies of social class. To be sure, social class cuts across and is inextricably bound up with race, as one is always class situated, whatever other determinants of social positionality may be simultaneously at work. Class theory, particularly in its Marxist and poststructuralist forms, is both complex and at the center of a variety of theoretical developments (Gibson-Graham, Resnick, & Wolff, 2001; Glassman, 2003; Harvey, 2014). While there are a number of approaches to class and economic positionality, here we use class as a trope for aspects of an agent's dynamic position in processes of economic and social production and reproduction. In Marxist terms, classes are elements of the social relations of production, which include not only people's primary productive activities, but also patterns of ownership, the appropriation and distribution of surplus value, and the legal and cultural systems and practices which justify and reinforce existing class inequalities (Harvey, 2010a, b). In this sense, classes are processes that extend beyond the 'economic' in any narrow and essentialist reading. As Glassman (2003, p. 685) writes, "… classes are always already constituted as economic, political, cultural, and ideological entities – including being gendered and racialized in specific ways…"

It is common in the social sciences for people to be assigned class position based on a variety of quantified indicators, including income, occupation and education. Other scholars focus on relational factors such as position in the extraction of surplus value, ownership patterns, and labor market position (Glassman, 2003). Class processes are connected to a complex range of issues, from political and economic power and job security to modes of consumption, identity formation, subjectivities, legal rights, and sociospatial processes (Bourdieu, 1984; Harvey, 2014). The latter include a range of issues from labor and housing segregation to land use patterns and the distribution of hazards.

As with the other concepts discussed here, class processes and class composition should be understood as historically constructed, overdetermined, contingent, and dynamic (Glassman, 2003). With class, change can be pronounced as

dominant regimes of accumulation shift with political economic crises and as localized class struggles crystallize over specific issues (Harvey, 1996; Smith, 2008). In the US and many other multi-racial societies, class and race are bound up together, a historical effect of racially exclusionary practices in education, housing, access to resources, sectoral employment, and the formation of industrial working classes in the US. The pervasive effects of these practices remain today as evidenced by income, poverty, and unemployment data and segregated urban landscapes (e.g. Boone et al., 2009).

The structural instability of class position in the context of a crisis-prone capitalist system is perhaps most visible with the economic restructuring in the US beginning in the 1970s and the ascendency of a hegemonic neoliberalism. This restructuring produced the 'de-proletarianization' of significant fractions of the US industrial working class as jobs and factories were moved toward non-union, low wage regions of the US and to the global South (Harvey, 2005; Soja, 1989, 2000), accompanied by the growth of insecure, low-wage, part-time, and service sector employment. It also produced geographic shifts in employment opportunities, weakened trade unions, reshaped industrial and residential landscapes, and reduced real incomes for significant fractions of the working class (Castree, 2009; Davis, 1992; Yates, 2005). It has also engendered a historically unprecedented job and wage squeeze on the middle and working classes over the last two decades (e.g., Harvey, 2005; Piketty, 2014; Soja, 2000). And these pressures are disproportionately impacting people of color, where by 2005 in the US more than 30 percent of black workers and 39 percent of Latino workers earned poverty wages or below (Yates, 2005). According to the Bureau of Labor Statistics, as of 2013, twice as many black and Latino workers were in poverty compared to whites,[3] and the net wealth of white US households was approximately 20 times that of black households and 18 times that of Latino households.[4] The upshot of these kinds of statistics is that the nature of economic vulnerability, which can shape hazard vulnerability, is changing and assumptions about the security of the middle class in disaster planning and recovery can no longer be taken for granted (see Bolin, Hegmon, Meierotto, York, & Declet, 2013). With neoliberalism being imposed on indebted Third World countries through the World Bank and the World Trade Organization, social inequalities and processes of marginalization are being intensified in the global South as well (Peet & Watts, 2004; Smith, 2008). The imposition of 'free market discipline' through structural adjustment programs has produced growing income inequalities, declining wages, reduced social protections and services, privatization of common property resources, the dispossession of peasants, and increased ecological disruptions (Davis, 2006; Harvey, 2010b; Robbins, 2012). These transformations lead to increased vulnerability to hazards through environmental degradation from resource exploitation, land grabs, displacement of the poor onto marginal lands, and a decline in social protections offered by the state (Bankoff et al., 2003; Collins, 2009; Hutanuwatr et al., 2012). Class, and the larger political economic relations which shape class processes are a key, if neglected, part of understanding disaster. Class positionality connects closely with the types of resources people have available for use in crises, the types of public resources available, and has a strong spatial dimension often linked to occupation of hazardous areas (Collins, 2009; Wisner & Walker, 2005).

To sum up to this point, race and class, are theoretically complex signifiers of social processes that involve struggles over legal and political rights, access to resources, livelihoods, and safe environments as well as the constitution of social identities (e.g., Peluso & Watts, 2001). The combined effects of these factors are linked to sociospatial processes in disasters as shown in the research literature (Mustafa, 2005; Wisner et al., 2004). In the following sections we will

[3] http://www.bls.gov/opub/reports/working-poor/archive/a-profile-of-the-working-poor-2013.pdf.

[4] http://inequality.org/99to1/facts-figures/.

discuss selected research on how these concepts have been utilized in disaster and vulnerability research.

10.3 A Brief History of US Disaster Research on Race and Class

The US disaster research tradition arose from the same postwar milieu that encouraged white immigrant-driven theories of racial assimilation noted above. Some of the earliest disaster studies were the Strategic Bombing Surveys of World War II, conducted to understand the 'morale' of civilian populations subjected to sustained bombing attacks (Mitchell, 1990). This general interest carried over into the Cold War, where research, funded by the military, was conducted on civilian disasters. A 'sociological perspective' on disaster emerged in a series of studies funded by the Army Chemical Center and conducted by the National Opinion Research Center (NORC) at the University of Chicago (Drabek, 1986). Disaster research in the US became institutionalized with the establishment of the Disaster Research Center (DRC) at Ohio State University in 1963 by sociologists Quarantelli and Dynes (Dynes & Drabek, 1994).

During this period, US-based researchers produced a series of monographs and other case studies on various disaster 'events' (see Bolin, 2006, for a review). The newfound sociological interest in racial/ethnic assimilation, however, did not extend to this civil defense oriented research, which largely ignored differential responses to disaster across diverse populations in favor of strategically-oriented estimates of universal behavior (Tierney, 2007). Some studies, however, (e.g. in Bates, Fogelman, Parenton, Pittman, & Tracy, 1963; Clifford, 1956; Moore, 1958), did report some differential disaster impacts, such as Moore's *Tornadoes over Texas* (1958). Moore reported findings on a limited number of blacks and Mexican Americans who turned up in his sample. Moore, for example, found that blacks had disproportionate losses from a tornado and consequently had greater need for external assistance to recover (as did the elderly in his sample). He also found that blacks had a higher injury rate than whites, a finding echoed in Bates, et al. (1963) which found that blacks had significantly higher mortality than whites after Hurricane Audrey. These are among the earliest findings suggesting that to be black and poor in the US was associated with disproportionate environmental risk, although such conclusions were not highlighted in the studies. These studies demonstrate the strong interest in warning, emergency response, and evacuation behavior in early disaster research (see Drabek, 1986 for a review), as well as the impulse to generalize and systematize findings irrespective of their fragmentary nature and simplistic understanding of complex social constructs.

It was not until the 1970s that the first studies on reconstruction and recovery were conducted, driven by new interest in demographic differences in disaster response. The expansion and theoretical elaboration of disaster research were abetted by the publication of the first major assessment of hazards and disaster research in the US in the early 1970s, a work that brought together much of the sociological and geographical research available to that time (White and Haas, 1975). This work, under the leadership of the hazards geographer Gilbert White, helped establish an agenda for new hazards and disaster research that would appear over the next two decades (Mileti, 1999; White & Haas, 1975). Part of this new agenda for hazards research of the 1970s included studies focusing on racial, ethnic, and socioeconomic differences in disaster response.

Some of the first explicit discussions of class issues (mostly concerned with poverty) and race come in discussions of a catastrophic flood in South Dakota as part of the Haas et al. reconstruction study. Class (as socioeconomic status) and racial differences in access to assistance, victim experiences in temporary housing, and general recovery processes were discussed (Haas, Kates, & Bowden, 1977). A historical analysis of the 1906 San Francisco disaster, as part of the reconstruction research, highlighted the changing pattern of ethnic and racial segregation in the city as it was rebuilt, marking an important early

example of historical geographical disaster research concerned with race and ethnicity. Other reconstruction research in this era compared household recovery in Nicaragua and the US. That study emphasized important class/socioeconomic and cultural/ethnic dimensions in accounting for different household recovery strategies (Bolin & Trainer, 1978). The primary limitation of cross-sectional survey research of this sort is that while race, class, and ethnic differences can be measured and their independent statistical effects can be controlled for, why those differentials exist, how they came about, and how they manifest themselves over time cannot be addressed. As discussed extensively in environmental justice studies, the focus on the relative statistical effects of race versus class obscures any understanding of the concrete ways that race and class are bound together and embodied in human subjects, structuring people's everyday lives, including where and how they live, and their particular ensembles of capacities and vulnerabilities (Holifield, 2001; Pulido, 1996).

US disaster research in the late 1980s and 1990s began to engage with more critical approaches to race and class. The 1989 Loma Prieta earthquake in Northern California provided opportunities for researchers to examine specific race, class, and ethnic issues. Several Loma Prieta studies approached their research ethnographically, providing detailed descriptions of how vulnerable and marginalized groups coped with the aftermath of a destructive earthquake (Bolin & Stanford, 1991; Laird, 1991; Phillips, 1993; Schulte, 1991). Each of these studies investigated processes of political, social, and cultural marginalization that systematically disadvantaged African Americans and Mexican Americans in a variety of ways, from housing assistance to political representation. These studies documented how federal assistance programs consistently failed to meet the needs of the homeless, Latino farmworkers, and low income African Americans. Their results illustrated the specific ways that class, race, and ethnicity articulate ways in actual disaster processes, something that conventional quantitative surveys could not.

A series of studies of Hurricane Andrew (1992) in Florida, although not using the explicit language of racial formations and racial projects, stands as an early example of US disaster studies that examined racial projects in the context of vulnerability and disaster, providing both quantitative scope and ethnographic depth (Peacock, Morrow, & Gladwin, 1997). This research offered theoretically informed discussion of race, class, gender, and poverty dynamics, explored in a series of case studies (Peacock et al., 1997). Grenier and Morrow (1997) offered a historical overview of the development of the Miami urban region to show how processes of political and economic marginalization were creating at-risk people and communities, especially for Caribbean immigrant groups and African Americans. Throughout the Hurricane Andrew case studies, the authors highlight how race, ethnicity and class inequalities shaped people's experiences, from impact related losses to access to assistance, inequities in insurance settlements, the effects of pre- and postdisaster racial segregation, and the calamitous effects of disaster on an already marginalized and impoverished black community (Dash, Peacock, & Morrow, 1997; Girard & Peacock, 1997; Peacock & Girard, 1997; Yelvington, 1997).

Each of these studies documents how already existing social conditions in greater Miami shaped the contours of disaster and the ways that marginalized populations variously endured continuing or increased disadvantages in the recovery process (see Dash et al., 1997). However, the research also demonstrates that race or ethnicity by itself is not an adequate explanatory element: what matters is how these factors (and immigration status, gender, and age) intersect in spatially specific ways to shape a person's class locations and their access to social and economic resources (e.g., Yelvington, 1997). That is, race, ethnicity and other 'identity' factors are intertwined with class processes and the privileges or disadvantages that flow from these converge to shape a person's vulnerability to hazard events.

Both the Hurricane Andrew work (Peacock et al., 1997) and research on the Northridge earthquake (Bolin & Stanford, 1998a, b, 1999) situate their respective disasters in the context of historical, spatial, and political economic processes in urban space, and focus on the particular ways social inequalities develop and shape people's vulnerabilities to disaster. This marks a convergence with vulnerability research approaches discussed below (e.g. Hewitt, 1983a, b, 1997),[5] but these studies are only examples and point to the need for greater attention to historical context and lived experience in the field as a whole. Ultimately, the challenge for disaster researchers is to approach race (and ethnicity) as complex and contested social constructs that form the axes of a variety of historical and contemporary social struggles across a range of scales (Feagin, 2015; Feagin & Cobas, 2014).

Given the often technocratic, expert-knowledge driven, policy focus of disaster research, it is not surprising that many 20th Century researchers were not engaged in extended theoretical discussions and qualitative unpacking of their key terms. However, to provide a richer, more contextualized understanding of racial and class disparities requires more attention to theorization and historical geographic processes that have produced racialized and class segregated landscapes (Harvey, 1996; Smith, 2008; Walker, 2012). Moreover, the complex mechanisms by which certain racial and ethnic categories of people are disadvantaged in relation to hazardous environments will remain invisible as long as researchers are concerned with statistical **differences** between groups rather than the pervasive social **inequalities** that produce measured difference to begin with (Holifield, 2001). That is, while identifying statistical differences may illustrate current racial inequalities, quantitative approaches too often fail to explore the mechanisms whereby spatial inequalities in hazard exposure are produced over time. Attention to the historical and geographical mechanisms that create segregated and unequal spaces, and disadvantage some groups over others in disasters, has distinct policy implications. Specifically it helps identify the root causes of vulnerability by race and class which hazard policy can then begin to address (see Wisner, et al., 2004).

10.4 Race, Class, and Vulnerability in Disasters

This review features disaster research characterized by a consideration of people's social vulnerability in relation to hazard agents. In particular, we focus on several notable disasters, including the Indian Ocean tsunami and Hurricane Katrina as key points in the treatment of race/ethnicity, class, and vulnerability in disaster studies.

10.4.1 Inequalities, Vulnerability and Disaster

Vulnerability analysis, beginning with its classic statement by Hewitt et al. in 1983, distanced itself from the dominant, technocratic approach to disaster by engaging in an extended critique of the conventional disaster management and research (e.g., Hewitt, 1997; Susman, O'Keefe, & Wisner, 1983; Watts, 1983). Vulnerability theories posited that the dominant view of disaster in the 1980s over-focused on the physical aspects of the hazard and sought technocratic and engineering solutions to disaster rather than social and political economic changes. The emphasis on physical hazards and management solutions "…directs attention away from the social factors implicated in disaster, including poverty, gender inequality, the lack of entitlements, economic underdevelopment, and ethnic marginalization. Such conditions are endemic

[5]We note that there are important theoretical and methodological convergences *and* differences between vulnerability studies and the recently emerged resilience approach to research on hazards and disasters, but a discussion of resilience is beyond the scope of this chapter (see Eakin & Luer (2006) for a review of both). Both types of studies use the term 'vulnerability' frequently, although not interchangeably, and some studies blend the two approaches (e.g. Hutanuwatr et al., 2012).

problems of everyday life for a large segment of the world's population…" (Bolin & Stanford, 1998a, p. 6). The original critique of Hewitt et al., and a series of critical exchanges since, have produced a lively, if not always productive, debate among disaster researchers of different theoretical and disciplinary positions (e.g., Eakin & Luer, 2006; Hewitt, 1995; Quarantelli, 1995; Wisner et al., 2004).

In general terms, vulnerability research examines political, economic, and sociospatial processes of marginalization that not only produce or intensify poverty, but that also may constrain certain portions of a given population (often marked by class, race, or ethnicity) to occupy hazardous areas and structures through segregation mechanisms. Prime examples can be seen as in the proliferation of unsafe, unplanned, and impoverished squatter settlements in many of the world's major urban centers and the lack of concern and consideration shown to such populations by planners and developers (Davis, 2006; Mustafa, 2005).

Wisner et al. (2004) provide a detailed discussion of vulnerabilities across a range of hazards under a variety of specific spatiotemporal conditions. At the core of their analysis is a processual model of vulnerability accumulation and the production of differential environmental risks, termed the Pressure and Release model (PAR). In their model, hazard vulnerability is understood as a historical geographical process comprising three linked elements: root causes, dynamic pressures, and unsafe conditions. The underlying causes refer to the general historical, political, economic, environmental, and demographic factors that produce unequal distributions of resources among people by a variety of positional factors, including race and class. These processes generate social vulnerability through such things as rapid urbanization, environmental degradation, economic crises, structural adjustment programs, political conflict, and poorly planned and executed development programs (Peet & Watts, 2004). As a result, unsafe conditions are created including both spatial location and characteristics of the built environment. These unsafe conditions also include fragile livelihoods, inadequate incomes, legal and political inequities and a lack of social protections offered by the state (Hutanuwatr et al., 2012; Mustafa, 2005).

10.4.2 The 2004 Indian Ocean Tsunami

Research on the massive and highly destructive Indian Ocean tsunami of 2004 has highlighted uneven development and social vulnerability in disaster. The scope and scale of the tsunami was unprecedented, with the sea waves generated by the magnitude 8.9 Sumatra earthquake heavily damaging coastal areas in 14 countries, killing more than 230,000 people and displacing millions more as many coastal communities were literally washed away (The World Bank, 2006; UNDAC, 2005; UNEP, 2005). Many of those who died or were displaced were among the most vulnerable, living in insecure structures with marginal livelihoods, mired in deep poverty in states that provided few if any social protections (Birkmann & Fernando, 2007; Telford & Cosgrave, 2006). Given the large cultural, political, and geographical diversity of the impact zones and highly uneven patterns of development, generalizations about the tsunami and its aftermath are difficult to make. We focus our remarks on a case study of disaster recovery in Thailand to illustrate class and ethnic factors in vulnerability and recovery.

The most heavily damaged area in Thailand was along the west coast, an area that includes major tourism destinations. Of the 8200 tsunami deaths in Thailand, some 2400 were foreign nationals, mostly tourists (Telford & Cosgrave, 2006). The tsunami also heavily impacted the Thai fishing fleet, putting more than 30,000 subsistence, small scale, and commercial fishers out of work for extended periods of time and

complicating recovery (UN Thailand, 2008). Much of the recovery effort in Thailand was led by a top down, inflexible, state-centered program that prioritized the tourism industry over local small scale economies and failed to deal adequately with an ethnically and economically diverse impact region (Hutanuwatr et al., 2012).

Using Wisner et al.'s Pressure and Release model (PAR), the Hutanuwatr et al (2012) study traced the historical geographical development of their case study community, a village that went through considerable ethnic and development changes in the decades preceding the disaster. One area of the village had historically been occupied by an indigenous ethnic group known colloquially as 'Sea Gypsies' or Moken: semi-nomadic subsistence fishers who are ethnically distinct from Thais and subject to substantial discrimination, including denial of citizenship and denial of official disaster assistance (Stechkley & Doberstein, 2011). Although the Moken had occupied the area long before ethnic Thais moved in, they lacked any official land tenure, a significant factor in their marginalization. The village of 6000 had approximately 1500 deaths in the tsunami and approximately 80 percent of built structures and fishing facilities were destroyed.

To condense a very detailed vulnerability study, we note some key findings in Hutanuwatr et al. (2012). A primary tension in recovery programs across Thailand was between the government's interest in restoring and expanding tourist industry (and foreign investment under free trade agreements), and local communities' interests in restoring fishing and subsistence livelihoods and reducing risks through a variety of mechanisms. In the case study community, the technocratic, top-down programs promoted by most NGOs and the government failed to consider the ethnically and class diverse population and likewise failed to address the underlying political economic conditions that shaped local vulnerability (Chalermpak & Sriyai, 2006). That is, inflexible government programs failed to restore appropriate housing in appropriate locations, did nothing to enable a return to fishing livelihoods, and similarly denied all assistance to the hard hit Moken. Given these programmatic recovery failures, a grass roots organization, the Community Coastal Center, stepped in, using a collaborative, participatory, democratic approach. The Center developed recovery programs that accounted for the economic and cultural diversity in the community and began to address underlying conditions that created marginal livelihoods and exposure to environmental hazards (The Network of Tsunami-Impacted People, 2005). The Center incorporated ethnic diversity into its program, improved housing conditions and land use, and engaged in political action at multiple scales. This included pushing for new rights for the indigenous Moken by pushing back against the Thai Nationality Law which denied them citizenship (Network of Tsunami-impacted People, 2005; Hutanuwatr et al., 2012). Thus, their collaborative approach engaged in a vulnerability reduction process by enhancing local livelihood opportunities through occupational training, gaining access to resources for the economically marginalized, enhancing local political cooperation, encouraging cultural diversity and tolerance for indigenous people, and developing disaster preparedness programs. While the case study focuses on a single village it illustrates a suite of recovery issues that typifies many coastal communities in Thailand.

10.4.3 The 2006 El Paso/Ciudad Juarez Floods

In US disaster literature, Collins offers a recent example of theoretically informed research on processes of marginalization and the production of vulnerability in the El Paso/Ciudad Juarez floods of 2006 (2009, 2010). His work is notable because it is grounded in Marxist urban political ecology, vulnerability theory, and environmental justice, and has a focus on a large cross-border urban area. It illustrates the ways social power can marginalize low income groups while producing social benefits and enhanced environmental security for privileged classes. The flood disaster in this case was instantiated by a 10 day period of unprecedented rains (twice normal

annual rainfall) which had widespread cross-border effects particularly on low income Latinos and Mexican citizens in both cities. On both sides of the border, those living in informal housing settlements suffered extensive losses and had access to few if any recovery resources.

Collins' work offers a critical assessment of the marginalization literature in vulnerability studies by arguing that it is not always only the poor and racialized minorities who occupy high hazard zones in an urban hazardscape. While El Paso, in aggregate, lacks the abject poverty of the poorest neighborhoods of Ciudad Juarez, it nevertheless hosts some 150 very low income *colonias.* These are quasi-informal settlements in unincorporated areas lacking any infrastructure and housing approximately 70,000 of the most socially vulnerable people in the area, virtually all of whom are of Mexican ancestry or Mexican nationals without US documentation (Collins, 2010, p. 269). While the *colonias* on the Texas side were inundated in the floods and experienced severe housing losses, they did not occupy the highest hazard zones. Rather, as Collins shows, the rugged, steep, hazard-prone hillsides and *arroyos* of the Westside area of El Paso were occupied by the wealthiest classes, people who voluntarily live in hazardous terrain in exchange for the environmental amenities such terrain offers: panoramic views, clean air, low density neighborhoods, and easy access to mountain recreation. As Collins (2009) observes, the terrain occupied by the wealthiest on the Texas side is directly analogous to the terrain occupied by the poorest across the border. That the wealthy in the global North sometimes seek out hazardous terrain for housing due to compensatory environmental amenities also has been noted in studies of wildland-urban interface fires (Collins & Bolin, 2009; Davis, 1998).

Collins argues that in both fire and flood cases, voluntary exposure to hazards is facilitated by class privilege which is used to extract social and infrastructural protections from the state to reduce risks associated with voluntary exposure. Collins (2009, 2010) develops the notion of *facilitation* to describe the inverse of marginalization and show how the wealthy can mobilize publicly funded protections (flood channeling, dams, levees, emergency management services, flood insurance) to minimize their potential losses in high risk zones while shifting negative externalities and the financial burdens of protections onto lower income groups who do not benefit from equal expenditures.

In the El Paso floods, the privileged classes living in the hazardous landscapes of the west side of the city, were well protected by (federal) flood insurance as well as extensive infrastructural developments made at public expense to channel and control floodwaters. In the aftermath of the floods, special programs were initiated, at public expense, to facilitate restoration and remediation of flood damage in Westside neighborhoods. However, in the *colonias*, few residents could or would take advantage of FEMA programs (Collins, 2010). Those in the country without documentation were not eligible, and others were fearful of applying or could not qualify due to the informal nature of their housing. Inexplicably, FEMA initially offered flood assistance information only in English (Collins, 2010, p. 279) denying non-English speaking residents information on their federal assistance entitlements. Furthermore, rather than enhancing infrastructural protections against floods as was done in wealthy Westside neighborhoods, lower income neighborhoods went through 'buy-out' programs, displacing and relocating residents on the premise that buying up low value property was more economically efficient than increasing flood mitigation. The asymmetries of such class and race based public expenditures on hazard mitigation and recovery assistance raises significant justice issues, given the disproportionate flow of resources to the wealthiest residents and away from the most vulnerable with their unmet recovery needs.

10.4.4 Hurricane Katrina

Hurricane Katrina in 2005 was another major turning point in the development and use of vulnerability approaches to disaster research in the US. The failure of structural engineering

safeguards such as flood levees in combination with a category 3 hurricane killed approximately 1800 people (estimates vary), displaced an additional 1.5 million residents, and did $108 billion worth of 'property damage' (Knabb, Rhome, & Brown, 2006; Weber & Messias, 2012) – a clinical and distant term for the often near-total destruction of homes and businesses. As briefly outlined in the introduction to this chapter, the aftermath of Katrina in New Orleans and across the Gulf Coast in Mississippi, Georgia, and Alabama prominently displayed the effects of historic systems of inequality based on race and class through the lens of a disaster. Access to evacuation, pre-disaster preparedness, the distribution of post-disaster recovery resources, and even the grimmest of outcomes such as mortality rates and physical and mental trauma were fractured along racial and class lines (Cutter et al., 2006; Elder et al., 2007; Elliott & Pais, 2006; Laska & Morrow, 2006; Sastry and VanLandingham, 2009).

Faced with media depictions of residents, the majority of whom were African American, stranded in their homes by historic flooding or sheltering *en masse* in the Superdome and entirely without the resources to meet basic needs, disaster researchers as well as the public were confronted with the realities of inequality within the United States: visible, insistent, and unambiguous vulnerability in a city with a long and troubling history of racial divisions and exclusionary practices and politics (Dyson, 2006). Even the earliest research on the aftermath of the storm strongly highlighted differences in Katrina's effects that reflect the racial and class history and realities of New Orleans as a city. Elliott and Pais (2006) used an environmental justice and vulnerability-based framework to situate their research, beginning with a historical review tracing the declining importance of New Orleans and other Gulf cities as economic booms brought other regions of the South to prominence. The relative unimportance of Gulf cities to industries and economies other than oil prevented the kind of economic prosperity and migration to these cities that might have transformed deeply rooted systems of racism and classism; systems that were reflected in post-disaster recovery outcomes in the wake of Katrina (Elliott & Pais, 2006). For many people in New Orleans, life before the storm was already an emergency—a struggle for survival and prosperity against constant marginalization (Cutter et al., 2006).

Racial and class disparities during and after Hurricane Katrina are well-documented in the disaster literature. Evacuation orders were less likely to reach, less likely to be trusted by, and less likely to be followed by persons of color and lower-income residents in New Orleans than more affluent and white residents (Brodie, Weltzien, Altman, Blendon, & Benson, 2006; Elder, et al., 2007; Lachlan, Burke, Spence, & Griffin, 2009; Messias, Barrington, & Lacy, 2012). Evacuation decisions were also a matter of resources. In addition to being less likely to have access to reliable transportation like a personal vehicle, lower-income and non-white residents stayed in the city due to reliance on the local public hospital system, because they needed to care for someone who was unable to leave, or because they were concerned that police would not protect their property and communities if they evacuated (Brodie, et al., 2006; Elder et al., 2007). Studies of recovery after the storm have found that rates of post-Katrina mental illness are higher (Rhodes et al., 2010; Sastry and VanLandingham, 2009), and employment and resettlement rates are significantly lower, for low-income and African American residents (Elliott, Hite, & Devine, 2009; Elliott & Pais, 2006; Fussell, Sastry, & VanLandingham, 2010; Kates, Colten, Laska, & Leatherman, 2006, Sastry, 2009; Zottarelli, 2008). The slower rates of return migration for non-white and low-income residents in part reflects greater housing and property damage from flood waters and delays in rebuilding flood protection structures in low-income areas (Elliott et al., 2009; Fussell, et al., 2010; Green, Bates, & Smyth, 2007; Sastry, 2009), highlighting the intersection of social processes, particularly racism and classism, which shape exposure to biophysical hazards like flooding (Kates et al., 2006). These intersections of social inequality and hazard

exposure are "the products of an enduring system of southern apartheid, involving racial segregation and consequent established patterns of community settlement of people of color into less desirable, low-lying, flood prone environments" (Adeola & Picou, 2016, p. 2).

The repeated message of study results—that race and class were highly consequential before, during, and after the hurricane—demonstrate that Katrina only provided a stage on which existing vulnerabilities played out. From the timing of the evacuation (two days before first-of-the-month paychecks arrived) to which residents returned to their damaged or destroyed homes after the floodwaters receded (lower-income homeowners, bound by mortgages and without other options), everything about the storm showcased the racialized and discriminatory processes that generate inequality (Cutter et al., 2006; Dyson, 2006; Elliott & Pais, 2006). These findings "refute the apparent randomness of natural disasters as social events" (Elliott & Pais, 2006, p. 317).

The race and class inequalities that formed the initial focus of Hurricane Katrina studies were often, although not always, explicitly situated in the tradition of vulnerability analysis developed by Hewitt et al. and stemming from political ecology's critical Marxist approach (see Cutter et al., 2006; Elliott & Pais, 2006; Laska & Morrow, 2006). In the years following, however, additional research on the political, economic, social, and physical effects of the hurricane has contributed not only to our general knowledge on disaster recovery, but further revealed processes and patterns of social inequality that are visible only in the long term. These studies have further developed our understanding of vulnerability to disaster, drawing greater attention to the unevenly distributed effects of post-disaster recovery efforts and the unintended consequences of resettlement and regrowth.

Despite personal and community hopes that the recovery process would provide an opportunity for positive social change (Weber & Messias, 2012), research on recovery from Katrina indicates that, instead of reducing inequalities and increasing access to resources and power for vulnerable peoples, the recovery process itself has for many constituted a second-order disaster (Adams, 2013; Elliott, et al., 2009). Facing budget cuts and other forms of economic deprivation from strongly neoliberal government institutions, disaster relief charities and other non-profits reify the vulnerability of communities based on racial and class categories in order to justify their expenditures and resource requests – a self-referential system that is both driven by and reinforces social inequality (Adams, 2013). This interstitial system of disaster relief was made necessary in part by the delayed and uneven distribution of federal recovery funds by state and local governments, which prioritized economic expansionist projects over socially-oriented interventions like the reconstruction of low-income housing (Weber & Messias, 2012). In New Orleans, a lack of comprehensive and unified post-Katrina planning exacerbated the problems of recovery still more, as residential neighborhoods in less flood-prone areas were haphazardly prioritized for reconstruction, de facto privileging whiter and more affluent areas of the city during recovery efforts (Kates et al., 2006). Even when neighborhoods were rebuilt relatively quickly after the storm, as in the case of the historically racially diverse Uptown district, the average higher incomes of white residents allowed for faster return migration (Elliott, et al., 2009). The quick pace of return by high-income white community members prompted an influx of displaced friends and relatives into recovered areas, further restricting opportunities for return migration by lower-income residents (largely African-American), as those without financial means to rebuild immediately were often forced to wait for external aid from organizations like the Red Cross or FEMA (Elliott et al., 2009).

External aid from non-profit or charitable organizations after Katrina has been another mechanism by which racial and class-based divisions are manifested. Adam's ethnography of post-Katrina New Orleans (2013) finds that normal social and economic structures were replaced by what she terms an 'affect economy', wherein recovery services relied on unpaid compassionate labor to fulfill needs that

profit-driven capitalist markets had no incentive to meet. This affect economy fragmented along lines of perceived morality: only the deserving receive help, while only the virtuous provide it (Adams, 2013). Weber and Messias (2012) examine the experiences of disaster recovery workers—those whom Adams might call 'the virtuous'– using an intersectional feminist framing that emphasizes the overlapping identities of race, class, gender, and illuminates the processes by which neoliberal power was consolidated via political and economic means during recovery. Their results show the personal consequences for recovery volunteers of working within the already over-stretched social safety nets in low-income communities in Mississippi. Overwhelmed by continuous requests for basic assistance, without the resources to meet these needs, and often asked to perform services well beyond the scope of their organization, recovery workers, who were themselves already disproportionately drawn from vulnerable populations, paid the cost of recovery in their own mental and physical health and well-being (Weber & Messias, 2012). These workers, particularly women and persons of color, were frequently trapped in powerless 'middle' positions, unable to meet the needs of their communities but also excluded and silenced when attempting to advocate on behalf of those suffering to more powerful state and corporate actors (Weber & Messias, 2012). Weber and Messias' work is an excellent reminder that the type of biophysical and social vulnerability created and reinforced by race- and class-based power structures is pervasive in all aspects of disaster and not limited to those most affected by the storm.

Race, class, and vulnerability form the theoretical touchstones of the literature on Hurricane Katrina. Although not all of the studies on Katrina undertake the fully historical, process-oriented analytical approach of vulnerability in its most critical form, the nearly universal attention to race and class marks a major turning point in the adoption of vulnerability concepts into mainstream US disaster literature. Whether using highly contextual qualitative methods to understand mechanisms by which disaster relief services were accessed by non-English speaking residents (e.g., Messias, et al., 2012), compiling quantitative indices of recovery in New Orleans (e.g., Finch, Emrich, & Cutter, 2010), or investigating the rise of neoliberalism after the floodwaters receded (e.g., Adams, 2013), race and class disparities are not only centered in the Katrina literature, they are integral pieces of a normative call for greater equity and justice in disaster policy and beyond.

In sum, vulnerability research emphasizes political economic inequalities and processes of racial, class, and spatial marginalization in relation to risks from environmental hazards. It also stresses the importance of historical political economic factors in the production of inequalities and their links to land use patterns (Gentile, 2016). The evidence from vulnerability studies is that disasters are produced and shaped by everyday expressions of the political economy and social relations in a given place, and should be understood as an extension and exaggeration of normal conditions. The central focus of vulnerability studies on the historical dynamics of social inequalities and their expressions in sociospatial patterns has an affinity with approaches used in the environmental justice literature, and it is to that topic we turn in the conclusion.

10.5 Race, Class, and Environmental Justice

Prior to Katrina, environmental justice (EJ) literature directed its attention primarily to technological hazards and disasters and to the unequal burdens that marginalized groups bear, placing it outside of more traditional disaster research and its focus on acute 'events' (e.g. Bullard & Wright, 2009). In this concluding section, we highlight a few themes of the EJ literature and briefly examine some suggestive examples from the literature, including a discussion of radiation hazards on the Navajo Nation.

Environmental justice literature examines inequalities by race and class in the exposure to and health impacts of environmental hazards across a range of spatial and temporal scales. The EJ literature, places the subjects of this chapter– race and class inequalities– at the center of its theoretical and empirical concerns (e.g. Walker, 2012). While much of the literature examines routine and chronic exposure to hazardous agents, technological crises like the Bhopal India chemical disaster, the Chernobyl nuclear reactor explosion, and the recent Fukushima Daiichi nuclear disaster all raise important environmental justice issues (Kyne & Bolin, 2016).

While much disaster research, almost by definition, has used a temporally bracketed 'extreme event' focus (e.g. Quarantelli, 1994), environmental justice research examines the chronic and routine environmental hazards that people live with in their daily lives at a variety of spatiotemporal scales (e.g. Grineski, Bolin, & Boone, 2007). At the core of EJ is a concern with distributional justice– how environmental risks are distributed in space, and how marginalization based on race and class produces differences in exposure. It also examines procedural justice concerns: the historical, geographic, and institutional processes that have promoted inequalities in people's exposure to these negative externalities (e.g. Collins, 2009). While there are exceptions such as in the case of Katrina and the El Paso floods (Bullard & Wright, 2009; Collins, 2010), EJ studies, in contrast to disaster research, typically deal with risks that are difficult to detect and with contested health impacts: toxic chemicals in the air and water, ambient air pollution, contaminated foods, radiation exposure, urban heat, resource depletion, climate change effects, and so forth. For those enduring chronic involuntary exposure to chemical toxins, hazardous waste sites, or depleted aquifers, however, the experience of daily life may feel an ongoing disaster even without overt physical losses (e.g. Fradkin, 2004; Gibbs, 2012). Contemporary urban disasters can involve a complex mix of the effects of a physical agent (earthquake, flood) and technological hazards, producing what Pritchard (2012) calls an 'envirotechnical disaster' or a 'cascade' of disasters, one hazard triggering another (Kumasaki, King, Arai, & Yang, 2016). For example, as Katrina studies have shown (e.g. Bullard & Wright, 2009) flood waters from breached levees were heavily contaminated by inundated hazardous waste sites and sewage, increasing risks of environmental illnesses.

Nuclear disasters provide an example of the complicated mix of technological disaster, unclear temporal scale, and often subtle but consequential health effects that environmental justice framings are well-suited to explore. While nuclear disasters like Fukushima Daiichi debacle in 2011 (still ongoing) may attract substantial media interest and raise significant EJ concerns, other nuclear contamination 'events' unfold over time and lack any signal event like a nuclear meltdown or large scale evacuation (Funabashi & Kitazawa, 2012; Kyne & Bolin, 2016). For example, the accumulation of now more than 80,000 tons of plutonium contaminated spent fuel rods at US civilian nuclear reactors constitutes and environmental health threat that is measured in tens of thousands of years. This risk is magnified since there is as yet no safe permanent storage of this extremely hazardous waste, most of it currently being stored on site at poorly secured reactor sites (Kyne & Bolin, 2016). Yet such chronic nuclear risks receive little if any media attention, in the absence of an acute release of radiation.

10.5.1 Radiation Hazards and Justice on the Navajo Nation

The Navajo Nation in the US Southwest has had to deal with the legacies of radiation contamination and its health effects for decades and only recently has it received assistance from the US Environmental Protection Agency (EPA) for hazard mitigation (Pasternak, 2014). Initial radiation exposure on the reservation began in the 1940s with extensive uranium mining operations

to support the US nuclear weapons program. In the course of 40 years more than 4 million tons of ore was extracted from Indian lands by Navajo miners. In the process miners were exposed to radon gas and other radioactive substances while communities across the reservation were exposed to dust and water contamination from large piles of mine waste and the tailings from uranium ore milling operations (Arnold, 2014). In addition, the Navajo Nation also received direct radioactive fall-out from the US nuclear surface testing program in Nevada (1950-1962), producing additional negative health effects from downwind radiation exposure (Kuletz, 1998). The legacy of this 'nuclear colonialism' is that today the 27,000 sq. mi. reservation has more than 500 unremediated mine and mill tailing sites. All emit varying levels of ionizing radiation and leach radioactive substances into groundwater with a variety of probable health effects including lung cancer (unheard of among the Navajo prior to the 1940s), kidney disease and a variety of other health complications (Arnold, 2014). Although uranium mining ceased on the reservation in the 1980s and was banned in 2005, the health effects persist across generations exposed to these radioactive releases. Nor are these issues limited to just the Navajo Nation but rather affect tribes across the US West.[6]

From an EJ perspective, the casual disregard of Indian miners and their families' health by corporations, the decades of delay in federal compensation for radiation exposure victims and in EPA clean-up and hazard mitigation all speak to the marginality of American Indians in these matters (Kyne & Bolin, 2016; Masco, 2006). While not a disaster in the sense of being a single hazard event, it nevertheless represents a protracted radiation exposure process, one whose effects persist and are felt most directly by at the bodily level, contaminated homes, communities, and critical groundwater resources (e.g. Johnston, 2007).,

[6]http://www.environmentalhealthnews.org/ehs/news/2016/tribal-series/crow-series/years-after-mining-stops-uraniums-legacy-lingers-on-native-land.

We have highlighted aspects of vulnerability analysis and environmental justice research in this chapter to suggest areas where more interchange and cross-fertilization with other approaches to disaster studies could be mutually beneficial enhancing theoretical diversity and encouraging increasingly interdisciplinary research efforts. With persistent racial and class discrimination in the US and elsewhere, growing income inequalities, and rapidly changing environmental conditions due to climate change across scales, disasters must be understood as part of a complex suite of socioenvironmental and political economic facts that pre-exist and shape a given disaster.

10.6 Looking Forward

To enrich future disaster research, a better grounding in the historical geographic development of class and race relations in particular places is necessary. This grounding must include more attention to the theoretical issues implicit in the categorization of peoples by race and class, the processes by which these categories are engendered, and the spatial patterns of segregation. Environmental justice research and vulnerability studies both provide models for such analyses that could be incorporated into the ensemble of methodologies already deployed by disaster sociologists (e.g., Morrow, 1999). The regional catastrophe that emerged in the aftermath of 2005s Hurricane Katrina provides researchers with a mandate to attend to the complex historical and political ecological factors that have shaped race and class relations and produced the landscapes of risk so clearly and tragically revealed in the disaster.

With disasters growing in number and severity, and often coupled with long-term environmental degradation, technological failures, anthropogenic climate change, racial and ethnic conflicts, and growing class inequalities, the shared interests of disaster research, vulnerability studies, and environmental justice research appear clear (Oliver-Smith & Hoffman, 1999; Robbins, 2012). The increased use of political

ecology theory, spatial analysis, and studies of racial formation and class inequalities would strengthen disaster research by providing a spatially and historically informed understanding of the conditions which shape the severity and consequences of disaster. It would also help connect disaster research with a larger intellectual community in environmental sociology, environmental justice studies, and political ecology, allowing researchers to connect the historically separate concept of a disaster event with its antecedent conditions. In-depth, interdisciplinary case studies spanning disaster sociology, political ecology and environmental justice research would provide the necessary theoretical and methodological tools to investigate the intersections of social inequalities, hazards, and the production of space, as well as how these intersections affect the lived experiences of disaster-affected communities. In particular, environmental justice research provides important examples of how the chronic disasters of toxic chemical and radiation exposure can make people's daily lives ones of risks and health uncertainties that span decades, low grade disasters that lack beginnings or ends (Kyne & Bolin, 2016; Walker, 2012). Lastly, new research will require a willingness to critically investigate social inequalities and the social and environmental policies that put people and places at risk.

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