Defining Disaster: An Evolving Concept

1

Ronald W. Perry

Contents

Definitions of disaster serve many important functions, particularly as an attempt to capture the content and essence of the concept. This is a critical issue for social scientists who must understand and specify the phenomena of disasters as a preface to systematic research that delineates their causes, conditions and consequences. Tracing the evolution of disaster definitions forms a basis for clarifying different sources and categories of definitions—popular, journalistic, applied, mandated, and social scientific. Further, comparing multiple definitions can inform the conceptualization process by illuminating different perspectives on and dimensions of disasters. A definition also allows the delineation of phenomena similar to disasters but that rest in different conceptual arenas. Such clear definition is required if social scientists are to meaningfully aggregate findings to create models and theories of basic disaster-related phenomena. This is a critical issue when social science knowledge forms the basis for recommending public policy and programs.

This chapter traces disaster definitions devised by social scientists, thereby elucidating the evolution of scholarly thinking and the elements of the conceptualization. There is no intent to create an exhaustive inventory, but only to capture the principal approaches to defining disasters. Similarly, the goal in examining definitional content is to grasp intent and meaning; every detail of a given definition may not receive attention. In addition, the emphasis here is upon the definition of the phenomenon itself. Stallings (2005) and Quarantelli (2005, 1989) have each cautioned that definitions should be separated from statements of causes, conditions and consequences of disasters; these are important in a broad theoretical sense but they are not critical definitional constituents. The discussion of definitions requires the identification of apparent consensus across researchers at different times, in spite of the challenges associated with such designations. Consensus is here pronounced subjectively, knowing that ultimately there is no expectation a single definition is possible (Alexander, 2005, p. 38; Quarantelli, 1987a) and that probably it is

R.W. Perry (✉)
Arizona State University, 2516 S. Shannon Dr., Tempe, AZ 85282, USA
e-mail: Ron.Perry@asu.edu

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_1

not critical for the persistence and success of disaster research (Oliver-Smith, 1998, p. 177).

Because there are many definitions, from many sources, used for many purposes, it is important to specify what definitions form the content for this chapter. Thus, for this review disaster is a social scientific concept that refers to a particular class of phenomena whose specification rests in theory-based thinking (cf. Perry, 1998). So emergencies and catastrophes are distinct from disasters and not included here (Alexander, 2014, p. 127; Perry & Lindell, 2007; Quarantelli, 2000, p. 68, 2005; Rodriguez, Trainor, & Quarantelli, 2006). Also, research indicates that severe disruptions arising from conflict situations are fundamentally different than those that arise from consensus situations (Peek & Sutton, 2003, Quarantelli, 1993, 2005; Singh-Peterson, Salmon, Baldwin, & Goode, 2015; Waugh, 2006, p. 392). Consistent with these findings, disaster definitions considered here are those that are separate from conflict-based occasions.

Finally, the definitions included herein are those devised by social scientists for theory-based uses. Sometimes, social scientists help to create disaster definitions that are used to identify the phenomenon for particular societal, organizational, institutional or governmental uses. Thus, governments develop "mandated" definitions of disaster for purposes of determining the boundaries of emergency management (such as mitigation, preparedness, response and recovery) and particularly in connection with the distribution of funds and other resources (Buckle, 2005; Britton, 2005). Shaluf, Ahmadun, and Mustapha (2003) described the role of regulatory agencies in defining disasters associated with technology. Also, organizations which provide aid, nongovernmental organizations (NGOs) and private sector organizations establish disaster definitions. Mayner and Arbon (2015) catalogued over 100 mandated definitions in use worldwide and Marre (2013) created a glossary of definitions to guide NGOs navigating multiple agencies simultaneously. These definitions are important, but not included here because they focus largely on setting technical thresholds and this chapter is concerned with definitions created by social scientists in pursuit of disaster research and theory construction.

1.1 Definitions of Disaster

Prince (1920) is generally credited with conducting the first systematic disaster study, although issues of definition and context awaited introduction by Carr (1932). There was real growth during the decade of the 1950s, accelerated by the founding of the Disaster Research Center (DRC) in 1963, with significant increases each decade thereafter, tied roughly to the availability of funding for research and application and to the occurrence of highly visible and destructive disasters (Tierney, Lindell, & Perry, 2001). Amid the increasing inventory of research findings, Drabek (1986) summarized 1,000 empirical studies and Quarantelli (1982, 1987b) began to call for attention to issues of defining disasters. His sustained work has kept the issue visible, produced both special issues of journals and volumes dedicated to the topic (Perry & Quarantelli, 2005; Quarantelli, 1998a) and significantly increased the number of formal definitions from many perspectives to appear in the literature.

Selectivity is an issue in an environment with many definitions, complicated by the fact that publication dates may have limitations as a way of capturing patterns of changing meaning. Indeed, some researchers have used a definition for years before publishing it or simply never published it. Researchers may have adopted a definition from the literature, sometimes making their choice explicit, sometimes not. When the occasion studied falls within broadly accepted social scientific ideas of what constitutes a "disaster", there is a temptation to simply not address the issue of definition. Finally, it is clear that the specific content of disaster definitions vary over time, between researchers and even for the same researcher in different times and contexts. This is appropriate and expected if disaster research is a conducted as a social scientific endeavor; as data accumulate and theories form, both

conceptualization processes and new knowledge produce changes in fundamental definitions.

One remedy to these challenges to cataloguing disaster definitions is to group them by broad era, with simultaneous concern for what might be called paradigm or orientation. While definitions themselves are purposed to identify the phenomenon being characterized (Perry, 2005; Reynolds, 2007), they are typically proposed in a context that elaborates attendant causes and consequences. These elaborations place the definition within a "world view" commonly captured by the concept of paradigm (Johnson, 2008, p. 100). This chapter identifies three traditions or paradigms that grew over time and became foci for disaster definitions: a classic approach with variants, the hazards-disaster tradition and an explicitly socially-focused approach. These paradigms are used only as an organizing feature; analytic creations designed to facilitate discussion. There is no suggestion that researchers self-identify within one of these categories when they engage study design or think of an answer to the question of what constitutes a disaster. It is clear that the "traditions" overlap in time and content and that a different observer may devise different paradigms and place definitions within different categories. They are at best a temporary ordering device and for that purpose they appear practicable.

1.2 Classic Period and Its Evolution

The classic period may be seen as beginning at the end of World War II and closing with the publication of Fritz' definition in 1961. The influence of the thinking and writing in this period on disaster definitions extends into the twenty first century. Three important intellectual and research activities operated early in this period. The WWII bombing studies from Europe (Ikle, 1951) were systematically examined to document both the reaction of the population and patterns of physical damage foreshadowing later databases. In 1951, the National Opinion Research Center (NORC) at the University of Chicago initiated a series of eight disaster studies (mostly airplane crashes, but also fires and an earthquake). Charles Fritz oversaw the NORC studies and the field teams included E.L. Quarantelli. These data formed the first explicitly social science database. The third development was the 1952 formation of the Disaster Research Group at the National Research Council under the auspices of the National Academy of Sciences (NAS-NRC). This group conducted a review of the state of disaster research as well as what has become a classic series of studies (Williams, 1954) thereby codifying and expanding the disaster knowledge base.

Many of these studies left the meaning of disaster implicit. The definitions that did arise mentioned an event as catalyst but focused explicitly on the concomitant failure of the social system to deliver reasonable conditions of life. Minimally, the data from these studies formed the earliest social scientific (as opposed to journalistic or historical) information about human behavior in disasters. It is important to make two observations about this era. First, while the definitions explicitly mentioned an agent as catalyst (hence the use of the term "event"), most really dealt with social disruption. Careful reading of this literature reveals little emphasis upon specific agents underlying disaster except insofar as different agents were linked to differing elements of experience (dimensions) such as speed, duration, magnitude or scope of onset (Perry, 1985, p. 18). The emphasis on the social can be seen in Fritz' (1961b) research on the therapeutic community which he argued arose out of the social disruption itself. Thus it would not be accurate to characterize this era as event centered; events were seen as precipitants with some implications for social disruption. Second, the seeds of emergent norm thinking were planted during this period. This framework was ultimately developed by social psychologists and influenced students of collective behavior (particularly those interested in crowd behavior) and some disaster researchers. It produced the vision of social interactions supported by norms that might be rendered ineffective by disasters, thereby requiring different norms until the environment began to stabilize again. The notion of "return to a

stable state" implied here has long elicited skeptics and been qualified multiple times (cf. Gillespie & Perry, 1974; Luchmann, 2013, pp. 3–6). Stallings' (1998) presentation of "exceptions" and "exception routines" to understand disasters within the social order is a modern adaptation of emergent norm thinking. It is important that emergent norm thinking grew later than the classical era and that the majority of researchers operating at the time discussed disasters within the context of social change perspectives. Research following the social change premise included Anderson's (1969) study of Anchorage following the 1964 Alaska earthquake. The classical era saw a great deal of inductive research (field studies), some deductive research (hypothesis based) and much thinking that spawned subsequent theory and definitional attempts.

In this active research context, three enduring formal definitions of disaster were published. Wallace (1956, p. 1) characterized disasters as "extreme situations" that involve not just impact, but also the threat of "an interruption of normally effective procedures for reducing certain tensions, together with a dramatic increase in tensions." The social readjustment following these interruptions was also cited as part of the definition of the disaster. This early definition highlights threats, not just impacts of agents, while emphasizing the role of the social both during and after the threat or impact. The use of the term "extreme situations" prefaced the later concern that disasters may actually be a sub-category of a larger class of events. At about the same time, Killian (1954, p. 67) proposed that disasters are disruptions of the social order producing physical destruction and death requiring that people cope by departing "from the pattern of norm expectations." Killian here prefaced his later work on emergent norm thinking but also placed social disruption at the forefront. Moore (1958, p. 310), as part of his studies of tornadoes in Texas, felt that disasters make people adopt new behavior patterns as a defining feature, however, he believed "the loss of life is an essential element." These three definitions are remarkably consistent with one another. Each characterizes disaster in terms of the impact or threat of an agent and each has a focus on social disruption. One interpretation is that the disruption or interrupted stability was the "disaster" which had an agent as cause and that later required social readjustments.

Charles Fritz, working for the most part in the same tradition and on many of the same projects as the first three authors, proposed a definition in 1961 (and reiterated it in 1968) designed to capture the sociological notion of disaster. Fritz saw disaster as affecting an entire society or some subdivision and included both threat and actual impact, but emphasized that "essential functions of the society [are] prevented" (1961a, p. 655). This definition doesn't depart radically from the previous ones, but it attempts to be more precise regarding the place of the social. It did specify disaster as an "event" which later critics would argue moved the focus from strictly social, but Fritz explicitly added "time and space" qualifications. Some scholars subsequently contended (Quarantelli, 1984) that these qualifications limited disasters to being rapid onset events, although that implication was already implicit in the other definitions. There was also the requirement that a "society or relatively self-sufficient subdivision" be affected. At the time the definition proposed (and since), little research was directed at disasters affecting an entire society. It appears that the liberal interpretation of "relatively self-sufficient subdivision" allowed disaster researchers to embrace the definition for decades while studying communities and groups smaller than communities.

Fritz' definition was generated from the intellectual context of the major disaster research efforts of the 1950s and the social context of the cold war. The apparent societal and governmental concerns of that time raised awareness about threats of an external attack; to some extent these appear to be reflected in the notion that disasters were both driven by agents and external to a focal society or social group. In retrospect, one advantage of the definition was that it seemed to provide an umbrella for much of the increasing number of studies done by a growing multidisciplinary and international body of disaster researchers (Quarantelli, 1987a). Many

researchers have adopted Fritz' definition verbatim or cited it in their own studies. Examples can be found across decades in Wettenhall's (1975) studies of bush fire disasters, work by Peacock and Bates (1987, p. 292) on social change and disaster, Perry's study of a nuclear power plant accident (1985), the review of flood studies by Perry and Lindell (1997) and Lowendahl's (2013, p. 11) cross national studies of natural disasters.

The Fritz definition has been used by many researchers who embrace the basic tenets of the definition while introducing slight variations to better fit contemporary research understandings. Sjoberg (1962, p. 357) characterized disaster as a "severe, relatively sudden, and frequently unexpected disruption" of a social system resulting from some precipitating event that is not subject to societal control. Thus, Sjoberg introduces the notions that the precipitating event is sudden onset, external to the system and not subject to control. This approach links disasters to the state of technology that might define human control, but over time, all types of disaster have come to be seen as arising from human causes (cf. Mileti, 1999; Tierney, 2014). Cisin and Clark (1962, p. 30) dropped some of Fritz' qualifiers, saying a disaster is any event that "seriously disrupts normal activities." In elaboration, these authors added the explicit qualifier that the disaster also may result from a threat that does not materialize. Turner (1978, p. 83) embraced part of the Fritz definition, but emphasized that there must be a collapse of social structural arrangements previously "culturally accepted as adequate;" this moves away from judging whether pre-disaster conditions were either "normal" or "fair" (cf. Donner & Rodriguez, 2008, p. 1092). Drabek (1986, p. 7) adopted Fritz' definition but included the provision that "disasters are accidental or uncontrollable events, actual or threatened." Moving into the 21st century, Buckle (2005:179) extended the definition by emphasizing the magnitude of social disruption, saying there is a sense of significant, irreversible loss and damage, requiring "the need of long term recovery." Similarly, Smith (2005:301) proposed that disasters are events that produce death and damage and cause "considerable social, political and economic disruptions." Fischer re-emphasized part of the classical era that appeared to be declining in visibility by adding that what sociologists really study is social change in connection with disasters (2003:95). Drabek and McEntire (2003, pp. 98–99) clarified the idea that the social order returns to "normalcy" after disasters, arguing that during and after the disaster operating norms shift to modified or novel forms in the short-term (therapeutic community, emergent organizations) and later "regularize" or stabilize, not necessarily reproducing pre-disaster states. Other researchers have also made additions to accommodate variance from the original definition. Thus, changes crept into the Fritz definition, introduced by researchers who largely embraced what they believed was Fritz' original meaning, but who sought to add theoretical clarity or update for changes in the extant body of knowledge.

As one traces the definition proposed by Fritz into contemporary disaster research, it appears that many researchers have come to share a focus on the social order as a key defining feature. While the authors cited below may or may not see themselves as operating in a "classical era" context, their definitions do reflect a concern with many of the key defining features mentioned by Fritz. Like Fritz, however, each places explicit emphasis upon disasters and social process or change. Perhaps Kreps (1998, p. 34) remains closest to Fritz when he defines disasters as "non-routine events" that create social disruption and physical damage. In elaborating his definition, he focuses upon four key defining properties – forewarning, magnitude of impact, scope of impact, and duration of impact. Robert Stallings created a picture of disasters that firmly placed them within a context of classical social theory, while at the same time emphasizing the notions of disruption and change. Stallings (1998, p. 136) examines routines, exceptions and exception routines: the social order is seen as routinized and "disasters are fundamentally disruptions of routines." Stallings also acknowledges that disasters are only one kind of occasion that interrupts routines in social life. Later,

Stallings (2005, p. 263) defined disaster as "a social situation" precipitated by non-routine destruction by forces of nature. Stallings was writing in the context of natural disasters and undoubtedly did not intend to limit disasters to agents of the natural environment. Stallings work is important both for its extension of Fritz' definition (placing disaster within the social order) but for allowing that disruption may be associated with situations that are not disasters. Porfiriev (1998, p. 1) also sees disaster as the destabilization of the social system, indicated by a failure of normal functioning that requires an intervention to reinstate stability. Again, one sees an emphasis upon disaster as transition or change that involves vulnerability and requires different patterns of social intercourse.

The spirit embodied in Fritz' definition is certainly reflected in these definitions and others, especially those that retain an agent or "event" perspective. However, few would completely embrace the classical definition any longer. While the influence of the classical era is present in many features of contemporary disaster research, we have moved from the original conception to a perspective that expands the phenomena that are studied as disasters. Also, a critical point of difference is that the early classical era saw disaster causes as outside human control and often external to the focal social system (Dynes & Drabek, 1994, p. 12). Most researchers currently acknowledge that all disasters ultimately arise from human agency and are thereby vested in the social system. Also, among the definitions sampled here, there is a progressively stronger emphasis (in the definition or in each author's elaborations) upon the social; on process, adaptation and change. These notions were more implicit in the approach taken by Fritz (Quaranatelli, 1998b). Indeed, the extent of emphasis is sufficient to later discuss a separate category of definitions and group them as characterizing disasters as "social phenomena."

1.3 The Hazards-Disaster Tradition

The study of natural hazards involves many disciplines but principally geography and other geophysical disciplines. One focus is upon understanding the hazard processes that produce earthquakes, tornadoes, floods, volcanic eruptions and similar events. Another focus is natural disaster but within the context of the processes associated with the hazard. This is a holistic approach sometimes seen in the context of another endeavor such as resource management (Burton & Kates, 1964). Natural hazards perspectives have early and enduring links to human ecology (Barrows, 1923; Burton, Kates, & White, 1968; Kates, 1971). The classic statement of the hazards approach is found in the work of Burton, Kates, and White (1978). Within this context generally, a disaster is viewed as an extreme event that arises when a hazard agent intersects with a human use system. Consequently, disasters take place as part of normal environmental processes and those processes are important for study. For example, when an earthquake occurs, it is a disaster if it affects humans, but it arises from patterns of seismic activity whether people are affected or not. At least in early formulations, the cause of a disaster is the extreme event and understanding disaster rests upon understanding the larger process (engaging both social science and natural science perspectives). The macroscopic view of hazards researchers contrasts with the more narrow focus on disaster events found in many of the classical era definitions. Quarantelli (2005, p. 342) argued that when hazard cycles and agents are the focus, disasters become an epiphenomenon rather than a central target for definition and explanation. It is equally true, however, that "a disaster is but a moment or materialization of [important] underlying conditions" (Birkmann et al., 2014, p. 4). Gaillard (2016) has pointed out that each of the disciplines where disasters are studied—

sociology, geography, psychology, anthropology and others—can be expected to reflect disciplinary interests in developing definitions. It is clear, too, that research from each perspective has contributed significantly to the body of knowledge associated with disasters.

Oliver (1980, p. 3) defined disaster as a part of the environmental process, but as a phenomenon that occurs when human systems intersect with the hazard creating major "human hardship with significant damage." The critical issue of a cyclic environmental process is present here, with the notion of serious social disruption and physical damage. Susman, Okeefe, and Wisner (1983, p. 264) are closer to the traditional geographers view when they define disaster as "the interface between an extreme physical event and a vulnerable human population." Hewitt (1998, p. 77) elaborates disaster as events where "physical agents define the problem." In 1983 he argued that disasters may be seen as unexpected and unprecedented impacts that "derive from natural processes of events" (Hewitt, 1983, p. 10). Peek and Mileti (2002, p. 512) see disasters produced when extreme events in the natural environment "interact [with] the natural, social and constructed environments." Paton and McClure (2013, p. 4) also view disasters arising from interactions between human use systems and natural processes that produce significant negative impacts for people and the built environment. However, these scholars include among consequences those that damage systems that support human life (agriculture, infrastructure, etc.). The logic for this is that such damage may affect human systems even if they are distant or otherwise protected. Each of these definitions highlights the traditional concern of hazards researchers with the cycle of hazard agents and the consequences when human systems intersect them. While the principal thrust of hazards perspectives dealt with hazards from natural processes, it is possible to use a hazards view when the nature of the underlying threat is human-generated by specifying the underlying force or process.

Consistent with a macroscopic emphasis, some hazards researchers have adopted an explicit focus on the nature of consequences and upon social vulnerability. Alexander (1993, p. 4) pointed out that natural disasters can be thought of as quick onset events with significant impacts on the "natural environment upon the socio-economic system." In later writing, he elaborated this by saying that disasters are not defined by fixed events "but by social constructs and these are liable to change" (Alexander, 2005, p. 29). Alexander is stressing that the disaster is not just the event arising from intersection of human and natural systems, but the social consequences (which are ever changing and variable across groups) of the event. Mileti (1999, p. 3) also warrants that disasters flow from overlaps of the physical, built and social environments, but that they are "social in nature." Mileti emphasizes that humans can be seen as creating disasters through their encroachment on the physical environment. Although he still places the origins of disasters in a hazard context, Mileti is explicit about the social emphasis when studying the events. Wisner, Gaillard, and Kelman (2012, p. 30) define a disaster as "a situation involving a natural hazard which has consequences in terms of damage, livelihoods, economic disruption and/or casualties" that outstrip local capacity to cope. The authors cautioned that they did not mean to eliminate events in small isolated towns, which may not have the option to seek resources from outside. Firmly in a vulnerability context, Cutter (2005, p. 39) argued that the issue is not disasters as events but instead human "vulnerability (and resiliency) to environmental threats and extreme events."

Each of these definitions moves toward an emphasis upon social contexts to varying degrees. Certainly hazards approaches have a longstanding interest in consequences and vulnerability (Quarantelli, 1998b), but definitions from this perspective have increasingly included social disruption as at least one defining feature of the disaster. To the extent that hazards researchers are moving in this direction, they are converging with sociological researchers to place people and social relationships at the core of disaster study.

1.4 Disasters as a Social Phenomenon

Relatively recently, many scholars have incorporated more aspects of social relations as defining characteristics of disasters and moved away from conceptions that are largely agent-based or that depend heavily upon notions of physical destruction. Physical damage is still cited as a correlate of the magnitude of the disruption that defines the disaster, but not as a primary defining feature. This trend includes those who may generally use classical era thinking in their formulations as well as those who approach from a hazards perspective. While Drabek (2013) has often included the essentials of Fritz' definition into his own writing, he has consistently specified that disasters are found in the social disruption rather than the agent. As Quarantelli (2005, p. 345) indicates, this emphasis reinforces the traditional notion that in defining and studying disasters, one should look first at social systems, since they (not the agent) are the real locus of disruption and vulnerability. The definition of disaster as social phenomena is evidenced when scholars place disaster in social systems and relationships and (not necessarily as definitional elements) seek its sources in human agency and vulnerability. The vision of disasters as social phenomena has roots in classical era definitions, those of hazards researchers and those from scholars working with macroscopic perspectives such as human ecology, social change and anthropologists who place disasters within social and cultural parameters. Although assigned here to the later evolution of the classic era, the definitions offered by Kreps (1998), Stallings (1998), and Porfiriev (1998) are transitional into the social phenomena classification. Each definition is distinct in emphasis upon social phenomena, attention to vulnerability as socially constructed, and the idea of social change; all to the near exclusion of physical agents. Barton (1989, p. 348) expressed concern that sociologists need to define disaster more firmly in social terms and place less emphasis on agents. Erikson (1976, p. 254) gave voice to this view early, when he contended that "are socially defined as having reached one or more acute stages."

E.L. Quarantelli's career spans the classical era through the present and has always included social in the definition of disaster, but has moved to a largely social position. Quarantelli (2000, p. 682) identifies defining features as: (1) sudden onset occasions, (2) serious disruptions of the routines of collective units, (3) evidenced in the adoption of unplanned courses of action to adjust to the disruption, (4) with unexpected life histories designated in social space and time, and (5) posing danger to valued social objects. Subsequently, he emphasized that disasters interact with vulnerability, reflecting "weaknesses in social structures or social systems" (Quarantelli, 2005, p. 345). In this evolving characterization, Quarantelli emphasizes neither an event nor a physical place or time as necessarily relevant to disasters.

While social phenomena definitions may explicitly or implicitly mention an agent, they share the distinction of making the key defining features of disaster rest in the social, often asserting that vulnerability (or danger) might be modified through social change processes. Clausen (1992, p. 182) emphasized the latter, arguing that disasters flow from normal social change even though their consequences are negative and their frequency rare. The reference to normality underscores the point that vulnerability lies within the social structure itself and is a regular part of human intercourse. Similarly, Gilbert (1998, p. 13) argues that "disasters are not a function of agents, but are social in origin;" like Mileti and Tierney later, he saw disaster as stemming from human agency. Wisner, Kelman, and Gailliard (2014, p. 16) point out that disasters are inherently social and that their occurrence both creates an opportunity for change simultaneously introducing stimulation for change. Rosenthal (1998, p. 226) discusses disaster as a socially defined occasion, related to social change that is "recognized across social time as a radical change" in the normative environment. The reference to social time particularly sets this definition apart.

Social change has long been associated with disaster definitions posed by sociologists but it is

not necessarily a sole defining characteristic of the social phenomena category. Dynes (1998, p. 13) defines disaster as occasions when norms fail, causing a community to engage in extraordinary efforts "to protect and benefit some social resource." Rodriguez and Barnshaw (2006, p. 222) see disaster as "human induced, socially constructed events that are part of the social processes that characterize societies." Carter (2008, p. 9) emphasized that disasters strike "with such severity that the affected community has to respond by taking exceptional measures." McEntire (2015, p. 3) defines disaster in relationship to underlying hazards but underscores that they are significant disruptive social events that require changes in routine behaviors. Mayner and Arbon (2015, p. 24) find disaster in altered social patterns arising from severe disruption and damage to the community. Pescaroli and Alexander (2015, p. 5) view disaster as situations that "generate a sequence of events in human subsystems that result in physical, social and economic disruption" and contend that levels of vulnerability determine the magnitude of the disruption.

Researchers interested in cross-national or cross-cultural aspects of disasters have long focused upon social systems to understand disasters. For example, Bates and Peacock (1993, p. 13) characterize disasters as a social event arising from "a process that involves a sociocultural system's failure" to protect its population from external or internal vulnerability. The event notion is present in the definition, but for these authors, disasters are social phenomena that have roots in the social structure itself. In his study of West African disasters, Ait-Chellouche (2015, p. 423) characterizes disaster as "serious disruption of the functioning of the community following widespread human, material, economic or environmental losses."

Jigyasu (2005) bases disasters exclusively in social systems, and he draws upon human interactions and the cognition that drives them for part of his definition. Conversely, for Horlick-Jones (1995, p. 311), "disasters are disruptions in cultural expectations" that result in the perception that institutions can't keep threats in check. He points out that disruptions stem from the ways in which society deals with vulnerability. Similarly, Dombrowsky (1998, 2005) proposes that disaster is the collapse of cultural protections—captured in habits, folkways, laws or policies—that either deflect or fail to deflect the threatening forces to which societies are exposed. For Dombrowsky, the disaster is social; it is engendered in social structure and can only be examined via that route. Anthropologist Anthony Oliver-Smith (1998; Oliver-Smith & Hoffman, 2002, p. 4) sees disaster as occurring when a destructive agent overlaps with a vulnerable population disrupting "social needs for physical survival, social order and meaning." Hewitt (2016, p. 8) similarly believes that the key features of disaster arise from the "disruption of a significant part of society's productive activity and administrative functions." For Hewitt, these are key drivers of social systems. Finally, Boin (2005, p. 159) believes that disasters flow from the normal functioning of social systems that take place when the "life sustaining functions of the system break down." Boin (like Barton, Quarantelli, Kreps and Stallings) argues that disasters are a subclass of a larger class. Barton called the larger class collective stress situations, while Boin (like Quarantelli and Rosenthal) uses the label crisis. For Boin, disasters are rooted in social structure and changes that cause disruption (a chapter by Boin, further elaborating crises, appears in this *Handbook*).

Although interdisciplinary in their training and international in origin, these authors share a conception of disaster that places it firmly in society and social relations. Disaster is social disruption that originates in the interruption of the social system and social relations. The preponderance of scholars who proposed social definitions elaborated disaster in the context of social change. Lovekamp and Arlikatti (2013, p. 468) have presented an articulate discussion of mechanisms that arise from disasters to create opportunities for change in many aspects of social systems, including opportunities for traditionally marginalized groups. Of course, changes implemented are not necessarily in the direction of reduced risk. Wisner, Blaikie,

Cannon, and Davis (2004, p. 32) found that both pre and post-disaster changes may enhance or retard vulnerability. Chakraborty, Collins, Montgomery, and Grineski (2014) argue that in the absence of apparent changes, those vulnerable and affected by a disaster at one time will become more vulnerable to future disasters.

1.5 Human Ecology, Vulnerability and Resilience

The perspective afforded by human ecology and the concepts of vulnerability and resilience have become ubiquitous in the contemporary disaster literature. It is important to point out that the content of theory-based definitions of disaster may be connected to ecological thinking only in a general fashion. There are no unique "ecological definitions" although a reader can surely identify definitions that may be argued to be more or less macro in scope. Similarly, vulnerability and resilience are concepts related to causes, conditions or consequences of disasters (Quarantelli, Lagadec, & Boin, 2006); they do not directly define disasters. The role that ecological thinking, vulnerability and resilience might play in disaster definitions is not as defining features, but as influences on the design of research addressing disasters. As noted below, there have been studies and theorizing that attempt to establish vulnerability and resilience as causes or effects of disasters. As such, each notion merits brief mention here.

The human ecology literature is classic, with roots in plant ecology and a significant presence in many social sciences (Park, 1915; Hawley, 1944, 1950), as well as being a framework used by scholars from the very beginning of disaster studies. Human ecology is an area of study and a framework for thinking about human societies and communities (Bates & Pelanda, 1994; Gaillard, 2016; Peacock & Ragsdale, 1997). Faupel (1987, p. 182) is one of only a few who used human ecology as an integrative perspective specifically for understanding human disaster behavior in the context of the community (broadly defined). He argued that the environment plays a role in shaping social processes which subsequently can produce disasters. The principal impact of a human ecological perspective on formulating disaster definitions is that such scholars tend to use more macroscopic thinking and place the disruption that defines disaster in a broader community context, rarely relying on a single physical agent as a primary defining feature (Oliver-Smith, 1996). Consequently, one finds the influence of ecological perspectives across classic, hazards type and social phenomena based definitions. Certainly in the contemporary disaster literature one sees social phenomena definitions in a position of prominent use and (whether so labeled or not) underpinned by macroscopic thinking.

Boin, Comfort, and Demchak (2010) contend that vulnerability and resilience have achieved the status of fashionable buzzwords, appearing not just in technical literatures but also in popular discourse about politics, sports and everyday pastimes. Gaillard (2010, p. 219) points out that each term began prominently appearing in the disaster literature in the 1970s—vulnerability first (O'Keefe, Westgate, & Wisner, 1976), and resilience later (Torry, 1979). After it was introduced, each concept frequently appeared in research and theory, particularly among scholars using hazards type perspectives (cf. Singh-Peterson et al., 2015, p. 756) and in anthropology. Both concepts have been widely employed by sociologists, especially those embracing ecological perspectives or interested in social change (cf. Donner & Rodriguez, 2008, p. 1091). In fact, both vulnerability and resilience have a generic quality (similar to "systems theory") and have been used across many different disciplines, sciences, and applications for decades, if not centuries.

The idea if not the term, vulnerability, is present in most historical and contemporary discussions of disaster. A few have explicitly used the term in their disaster definition. Wamsler (2014, p. 4) says that disasters arise when there is an interaction between "hazards and vulnerable conditions." Bradshaw (2014, p. 34) believes disaster exists when "an individual or group is vulnerable to the impact of a natural or

human-made hazard." Each of these definitions actually keeps the disruption that is the disaster implicit while highlighting the conditions that create it. Most scholars, however, see vulnerability as a cause, condition or consequence of disasters, or correlated with magnitude of disruption, but not as a feature of the definition itself (Konukcu, Mentese, & Kilic, 2015, p. 14). Blaikie, Cannon, Davis, & Wisner (1994) produced what is widely seen as the classic statement of the relationship between human vulnerability and disasters. Alexander (2016, pp. 2–3) argues that vulnerability is a critical concept for future research and practice, emphasizing that attention must be given both to clarifying the conceptual relationship of vulnerability to disaster, and to understanding the critical dimensions of vulnerability itself (as a distinct concept). Lindell (2013, pp. 11–12) also presents this critique, noting that the conventional definition of vulnerability is conceptually and operationally ambiguous and that there is a need to identify which variables are indicators of vulnerability, which are proximal and distal causes, and which are simply correlates of vulnerability. Indeed, many of the challenges posed by vulnerability—as well as resilience—arise from the need to specifically adapt it disaster research and theory. Aguirre (2007, p. 41) began the process of clarifying the relationships among the concepts of disaster, vulnerability and resilience and suggests that much scrutiny by the body of scholars is required to meaningfully integrate either concept into the dialog about disasters.

Zakour and Gillespie (2013, p. 73) argue that disaster resilience is a logical extension of and complement to the concept of vulnerability; resilience captures the capacity to reduce the effects of disasters through many possible mechanisms or conditions. Disaster researchers have found resilience a useful concept but continue to seek clarity and consensus on issues of meaning and conditions (Aguirre, 2006). Both Hayward (2013) and Aldunce, Beilin, John Handmer, and Howden (2014, p. 252) seek basic meaning consensus in the face of many apparently different definitions and especially explication of the notion of "bouncing back from disasters." Paton (2006, p. 305) sought to integrate a wide variety of perspectives on resilience (individual, community, institutional and environmental) and Berkes and Ross (2013) recently tried to find "common ground" between approaches based in social-ecological systems and those centered in the psychology of individuals. But there remain issues to be resolved for applications at the community level of analysis (Barrios, 2014), for ways to measure resilience (Cutter, Ash, & Emrich, 2014) and for the relationship of resilience to public policy, especially disaster risk reduction (Amundsen, 2012). At the most basic level, Cutter (2016) points out that while resilience and vulnerability are related, there is a need to specify not just the conceptual particulars of each concept but also the nuanced relationship between them.

Resilience may arise in disaster definition elaborations to the extent that it is conceptually seen as a modifier of vulnerability or in the applied arena to the extent that resilience can be defined, learned, and implemented across disasters and communities (Leykin, Lahad, Cohen, Goldberg, & Aharonson-Daniel, 2016). Resilience has not been used as an element of disaster definitions themselves to date, probably because the thrust of the concept appears to be more as either a reaction to disasters (after the disruption) or as features of the unit of analysis (ecologically the community) that modify the magnitude of subsequent disasters (thereby before the focal disruption). Intuitively, the disruption that most agree forms a defining characteristic of disasters could certainly be affected by the presence of resilience. The observation remains, however, that systematic use of the concept must await further conceptualization that elucidates the definition and elements of resilience and its relationship to other concepts such as vulnerability, as well as empirical verification of the proposed relationships (Klein, Nichols, & Thomalla, 2003, p. 41).

1.6 Consensus Regarding Disaster Definition

A reasonable reviewer would not expect to find significant homogeneous content among a great number of definitions, devised at many different times by researchers from many different disciplines. Indeed, the degree of consensus seen depends both upon the observer and upon the level of specificity demanded to define consensus. However, with the qualification that definitions focus on the phenomenon itself and not accounting for views about causes or consequences, the past decade has seen increasing agreement among researchers about important features of disasters. Even historically, particularly within the three artificially constructed "families" of definitions used here as an organizing devise, there exists more than a small degree of congruence regarding the meaning of disaster. There are clear differences between disciplines especially regarding focus, but one expects some difference flowing from the different domains of disciplines. This a positive condition since much of the richness and fecundity of research, models and theory-work about disasters arises from cross- and inter-disciplinary involvement. Of course, discussion and debate stimulate the interplay between (abstract) concepts and (concrete) research findings thereby forming a fundamental part of metatheory and hence the process of science (Perry, 2005, p. 323). There is great variation with respect to the theory context in which definers place disaster and considerable variation among scholars with respect to how many defining features are assigned to the term.

There is significant contemporary consensus that all disasters have origins in human volition; sometimes in complex ways, many factors under human control are characterized as the ultimate cause of disasters. There is also growing consensus about what might be called the minimum defining features of disasters. Nearly two decades past, Quarantelli (2000, p. 682) reported that a consensus definition could be stated as: disasters are "relatively sudden occasions when… the routines of collective social units are seriously disrupted and when unplanned courses of action" must be undertaken to cope. Most contemporary researchers would only find small issue with this composite definition. Quarantelli (2005, p. 339) later stressed that disaster must be understood as an inherently social phenomenon. Again, many contemporary researchers agree that the disaster is the fundamental disruption in the social system (of whatever size) that renders ineffective whatever patterns of social intercourse prevail. This characterization does not judge the equity or normalcy of the patterns of social intercourse prior to or after the disaster, although it is acknowledged that some researchers believe that social inequity is the root cause of all disasters (cf. Donner & Rodriguez, 2008). Those who study emergent phenomena also point out that sometimes new, but definitely different, patterns of social intercourse (perhaps reflected even in formation of informal groups) will arise (for the short or long term) as a function of the disaster. Some researchers refer to the changed patterns as a "coping" response to the disaster disruption. This view can be interpreted as a phase-type vision that has original patterns followed by alternate patterns which are presumably followed by more regularized patterns. While some remain comfortable with this interpretation, other researchers are not; expressing concern that phases are not necessarily distinct in time and that their specification invites difficult to defend labels such as "normal." An alternate approach common in the literature identifies the disruption of social intercourse and acknowledges that alternate patterns arise within this context and over time some may disappear, while some may persist. The latter approach keeps the focus on social disruption without partition and embraces the notion that the patterned interactions observed during and after a disaster are likely to be different than the patterns observed before the disaster (whether the patterns carry functionalist labels or not).

The review of definitions also revealed several issues lacking wide consensus and that are under scrutiny or at least left unresolved. One is the role of a hazard agent and how physical damage should be considered in disaster definitions. For

many years it has been contended that agents don't define disasters, social disruption defines disasters. In part, the agent focus lead to the development of pseudo-typologies that attempt to describe or group disasters into various categories such as natural, man-made, public health, creeping, hybrid or by any other surface characteristic (Shaluf, 2007, p. 687). These are principally agent descriptions that fail to meet the basic definition of a typology, namely that it is theory-based (underlain by taxonomic thinking) and composed of a collection of classifications (categories) that are mutually exclusive and collectively exhaustive (McKinney, 1970, p. 168). The variation along dimensions of disaster—such as speed and scope of onset, duration, etc.—is easily documented to be as great within the category of "natural" events as between that category and "technological" events or any other agent-based or descriptive category. Quarantelli called such practice phenotypic classification and argued that there is sufficient disaster research and theory that social scientific attention should focus classification along more fundamental theory-based lines (genotypic). Although these classifications are not theory-based and are rarely used analytically any longer, they still appear in various literatures (cf. Perrow, 2006, p. 523).

Some researchers continue to stress the importance of a proximal agent as a manifestation of hazard processes when defining disasters. A few of these superficially resemble the non-theoretical typologies mentioned above. Some are based in physical science perspectives, where geologists—as part of their scientific ethos—center their work on hazard process and define disasters in those terms (Abbott, 2014; Keller & DeVecchio, 2014). Among social scientists, some definitions acknowledge that the nature of physical agents affect features of disaster occasions (such as level of fear, magnitude of impact, and others) that may themselves affect the behaviors (content of social intercourse) that arise during and following the disruption. There has been, however, movement away from the contention that any agent "is" the disaster, but disagreement persists regarding the extent to which agents are central or peripheral features of disaster definitions. A related issue is the contention that disasters originate "outside" the focal social system, which arises in some classical era definitions. This claim appears rarely in contemporary literature, probably owing to the growing acknowledgement that all disasters are human-caused. Thus, ecological perspectives emphasize that disasters originate within the social system itself where causes rest in the social structure, social interactions and the environment as a whole.

The role of physical damage in defining disasters also remains open to different interpretations. Researchers since the classical era acknowledge that damage is not necessarily a defining feature of disaster; for example, threats can produce the social disruption as well. But there is also agreement that physical damage is correlated with and can magnify social disruption, and that physical damage is often correlated with agent type. Some classic era definitions and some used by anthropologists include physical damage as part of the definition of disaster. In these cases, disagreement remains about the theory consequences of including damage as part of a definition. There is some consensus, however, that the magnitude of a disaster should be measured not in lives or property lost, but by the extent of the disruption and failure of the normative or cultural system. There is reasonable agreement that fundamental differences in individual and social system behavior should be expected among emergencies, disasters and catastrophes and that physical damage may indirectly arise in connection with catastrophes. These are not phenotypic categories based in magnitude or damages or similar characteristics. Instead, the categories represent differences in dimensions including social preparedness, destabilization of the social system through blocks to the ability to sustain interaction, and still others including the inability of people to occupy the physical area of the social system. In this view, the importance of physical destruction rests in its relationship to the need to completely empty an impact area prior to, during or after the disaster and the limitations that dispersal places upon social intercourse.

There also are apparent "agent-related" differences among disasters, documented in the literature, that make it appear some research findings do not apply to all events labelled disasters. That is, if "disasters" actually constitute a single class of phenomena, then one would expect consistency of research findings across them, but empirically differences arise that are in some cases apparently correlated with the agent. For example, behaviors seen in disasters associated with conflict environments (e.g. terrorism) are different from those arising from consensus environments (e.g. some natural hazards). Similarly, "disasters" characterized by very wide scopes of impact and very gradual onset (climate change) also appear to be empirically distinct from other "disasters". During the classic era, some researchers addressed this issue by either qualifying their findings in terms of the specific agent studied (volcano, flood, etc.) or by narrowing the findings to a given category of disaster events (natural or technological). Although such solutions can qualify differential research findings, over time this approach builds bodies of knowledge specific to agents or to categories of agents wherein differences may still persist within the class of agents or the narrower categories of disasters (Perry, 2006, pp. 13–15). For example, citizen warning compliance levels were lower for volcanic eruptions at Mt. St. Helens, Washington, than for those at Mt. Usu, Japan (Perry & Hirose, 1991, p. 180). Quarantelli (1982) has long argued that agent-based classifications of disasters are problematic; he believes that if social scientific principles of disaster behavior are to be devised, they must be based on theoretical distinctions instead of differences among agents. Quarantelli (1998b, p. 245) emphasizes that in examining disasters, one must separate "…phenotypical (surface or manifest characteristics) and genotypical (common non-visible factors [theory-based])" approaches. Quarantelli (1998b, p. 248) further notes that "I stopped using the natural/technological disaster distinction [phenotypic typology] long ago;" he favored instead a conceptual approach where disasters were classified based on analytic dimensions such as scope, duration, speed of onset, the nature of secondary impacts, predictability and social preparedness. Using such a conceptual approach, when empirical studies report that mental health consequences are rare in "natural disasters" but more common in certain kinds of "technological disasters," the real operative differences in mental health response may be more related to differential fear and knowledge of the threat (and other analytic characteristics as above) rather than to anything inherent in the difference between nature and technology. These anomalies may be seen as typological classification error; comparing two things that are similar in phenotype (appearance), but actually represent different genotypes (thus having distinct conceptually-based differences). One means of approaching such anomalies, when the goal is to construct theory, is to engage in taxonomic thinking to create typologies of disasters wherein comparison of research findings is done within categories of the classifications.

Thus, typologies offer a way of sorting occasions and findings to make more conceptually appropriate comparisons (Perry, 1989, p. 354). Lukic et al. (2013) has argued that disasters only can be meaningfully defined within the categories of a classification scheme or typology. Two comprehensive typologies have been devised. Barton (1969, 2005) created many categories in a typology of "collective stress" situations (of which disasters are one) and subsequently further classified disaster types based upon a matrix of four dimensions (scope of impact, speed of onset, duration of impact, and social preparedness) and characterized each cell in social and interpersonal terms (Barton, 1989). Kreps (1989) devised an intricate system by looking at domains, tasks, resources and activities (DTRA). Most recently, Boin and his colleagues have begun to elaborate "crises" as a more general dimension which includes disasters and to conceptualize other kinds of crises as well (cf. Quarantelli et al., 2006, p. 16). To date, researchers have engaged in only scant use of typological classification to place their studies in conceptual space, but especially with Boin's work, the practice may be increasing. The scant use of typologies also extends to issues other

than types of disasters. Fischer (2003, p. 100) proposed a ten-point scale to measure the *severity* of disasters which was theory-based, but has also been rarely used by social scientists or emergency managers. While Fischer's scale is superior on social scientific grounds, severity measures are routinely given in terms of damages (calculated in a variety of ways) or with agent-specific measures such as the Saffir-Simpson hurricane scale (with five categories based on based on wind speed).

Geographers and anthropologists have long focused thinking and research on the context in which hazards and disasters are present. In spite of this, research that examines multiple hazards and disasters simultaneously constitutes only a small portion of all disaster studies. The growing contemporary emphasis on ecological perspectives may introduce new tactics for research design and encourage adjustments of disaster definition. Ecological perspectives embrace a macroscopic view that minimally should direct attention to the threat or risk environment. There has been some movement toward studying disasters in the context of the range of threats that affect the focal system or environment. Perry and Lindell (2008) studied hazard perception in the context of three natural hazards (volcanoes, fires and earthquakes) and research by Lindell and Hwang (2008) included natural hazards (flood and hurricane) with a toxic chemical release threat. Diefenbach, Wood, and Ewert (2015) have examined the risk environment of communities threatened by multiple volcanoes. There is also a growing literature on hazardous materials releases in connection with natural disasters (Sengul, Santella, Steinberg, & Cruz, 2012; Young, Balluz, & Mililay, 2004). The term cascading disasters has been used in the literature to characterize the broader vulnerability of a place. Sometimes the usage is narrow scope, referring to disasters that happen in time sequence and appear to be connected (Kumasaki, King, Arai, & Yang, 2016). Others argue that cascading disasters can be conceptualized in broader terms (not "falling dominoes") that more effectively captures the hazard and disaster context (Pescaroli & Alexander, 2015). Ultimately, however, cascading disasters are not a variant on the disruption (disaster), but a focus on the broader hazard and disaster environment and how that environment may be manifest in multiple disaster episodes that are in some way sequential or linked.

In closing, this review has followed definitions and visions of disaster since the earliest social scientific studies. Consistent with the classic description of the process by Hempel (1952), disaster as a concept has been much refined and defined over years and generations of researchers. For at least the first three decades of research and theorizing, much concern was devoted to isolating what constituted the "disaster" from associated causes, conditions and consequences. Over time, researchers have moved away from an agent-centered, damage-driven, uncontrollable event vision. In the context of disaster events, it is now generally acknowledged that, although agents may be proximal causes, humans "cause" virtually all forms of occasions we label "disasters." Relative to the disaster concept itself, most researchers currently view social disruption as the key defining feature or essential dimension. Conceptual refinements have attempted to understand individual, organizational and social system levels of disruption and how these may differ or interact within the context of "disaster" episodes (Quarantelli, 2000, 2005; Perry & Lindell, 2007; Gaillard, 2016). There has also been attention to how (and whether) the disruption feature of disasters should be analytically separated from short-term, temporary interactions (such as emergent groups) that appear to arise as part of the disruption (Stallings, 1998; Drabek & McEntire, 2003). As research findings continue to accumulate and the potential for anomalous findings increase, like the differential mental health consequences cited above, researchers may turn to theory-based approaches such as typologies to find interpretable meaning in the body of research. Whether the typologies that come into use are those of Barton or Kreps or something entirely different, the categories of the classification schemes will serve as contexts to further specify the nature and character of the disruption now broadly viewed as the defining feature of disaster. Ultimately, researchers and

theorists need to embrace Quarantelli's admonition that a social scientific vision of disasters requires focus on the key dimensions of the concept, independent of externalities that may constitute causes, conditions for or consequences of disasters. To build a theory-basis for disaster research does require much knowledge of causes, conditions and consequences, but it is critical to build such a body of knowledge on a shared understanding of the concept of disaster.

References

Abbott, P. (2014). *Natural disasters* (9th ed.). New York: McGraw-Hill.

Aguirre, B. E. (2006). *On the concept of resilience.* Newark, DE: Disaster Research Center, Preliminary Paper #356.

Aguirre, B. E. (2007). Dialectics of vulnerability and resilience. *Georgetown Journal on Poverty Law and Policy, 14*(1), 39–59.

Ait-Chellouche, Y. (2015). *Mainstreaming and implementing disaster risk reduction in West Africa*. Addis Ababa, Ethiopia: United Nations Economic Commission for Africa.

Aldunce, P., Beilin, R., John Handmer, J., & Howden, M. (2014). Framing disaster resilience. *Disaster Prevention and Management, 23*(3), 252–270.

Alexander, D. A. (1993). *Natural disasters*. New York, NY, USA: Chapman and Hall.

Alexander, D. A. (2005). An interpretation of disaster in terms of changes in culture, society and international relations. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 25–38). Philadelphia: Xlibris Publishers.

Alexander, D. A. (2014). Emergency and disaster planning. In A. Lopez-Carresi, M. Fordham, B. Wisner, I. Kelman, & J. C. Gaillard (Eds.), *Disaster management* (pp. 125–141). London: Routledge.

Alexander, D. A. (2016). The game changes. *Disaster Prevention and Management, 25*(1), 2–10.

Amundsen, H. (2012). Illusions of resilience? *Ecology and Society, 17*(4), 1–19.

Anderson, W. A. (1969). *Disaster and organizational change: A study of the long-term consequences in Anchorage of the 1964 Alaska earthquake*. Newark, DE, USA: Disaster Research Center.

Barrios, R. (2014). Here, I'm not at ease: Anthropological perspectives on community resilience. *Disasters, 38* (2), 329–350.

Barrows, H. (1923). Geography as human ecology. *Annals of the Association of American Geographers, 13*(1), 1–14.

Barton, A. H. (1969). *Communities in disaster*. New York, NY, USA: Doubleday.

Barton, A. H. (1989). Taxonomies of disaster and macrosocial theory. In G. A. Kreps (Ed.), *Social structure and disaster* (pp. 346–350). Newark, DE, USA: University of Delaware Press.

Barton, A. H. (2005). Disaster and collective stress. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 125–152). Philadelphia: Xlibris Publishers.

Bates, F. L., & Peacock, W. G. (1993). *Living conditions, disasters and development*. Athens, GA, USA: University of Georgia Press.

Bates, F. L., & Pelanda, C. (1994). An ecological approach to disasters. In R. Dynes & K. Tierney (Eds.), *Disasters, collective behavior and social organization* (pp. 145–159). Newark, DE, USA: University of Delaware Press.

Berkes, F., & Ross, H. (2013). Community resilience. *Society and Natural Resources, 26*(1), 5–20.

Birkmann, J., Cardona, O., Carreno, M., Barbat, A., Pelling, M., Schneiderbauer, S., et al. (2014). Theoretical and conceptual framework for the assessment of vulnerability to natural hazards and climate change in Europe. In J. Birkmann, S. Kienberger, & D. Alexander (Eds.), *Assessment of vulnerability to natural hazards* (pp. 1–20). London: Elsevier.

Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (1994). *At risk: Natural hazards, people's vulnerability and disasters*. London: Routledge.

Boin, A. (2005). From crisis to disaster: Towards an integrative perspective. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 153–172). Philadelphia: Xlibris Publishers.

Boin, A., Comfort, L., & Demchak, C. (2010). The rise of resilience. In L. Comfort, A. Boin, & C. Demchak (Eds.), *Designing resilience* (pp. 1–13). Pittsburgh: University of Pittsburgh Press.

Bradshaw, S. (2014). Engendering development and disasters. *Disasters, 30,* 34–55.

Britton, N. R. (2005). What's a word—Opening up the debate. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 60–78). Philadelphia: Xlibris Publishers.

Buckle, P. (2005). Mandated definitions, local knowledge and complexity. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 173–200). Philadelphia: Xlibris Publishers.

Burton, I., & Kates, R. (1964). The perception of natural hazards in resource management. *Natural Resources Journal, 3,* 412–441.

Burton, I., Kates, R., & White, G. (1968). *The human ecology of extreme geophysical events.* Boulder, CO: University of Colorado, Boulder, Natural Hazards Center, Working Paper No. 1.

Burton, I., Kates, R., & White, G. (1978). *The environment as hazard*. New York, NY, USA: Oxford University Press.

Carr, L. T. (1932). Disaster and the sequence-pattern concept of social change. *American Journal of Sociology, 38,* 207–218.

Carter, N. (2008). *Disaster management*. Manila, Philippines: Asian Development Bank.

Chakraborty, J., Collins, T., Montgomery, M., & Grineski, S. (2014). Social and spatial inequities in exposure to flood risk in Miami. *Florida, Natural Hazards Review, 15*(3), 152–157.

Cisin, I. H., & Clark, W. B. (1962). The methodological challenge of disaster research. In G. Baker & D. Chapman (Eds.), *Man and society in disaster* (pp. 23–54). New York, NY, USA: Basic Books.

Clausen, L. (1992). Social differentiation and the long-term origin of disasters. *Natural Hazards, 6,* 181–190.

Cutter, S. (2005). Are we asking the right question? In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 39–48). Philadelphia: Xlibris Publishers.

Cutter, S. (2016). Resilience to what? Resilience for whom? *The Geographical Journal, 182*(2), 110–113.

Cutter, S., Ash, K., & Emrich, C. (2014). The geographies of community disaster resilience. *Global Environmental Change, 29,* 65–77.

Diefenbach, A., Wood, N., & Ewert, J. (2015). Variations in community exposure to lahar hazards from multiple volcanoes in Washington State. *Journal of Applied Volcanology, 4*(4), 15–24.

Dombrowsky, W. R. (1998). Again and again: Is a disaster what we call a disaster? In E. L. Quarantelli (Ed.), *What is a disaster: Perspectives on the question* (pp. 19–30). London: Routledge.

Dombrowsky, W. R. (2005). Not every move is a step forward. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 79–98). Philadelphia: Xlibris Publishers.

Donner, W., & Rodriguez, H. (2008). Population composition, migration and Inequality. *Social Forces, 87* (2), 1089–1114.

Drabek, T. E. (1986). *Human system responses to disaster*. New York, NY, USA: Springer.

Drabek, T. E. (2013). *The human side of disaster* (2nd ed.). Boca Raton, FL, USA: CRC Press.

Drabek, T. E., & McEntire, D. (2003). Emergent phenomena and the sociology of disaster. *Disaster Prevention and Management, 12*(2), 97–112.

Dynes, R. R. (1998). Coming to terms with community disaster. In E. L. Quarantelli (Ed.), *What is a disaster: Perspectives on the question* (pp. 109–126). London: Routledge.

Dynes, R. R., & Drabek, T. E. (1994). The structure of disaster research. *International Journal of Mass Emergencies and Disasters, 12*(1), 5–23.

Erikson, K. (1976). *Everything in its path*. New York, NY, USA: Simon & Schuster.

Faupel, C. (1987). Human Ecology. In R. Dynes, B. De Marchi, & C. Peland (Eds.), *Sociology of disasters* (pp. 181–212). Milan, Italy: Franco Angeli.

Fischer, H. (2003). The critics corner: The sociology of disaster. *International Journal of Mass Emergencies and Disasters, 21,* 91–108.

Fritz, C. E. (1961a). Disaster. In R. Merton & R. Nesbit (Eds.), *Contemporary social problems* (pp. 651–694). New York, NY, USA: Harcourt Publishers.

Fritz, C. E. (1961b). *Disaster and community therapy*. Washington, DC, USA: National Research Council-National Academy of Sciences.

Fritz, C. E. (1968). Disasters. In D. L. Sills (Ed.), *Encyclopedia of the social sciences* (pp. 202–207). New York, NY, USA: Collier-Macmillan.

Gaillard, J. C. (2010). Vulnerability, capacity and resilience. *Journal of International Development, 22,* 218–232.

Gaillard, J. C. (2016). Natural hazards and disasters. In D. Richardson, N. Castree, M. Goodchild, A. Kobayashi, W. Liu, & R. Marston (Eds.), *The international encyclopedia of geography* (pp. 863–871). Chichester: Wiley-Blackwell.

Gilbert, C. (1998). Studying disaster. In E. L. Quarantelli (Ed.), *What is a disaster: Perspectives on the question* (pp. 11–18). London: Routledge.

Gillespie, D., & Perry, R. W. (1974). An integrated systems and emergent norm approach to mass emergencies. *Mass Emergencies, 1*(2), 303–312.

Hawley, A. H. (1944). Ecology and human ecology. *Social Forces, 22*(4), 398–405.

Hawley, A. H. (1950). *Human ecology*. New York, NY, USA: The Ronald Press.

Hayward, B. (2013). Rethinking resilience. *Ecology and Society, 18*(4), 1–7.

Hempel, C. G. (1952). *Fundamentals of concept formation in empirical science*. Chicago: University of Chicago Press.

Hewitt, K. (1983). The idea of calamity in a technocratic age. In K. Hewitt (Ed.), *Interpretations of calamity* (pp. 3–32). Boston, USA: Allen and Unwin.

Hewitt, K. (1998). Excluded perspectives in the social construction of disaster. In E. L. Quarantelli (Ed.), *What is a disaster?* (pp. 75–91). London: Routledge.

Hewitt, K. (2016). *Regions of risk* (2nd ed.). London: Routledge.

Horlick-Jones, T. (1995). Modern disasters as outrage and betrayal. *International Journal of Mass Emergencies and Disasters, 13,* 305–316.

Ikle, F. (1951). The effects of war destruction upon the ecology of cities. *Social Forces, 29,* 383–391.

Jigyasu, R. (2005). Disaster: A reality or construct? In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 49–59). Philadelphia: Xlibris Publishers.

Johnson, D. P. (2008). *Contemporary sociological theory*. New York, NY, USA: Springer.

Kates, R. W. (1971). Natural hazard in human ecological perspective. *Economic Geography, 47*(3), 438–451.

Keller, E., & DeVecchio, D. (2014). *Natural hazards* (4th ed.). Upper Saddle River, NJ, USA: Prentice Hall.

Killian, L. M. (1954). Some accomplishments and some needs in disaster study. *Journal of Social Issues, 10,* 66–72.

Klein, R., Nichols, R., & Thomalla, F. (2003). Resilience to natural hazards: How useful is this concept? *Environmental Hazards, 5*(1), 35–45.

Konukcu, B., Mentese, E., & Kilic, O. (2015). Assessment of social vulnerability against disasters. *WIT Transactions on the Built Environment, 150,* 13–23.

Kreps, G. A. (1989). Disaster and the social order. In G. A. Kreps (Ed.), *Social structure and disaster* (pp. 31–51). Newark, DE, USA: University of Delaware Press.

Kreps, G. A. (1998). Disaster as systemic event and social catalyst. In E. L. Quarantelli (Ed.), *What is a disaster: Perspectives on the question* (pp. 31–55). London: Routledge.

Kumasaki, M., King, M., Arai, M., & Yang, L. (2016). Anatomy of cascading natural disasters in Japan. *Natural Hazards, 80,* 1425–1441.

Leykin, D., Lahad, M., Cohen, R., Goldberg, A., & Aharonson-Daniel, L. (2016). The dynamics of community resilience between routine and emergency situations. *International Journal of Disaster Risk Reduction, 15*(1), 125–131.

Lindell, M. K. (2013). Disaster studies. *Current Sociology Review, 61*(5–6), 797–825.

Lindell, M. K., & Hwang, S. (2008). Households' perceived personal risk and responses in a multihazard environment. *Risk Analysis, 28*(2), 539–556.

Lovekamp, W., & Arlikatti, S. (2013). Social change and empowerment. In D. Thomas, B. Phillips, W. Lovekamp, & A. Fothergill (Eds.), *Social vulnerability to disasters* (2nd ed., pp. 447–472). Boca Raton, FL, USA: CRC Press.

Lowendahl, B. (2013). *Strategic management of disasters: Italy, Japan and the United States*. Lisbon, Portugal: Universidade Catolica Portuguesa, Escola de Administração de Empresas.

Luchmann, N. (2013). *Introduction to systems theory*. Cambridge, UK: Polity Press.

Lukic, T., Gavrillo, M. B., Markovic, S. B., Komac, B., Zorn, M., Mladan, D., et al. (2013). Classification of natural disasters between the legislation and the application. *Acta Geographica Slovenica, 53*(1), 150–164.

Marre, K. (2013). Components of risk: a comparative glossary. In J. Birkmann (Ed.), *Measuring vulnerability to natural hazards* (2nd ed., pp. 569–618). Tokyo: United Nations University Press.

Mayner, L., & Arbon, P. (2015). Defining disaster: The need for harmonization of terminology. *Australian Journal of Disaster and Trauma Studies, 19,* 21–25.

McEntire, D. (2015). *Disaster response and recovery*. Hoboken, NJ, USA: John Wiley.

McKinney, J. (1970). Social theory and the process of typification. In J. McKinney & E. Tiryakian (Eds.), *Theoretical sociology* (pp. 165–172). New York: Appleton-Century-Crofts.

Mileti, D. S. (1999). *Disasters by design*. Washington, DC, USA: John Henry Press.

Moore, H. E. (1958). *Tornadoes over Texas*. Austin, TX, USA: University of Texas Press.

O'Keefe, P., Westgate, K., & Wisner, B. (1976). Taking the naturalness out of natural disasters. *Nature, 260,* 566–567.

Oliver, J. (1980). The disaster potential. In J. Oliver (Ed.), *Response to disaster* (pp. 3–28). North Queensland: Center for Disaster Studies, James Cook University.

Oliver-Smith, A. (1996). Anthropological research on hazards and disasters. *Annual Review of Anthropology, 25,* 303–328.

Oliver-Smith, A. (1998). Global challenges and the definition of disaster. In E. L. Quarantelli (Ed.), *What is a disaster: Perspectives on the question* (pp. 177–194). London: Routledge.

Oliver-Smith, A., & Hoffman, S. (2002). Introduction: Why anthropologists should study disasters. In S. Hoffman & A. Oliver-Smith (Eds.), *Catastrophe and culture* (pp. 3–22). Santa Fe, New Mexico: School of American Research Press.

Park, R. (1915). The city. *American Journal of Sociology, 20,* 577–620.

Paton, D. (2006). Disaster resilience. In D. Johnson & D. Paton (Eds.), *Disaster resilience* (pp. 3–10). Springfield, IL, USA: Charles C. Thomas.

Paton, D., & McClure, J. (2013). *Preparing for disaster*. Springfield, Illinois: Charles C. Thomas.

Peacock, W., & Bates, F. L. (1987). Disasters and social change. In R. Dynes, B. De Marchi, & C. Pelanda (Eds.), *Sociology of disasters* (pp. 291–330). Milan, Italy: Franco Angeli.

Peacock, W., & Ragsdale, A. K. (1997). Social systems, ecological networks and disasters. In W. Peacock, B. Morrow, & H. Gladwin (Eds.), *Hurricane Andrew* (pp. 20–35). New York, NY, USA: Routledge.

Peek, L. A., & Mileti, D. S. (2002). The history and future of disaster research. In R. Bechtel & A. Churchman (Eds.), *Handbook of environmental psychology* (pp. 511–524). Hoboken, NJ, USA: Wiley.

Peek, L. A., & Sutton, J. N. (2003). An exploratory comparison of disasters, riots and terrorist acts. *Disasters, 27*(4), 319–335.

Perrow, C. (2006). Disasters ever more? In H. Rodreguez, E. L. Quarantelli, & R. R. Dynes (Eds.), *Handbook of disaster research* (pp. 521–533). New York, NY, USA: Springer.

Perry, R. W. (1985). *Comprehensive emergency management*. Greenwich, CT, USA: JAI Press.

Perry, R. W. (1989). Taxonomy, classification and theories of disaster. In G. A. Kreps (Ed.), *Social structure and disaster* (pp. 351–359). Newark, DE, USA: University of Delaware Press.

Perry, R. W. (1998). Definitions of disaster and the development of a theoretical superstructure for disaster research. In E. L. Quarantelli (Ed.), *Defining disasters* (pp. 197–217). London: Routledge.

Perry, R. W. (2005). Disasters, definitions and theory construction. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster? New answers to old questions* (pp. 311–324). Philadelphia: Xlibris Publishers.

Perry, R. W. (2006). What is a disaster? In H. Rodriguez, E. L. Quarantelli, & R. R. Dynes (Eds.), *Handbook of disaster research* (pp. 1–15). New York, NY, USA: Springer.

Perry, R. W., & Hirose, H. (1991). *Volcano management in the United States and Japan*. Greenwich, CT, USA: JAI Press.

Perry, R. W., & Lindell, M. K. (1997). Aged citizens in the warning phase of disasters. *International Journal of Aging and Human Development, 44*(4), 257–267.

Perry, R. W., & Lindell, M. K. (2007). *Emergency planning*. Hoboken, NJ, USA: John Wiley.

Perry, R. W., & Lindell, M. K. (2008). Volcanic risk perception and adjustment in a multi-hazard environment. *Journal of Volcanology and Geothermal Research, 172*(1), 170–178.

Perry, R. W., & Quarantelli, E. L. (2005). *What is a disaster? New answers to old questions*. Philadelphia: Xlibris Publiishers.

Pescaroli, G., & Alexander, D. (2015). A definition of cascading disasters and cascading effects. *Planet at Risk, 3*(1), 1–9.

Porfiriev, B. N. (1998). Issues in the definition and delineation of disasters and disaster areas. In E. L. Quarantelli (Ed.), *What is a disaster: Perspectives on the question* (pp. 56–72). London: Routledge.

Prince, S. (1920). *Catastrophe and social change*. New York, NY, USA: Columbia University Faculty of Political Science.

Quarantelli, E. L. (1982). What is a Disaster? In B. Jones & M. Tomazevic (Eds.), *Social and economic aspects of earthquakes* (pp. 453–478). Ithaca, NY, USA: Cornell University Program in Urban and Regional Studies.

Quarantelli, E. L. (1984). Perceptions and reactions to emergency warnings of sudden hazards. *Ekistics, 309* (6), 511–515.

Quarantelli, E. L. (1987a). Disaster studies. *International Journal of Mass Emergencies and Disasters, 5*(3), 285–310.

Quarantelli, E. L. (1987b). Presidential address: What should we study? *International Journal of Mass Emergencies and Disasters, 5,* 7–32.

Quarantelli, E. L. (1989). Conceptualizing disasters from a sociological perspective. *International Journal of Mass Emergencies and Disasters, 7*(3), 243–251.

Quarantelli, E. L. (1993). Community Crises. *Journal of Contingencies and Crisis Management, 1*(2), 67–93.

Quarantelli, E. L. (1998a). *What is a disaster: Perspectives on the question*. London: Routledge.

Quarantelli, E. L. (1998b). Epilogue: Where we have been and where we might go. In E. L. Quarantelli (Ed.), *What is a disaster: Perspectives on the question* (pp. 234–273). London: Routledge.

Quarantelli, E. L. (2000). Disaster research. In E. Borgatta & R. Montgomery (Eds.), *Encyclopedia of sociology* (pp. 682–688). New York, NY, USA: Macmillan.

Quarantelli, E. L. (2005). A social science research agenda for the disasters of the 21st century. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 325–396). Philadelphia: Xlibris Publishers.

Quarantelli, E. L., Lagadec, P., & Boin, A. (2006). A heuristic approach to future disasters and crises. In H. Rodriguez, E. L. Quarantelli, & R. Dynes (Eds.), *Handbook of disaster research* (pp. 16–41). New York, NY, USA: Springer.

Reynolds, P. D. (2007). *A primer in theory construction*. New York: Routledge.

Rodriguez, H., & Barnshaw, J. (2006). The social construction of disasters: From heat waves to worst-case scenarios. *Contemporary Sociology, 35* (3), 218–223.

Rodriguez, H., Trainor, J., & Quarantelli, E. L. (2006). Rising to the challenges of a catastrophe. *Annals of the American Academy of Political and Social Science, 604*(1), 82–101.

Rosenthal, U. (1998). Future disasters, future definitions. In E. L. Quarantelli (Ed.), *What is a disaster: Perspectives on the question* (pp. 146–159). London: Routledge.

Sengul, H., Santella, N., Steinberg, L., & Cruz, M. (2012). Analysis of hazardous material releases due to natural hazards in the United States. *Disasters, 36*(4), 723–743.

Shaluf, I. (2007). An overview on disasters. *Disaster Prevention and Management, 16*(5), 687–703.

Shaluf, I., Ahmadun, F., & Mustapha, S. (2003). Technological disaster's criteria and models. *Disaster Prevention and Management, 12,* 305–311.

Singh-Peterson, L., Salmon, P., Baldwin, C., & Goode, N. (2015). Deconstructing the concept of shared responsibility for disaster resilience. *Natural Hazards, 79,* 755–774.

Sjoberg, G. (1962). Disasters and social change. In G. Baker & D. Chapman (Eds.), *Man and society in disaster* (pp. 356–384). New York, NY, USA: Basic Books.

Smith, D. (2005). Through a glass darkly. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 292–307). Philadelphia: Xlibris Publishers.

Stallings, R. A. (1998). Disaster and the theory of social order. In E. L. Quarantelli (Ed.), *What is a disaster: Perspectives on the question* (pp. 127–145). London: Routledge.

Stallings, R. A. (2005). Disaster, crisis, collective stress and mass deprivation. In R. W. Perry & E. L. Quarantelli (Eds.), *What is a disaster: New answers to old questions* (pp. 237–274). Philadelphia: Xlibris Publishers.

Susman, P., O'keefe, P. & Wisner, B. (1983). Global disasters, a radical interpretation. In K. Hewitt (Ed.), *Interpretations of calamity* (pp. 263–283). Boston: Allen and Unwin.

Tierney, K. (2014). *The social roots of risk*. Stanford, CA, USA: Stanford University Press.

Tierney, K., Lindell, M., & Perry, R. W. (2001). *Facing the unexpected*. Washington, DC, USA: John Henry Press.

Torry, W. I. (1979). Hazards, hazes and holes: A critique of the environment as hazard and general reflections on disaster research. *Canadian Geographer, 23*(4), 368–383.

Turner, B. A. (1978). *Man-made disasters*. London: Wykeham Publications.

Wallace, A. F. C. (1956). *Human behavior in extreme situations.* Washington, DC, USA: National Research Council—National Academy of Sciences.

Wamsler, C. (2014). *Cities, disaster risk and adaptation*. London: Routledge.

Waugh, W. L. (2006). Terrorism as disaster. In H. Rodriguez, E. L. Quarantelli, & R. R. Dynes (Eds.), *Handbook of disaster research* (pp. 388–404). New York, NY, USA: Springer.

Wettenhall, R. L. (1975). *Bushfire disaster: An Australian community in crisis*. Sydney: Angus & Robertson.

Williams, H. B. (1954). Fewer disasters, better studied. *Journal of Social Issues, 10,* 11–15.

Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). *At risk: Natural hazards, people's vulnerability and disasters*. New York, NY, USA: Routledge.

Wisner, B., Gaillard, J. C., & Kelman, I. (2012). *Handbook of hazards and disaster risk reduction and management*. London: Routledge.

Wisner, B., Kelman, I., & Gailliard, J. C. (2014). Hazard, vulnerability, capacity, risk and participation. In A. Lopez-Carresi, M. Fordham, B. Wisner, I. Kelman, & J. C. Gaillard (Eds.), *Disaster management* (pp. 13–22). London: Routledge.

Young, S., Balluz, L., & Mililay, J. (2004). Natural and technologic hazardous material releases during and after natural disasters. *Science of the Total Environment, 322*(1), 3–20.

Zakour, M., & Gillespie, D. (2013). *Community disaster vulnerability*. New York, NY, USA: Springer.