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TO THE STUDY OF RISK

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ABSTRACT

Sociologists tend to accept in an uncritical way the theories and research findings on risk, currently derived mostly from studies in anthropology and psychology. However, they should critically assess what these other disciplines take for granted, correct such biases as exist in the literature, and adopt a more distinctive sociological perspective on the topic of risk. More specifically, sociology can bring clarity to analyses of risk-related phenomena by studying in a systematic manner: how risk estimates are socially constructed, and how risk is socially produced. Sociologists are particularly qualified to show how social structural, organizational and institutional factors generate and socially distribute hazards and risks.

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Introduction

In his 1984 Presidential address at the American Sociological Association annual meeting, James F. Short (1984) issued a call for a social transformation of the study of risk and the practice of risk analysis, and he urged sociologists to become more involved in the scholarly and policy-oriented dialogues that were taking place in the field. He concluded by arguing that the development of a sociological perspective on risk-related phenomena would not only enhance the study of risk but would also place the field of sociology at the center of important societal debates and controversies to which the discipline can make a unique contribution.

Since 1984, a number of catastrophes have occurred that have further highlighted importance of Short's message. A partial list of these events includes both devastating technological disasters such as the 1984 chemical release at Bhopal, the 1987 Chernobyl nuclear disaster, and the 1989 Exxon oil spill, and massive natural disasters, such as the 1985 Mexico City earthquake, the 1988 earthquake in Armenia, Hurricane Hugo in 1989, the tragic cyclone in Bangladesh in 1991, and Hurricane Andrew in 1992. The losses associated such events are a harsh reminder that risk, uncertainty, and disaster are unescapable features of social life.

Interest in the study of risks, hazards, and disasters has grown considerably in the field of sociology since Short's address,¹ and several writers (e.g., Heimer, 1988; Dietz, Frey, and Rosa, 1993; Clarke and Short, 1993) have suggested possible strategies for formulating a sociological perspective on risk. This paper attempts to synthesize and add to that work by

¹ For example, sessions on the sociology of risk have begun to appear at annual American Sociological Association meetings, sessions on disaster research have increased in number at both national and regional conventions, a section on environmental sociology has formed within the ASA, and the Research Committee on Disasters has been organized within the International Sociological Association.

discussing the distinctive contributions the discipline of sociology can make to the study of risk. First, some background on the field of risk assessment is presented. Next, the discussion moves to a consideration how sociological theory, concepts, and research can inform and improve a field that is generally dominated by other disciplines.

Current Emphases in the Risk Assessment Field

Definitions of terms like hazard, risk, and uncertainty abound in the literature. For purposes of this discussion, risk will be conceptualized broadly, as "the potential for realization of unwanted, negative consequences of an event" (Rowe, 1977: 24). The fields of risk assessment and risk analysis aim at identifying, measuring, and evaluating the outcomes resulting from natural and technological hazards (Mitchell, 1990; Rowe, 1988; Crouch and Wilson, 1982; Lave, 1982; Lowrance, 1976). Multidisciplinary and largely quantitative, risk analysis developed out of related lines of inquiry in the fields of engineering, insurance, decision sciences, and operations research.

In the United States, pressure to develop a systematic approach to the study of risk originated from a number of societal sources, including the need for standards of safety in the regulation of new technologies and products (Mitchell, 1990); increased public concern with risky technologies; growing public skepticism about the regulatory process (Lipset and Schneider, 1983); legislation requiring social and environmental impact assessments; and the insurance industry's need for accurate data which to base premiums (Heimer, 1985; Abraham, 1986). As currently constituted, the study of risk encompasses a range of topics and studies that estimate both the probability of various events and their likely effects, including mortality, morbidity, and economic losses (c.f. Petak and Atkisson, 1982). Much of the literature focuses on the analysis of the risks and consequences associated with natural hazards and disasters, but in recent years technological risks have become a major focus in the field (for a good recent overview, see Royal Society Study Group, 1992). In the social sciences, studies focus increasingly on the perceptions of risk held by both the general public and various specialized audiences (Tversky and Kahneman, 1982; Covello, 1983; Fischhoff, 1990) and on the process of risk communication (Covello, McCallum, and Pavlova, 1988).

To date, other social science perspectives have had more of an impact on the art and science of risk assessment than has sociology (Dietz, Frey, and Rosa, 1993). Studies of risk in the field of geography developed out of a program of research at the University of Colorado on the societal response to natural hazards and expanded in recent years to include a growing body of research on technological hazards. The emphasis in this tradition has been on documenting the risks and impacts associated with various hazards, both in the U. S. and in cross-national context, as well as on

assessing alternative strategies for adjusting to hazards (Kates, 1971; White, 1974; Burton, Kates, and White, 1978; Kates, Hohenemser, and Kasperson, 1985).

The field of anthropology has contributed to discourse on risk by identifying how culture and ideology contribute to societal definitions of danger. Douglas and Wildavsky (1982), for example, describe views on risk not as reflections of objective reality but rather as cultural phenomena that reflect societal and group values and that must be interpreted in light of their broader cultural functions. Kirby (1990: 282) continues this theme by arguing that "the individual's perception of risk is usually dependent upon a social representation, which can be defined as a culturally conditioned way of viewing the world and the events that take place there." Raynor and Cantor argue for a "cultural model of institutional risk behavior" (1987: 8) in which organizational interests shape risk estimates and give rise to conflicts among the various constituencies concerned with risk management.

Among the social sciences, the fields of psychology and social psychology have probably made the largest contribution to date to the study of risk. The main objective of the work conducted within this branch of the field is to understand how individuals perceive various risks and what social psychological factors enter into the estimation of risk. Central to the psychometric paradigm is the argument that most people have difficulty understanding probabilistic risk information and for a range of reasons aren't in a position to develop clear, correct estimates of the risks associated with various activities. A substantial body of published work in this area focuses on how individual perceptions of actual or objective levels of risk are influenced by various distorting factors. Particular emphasis is placed on the nature of human cognitive processes and on the manner in which statements about risk are "framed." Studies focus on the "heuristics," or cognitive shortcuts that distort risk perception; the attributes of risky events that tend to lead to misestimation (e.g., their perceived dreadfulness and irreversibility); the ways in which people's perceptions of hazards shift, depending on the manner in which risk probabilities are stated; and the ways in which the risk perceptions of laypersons differ from the estimates offered by experts and from objective data (Tversky and Kahneman, 1973; Slovic, Fischhoff, and Lichtenstein, 1977; Fischhoff, et al., 1981; Kahneman, Slovic, and Tversky, 1982).

Alternative Perspectives Offered by Sociology

Reflecting on the work conducted to date in the risk assessment area, sociologists and others have begun to identify an entirely different set of biases and distortions--namely, those contained in the risk assessment literature itself. Sociologists are arguing increasingly that existing research on risk can be

criticized less for what it has found as for what it has failed to examine, and that sociology's contributions lie in focusing on what other disciplines take for granted, correcting existing biases, and filling in the gaps in our understanding of risks and risk analysis. Like many recent writings in the field, this paper argues that sociology can bring clarity to discussions of risk-related phenomena by placing more emphasis on studying both the social construction of risk and its social allocation. The paper combines discussions of problems with the way risk is currently conceptualized and studied with suggestions for alternative, more sociologically-grounded approaches.

"Objective" Science Vs. the Social Construction of Risk

Risk as a Social Construct. Writings on risk analysis outside the social sciences overwhelmingly treat the probabilities associated with the occurrence of particular events as objective, knowable, and quantifiable. The estimation of risk is viewed by practitioners in the field as a problem that is inherently capable of solution. A shortage or even an absence of relevant data do not constitute major constraints for the disciplines that deal with risk. In engineering research, for example, probabilistic methods are frequently employed for hard-to-model phenomena (such as nuclear power plant failures) that do not lend themselves deterministic calculations. Problems that might arise in arriving at precise risk estimates are solved through the application of specialized methodologies such as fault-tree analysis. Risk-related variables for which data are insufficient are frequently handled through the use of expert judgment methods such as the Delphi technique, in which panels of knowledgeable individuals are asked to assign probabilities to various outcomes based on their past research, experience, or "engineering judgment." A specialized subdiscipline has developed to deal with what are termed "low-probability, high-consequence" events, i.e., catastrophic events with extremely low historic rates of occurrence, for which risk estimates are nonetheless considered crucial (c. f. Waller and Covello, 1984). Major accidents typically do not call into question the basic assumptions of the procedures employed. Regardless of their empirical soundness, risk estimates, once derived, tend to be reified.

As Perrow (1984) has noted, many social scientists adhere to this objectivist model of risk analysis quite uncritically, treating risk projections as actual representations of reality in their work. In the risk perception subfield, for example, studies focus on understanding the magnitude and origin of the discrepancies that are observed between "actual" and "perceived" risk, and researchers struggle to develop risk communication strategies that bring laypersons' presumably distorted views more into line with calculations of "objective" risk (c.f. Covello, et al., 1987).

However, there seems to be a growing recognition that "[t]o assume that objects are simply waiting in the world to be perceived or defined as risky is fundamentally unsociological" (Hilgartner, 1992: 41). Work in the field tends increasingly to view both risk and risk estimates as socially constructed. A social constructivist approach does not claim that there is no objective basis for believing that certain risks exist. Rather, it assumes that "the basic sociological task is to explain how social agents create and use boundaries to demarcate that which is dangerous" (Clarke and Short, 1993: 379).

Two general areas are studied by sociologists interested in risk as a social construct. The first involves the social and cultural factors that influence the selection of what Hilgartner (1992) terms "risk objects"--a term that encompasses event probabilities, event characteristics, resulting impacts and losses, and the putative sources of those events and losses. A volume edited by Johnson and Covello (1987), for example, contains contributions that examine how various societal actors, including emergent groups, social movements, business enterprises, government agencies, and professions shape both how risks are characterized and the selection of risk management strategies.

The second, more specialized line of research--and the one that is emphasized in this paper--focuses on the social factors that influence the formal risk analysis process. Sociologists have long been interested in the manner in which factors such as the organization of scientific work and the nature of interaction among those engaged in scientific endeavors influence the process of scientific discovery (c.f., Mulkay, 1979; Knorr-Cetina, 1981; Lynch, 1984). In the risk area, Dietz, Frey, and Rosa (1990), argue that sociologists need to study risk analysis as a type of scientific enterprise, and to focus on the institutional constraints that influence the manner in which these analyses are conducted.

Sociological studies of science have produced a number of insights that can usefully be applied to the study of risk. For example, Pinch and Bijker (1984), whose work focuses on both basic science and technology, highlight the importance of "closure mechanisms," the processes by which scientific consensus is achieved in a field, and of groups they call "core-sets," consisting of those scientists that are most closely involved in the settling of scientific controversies. Closure processes and dominant coalitions clearly influence the production of risk estimates. Perrow (1984) and Schrader-Frechette (1985), for example, describe how the risk assessments that were conducted on nuclear power were influenced by various organizational considerations, resulting in the exclusion of many potential causes of system failure.

Even in relatively well-understood area like airline safety, limits are placed on what safety threats risk analyses will consider.² The socially-constructed nature of risk estimates is even more evident for technologies (e. g., atomic breeder reactors, genetic engineering) that are too new to be accompanied by extensive performance records, with potential effects that are poorly understood (Perrow, 1984). A lack of actual experience does not prevent analysts from constructing risk estimates for catastrophic natural disaster events that have no historic parallel, such as a recurrence of the New Madrid earthquake sequence of 1811 and 1812 in the Central United States, the occurrence of a 7.0 earthquake on the Newport-Inglewood Fault, or a comparable event on the Elysian Park Fault System in Los Angeles.

Because there is typically considerable pressure to produce tangible scientific projections and because of the politically-charged nature of much of the research that is conducted in the field, risk analyses are invariably subject to distorting influences--perhaps more so than other types of scientific analysis. Clearly, more research is needed that sheds light on how and why specific risk calculations are constructed, as well as on the processes through which they come to be accepted as valid.

Structural Influences on Risk Estimation Practices. The argument that risk estimates are social constructs rather than characterizations of objective phenomena begs the question of why particular risk estimates are selected, rather than others (Reiss, 1992). To address this issue, it is necessary to focus on the institutional and organizational context in which positions on risk are developed and promulgated. Those who have studied and participated in the development of risk estimates provide important insights on how those influences work. For example, Henry Kendall's (1991) account of the way in which the problems associated with nuclear power were systematically underestimated for decades discusses in detail how various organizational entities, such as the Atomic Energy Commission, the Joint Committee on Atomic Energy, and the Nuclear Regulatory Commission consistently pushed the idea that nuclear power plants were necessary, safe, and economical, despite mounting evidence to the contrary. Even very early on, for example, studies that could have been detrimental to the nuclear energy program, such as WASH-740, which was commissioned by the Atomic Energy Commission and conducted by Brookhaven National Laboratory, were simply not

² In their article on the 1989 Sioux City, Iowa airline crash, for example Charles and Settle (1991: 79) note that the total hydraulic failure that caused the crash was deemed by the manufacturer and the airline as so unlikely that "pilots are neither specifically trained to respond to such a catastrophe, nor are flight manuals written with instructions on how the flight crew is to proceed under such circumstances."

allowed to see the light of day. Over the years, as the program expanded, many critical safety issues were either ignored or left unresolved, and the safety recommendations that were accepted by expert panels were often implemented in a weaker form. In this same vein, Lee Clarke (1985) documents the highly activist role played

by the Federal government in promoting nuclear energy. The government needed to take a strong advocacy position and overcome the utility industry's resistance because nuclear power was closely linked in the plans of policy-makers with the military uses of atomic energy.

Clarke (1990) has also looked into the role played by key institutional actors in framing estimates of the risks associated with oil spills. Focusing on both the decision to build the trans-Alaska pipeline and the use of supertankers like the Exxon Valdez, he shows it is incorrect to think that decisions about large-scale technologies and projects are driven by considerations of safety or risk. Rather, the opposite is the case: safety projections should more appropriately be viewed as the byproducts of decisions made on economic and political grounds--figures produced to bolster the argument that the measures decided on are needed. Once a decision is made to undertake a project, and to do that project in a particular way, then studies are conducted that show how necessary it is--and how safe it is.

In a similar analysis, Vaughan (1989) examines how the structure and decision-making processes of the NASA team contributed to the distorted conceptions of risk that resulted in the Challenger accident. Her findings suggest that risk assessments are appropriately viewed not as the product of objective, scientific calculation, but rather as the product of organizational decisions. Influencing these decisions is a combination of technical information, organizational agendas and constraints, and role-related pressures. Starting from the premise that risk assessments that are based only on what is known about the performance of technical systems are inherently invalid because they fail to consider the contribution the organization itself makes to risk, she concludes that "when technical systems are assigned low, moderate, or high risk potential without considering the organizations that produce and run them, the risk is always greater than we think" (Vaughan, 1989: 346). Even though organizational factors are increasingly seen as playing a significant role in technological disasters (see, for example, Shrivastava, 1987), risk assessments still ignore these factors (Fischer, 1991).

The risk analysis field in the U. S., by its very structure and organization, has an especially close affinity with the interests of the Federal government and major industries. Studies on the U. S. "risk policy system" (Dietz and Rycroft, 1987; Dietz, Frey, and Rosa, 1990) find that the majority of the professionals

in the risk analysis field work in a small number of institutional settings. About one-fourth of those professionals work for federal government regulatory agencies. Corporations and industry associations employ the next largest number of professionals, about 18%. The remainder are split among law and consulting firms, environmental organizations, state and local governments, labor organizations, universities, and "think tanks." Analysts with the highest levels of expertise and training typically work for government or private industry. Thus, if the institutional agenda emphasizes scientific consensus and the need to take a unified stand on some risk-related issue, it is relatively easy for organizations to obtain the analyses they need, particularly with the budgets they have at their disposal and the controls they are able to exercise over those who do the actual work. Government and industry have, in effect, "cornered the market" on risk analysis.

Neither sector is known for its tolerance of whistle-blowers and non-team players. Russell Peterson, a member of the Kemeny Commission, which investigated the Three Mile Island nuclear power plant incident, made the following observations about how willing the scientists involved were to listen to individuals with differing perspectives, even in the aftermath of the accident (1982: 42):

Why is it that a Ph.D. nuclear physicist who has worked on nuclear energy in a highly creditable way with his colleagues for many years loses his credibility at the moment that he questions the safety of nuclear energy? I tried to arrange for just one such nuclear physicist to work side by side with, or just consult with the nuclear scientists on the Kemeny Commission staff, who as a group had the mindset that nuclear energy is safe. This effort of mine was successfully resisted.

Clarke (1993), borrowing from the work social psychologists have done on the role of heuristics in individual risk perception, suggests that organizations also use heuristics when they develop their positions on risk. Contingency plans for disaster events such as major oil spills are based on accident scenarios, which are in turn based on quantitative, "objective" risk analyses. However, in deciding the types of events to model, organizations invariably show a distinct preference for easy-to-manage scenarios and low risk estimates--and these estimates are then used to justify their correspondingly optimistic assessments of their ability to respond.

Risk perceptions are typically used in analyses as independent variables that explain various behavioral outcomes, such as the self-protective decisions individuals make. However, such perceptions and perceptual frames might also be studied as dependent variables. Heimer (1988) suggests, for example, that the heuristics and perceptual frames focused on by the social psychologists who study risk can be viewed as outcomes of the rhetorical strategies that various institutions employ in pressing their claims about risk levels. The public's judgments about risk do not develop in a vacuum; rather, they are influenced by organizational strategies that seek to frame risks in particular ways. Because institutional power and resources are key determinants of the ability to persuade effectively, "some groups, such as federal officials and representatives of business, are more likely to be able to get their cases heard than are others, such as workers and environmentalists" (Heimer, 1988: 505). In addition to treating frames as outcomes rather than independent variables, Heimer's discussion also highlights the importance of moving beyond individualistic, psychologistic, and objectivist views of risk and focusing instead on the political functions of risk assessment.³

³ The examples discussed so far describe situations in which the risks associated with certain events and activities have been systematically underestimated and even ignored. However, examples can also be cited involving organized efforts to use risk estimates to argue that certain risks are unacceptably high. As in the other examples discussed, it is also possible to link these assessments of danger institutional interests. For example, a group called Natural Disaster Coalition, which represents the U. S. insurance industry, has for several years been developing scenarios and promulgating estimates for losses associated with hypothetical catastrophic disasters in the U. S. The Coalition projects huge losses and negative economic consequences on a national level for some of these disaster events, predicting that the entire insurance industry would likely falter as a result of massive disaster-induced payouts. One of the objectives of these assessments is to convince the Congress that a federal hazard insurance program is needed to provide back-up funds for private insurers.

Manning (1989: 351) who also rejects the objectivist perspective on risk estimation, argues that what should be used instead is a perspective based in the political economy of organizations:

Ultimately, organizational decisions concerning the existence, level, kind and location of risks and the consequences for target populations are political decisions. The values by which decisions are rationalized, and the grounds presented to publicly account for these decisions, are in the first instance neither 'legal' nor based entirely on scientific reasoning. They do not rest solely on probabilistic calculations of likely outcomes. This is true even if the rendered accounts for the decisions are cast in the language of 'risk analysis.'

Constructing the Causes of System Failures. Non-social scientific assessments invariably portray risk as a property of physical or technical systems and their components; accidents or disasters occur because system components fail to perform as they are supposed to. The search for causes and explanations for disaster events is typically not wide-ranging. In studies of system failures, proximate conditions are emphasized, and generally two categories of causes are favored: physical/technical system failures and "human error." Explanations are sought in the design details of system components, the immediate circumstances surrounding an accident, and individual decision-making at the time an incident occurs. Thus, analyses of the Challenger accident focus on "O-rings," analyses of the collapse of the Cypress structure in the 1989 Loma Prieta earthquake focus on the proper engineering specifications for double-decker highways; analyses of the Exxon oil spill focus on who was on the bridge when the tanker hit Bligh reef, how much the captain drank, and when he drank it; and accident analyses focus on poorly maintained gauges that don't work, dials that don't give the right readings, and operators who don't use good judgment. What are typically not discussed are the broader organizational, institutional, and societal factors that contribute to system failure.

Leo Tasca's The Social Construction of Human Error (1990) is a good example of the type of work sociologists ought to be doing to broaden the causal framework used in the analysis of disaster events. Through analyzing investigations on maritime accidents, Tasca shows how accident report findings and conclusions are shaped by legal and institutional pressures, specifically the interests of organizations like the U. S. Coast Guard and the various legal and administrative entities that regulate shipping. He also shows how the individualistic assumptions about blame for accidents, which

are embedded in judgments about human error, serve to divert attention away from the structural sources of marine accidents, such as the production pressures ship owners place on marine workers.

In work resembling Gusfield's (1981) research on the drinking-driving problem, Stallings (1990) analyzes news reporting on a bridge failure that resulted in nine deaths to illustrate how the mass media construct the causes of accidents. He argues that certain causal factors are selected for emphasis because of the kinds of sources news reporters typically use; the use of particular sources is related in turn to journalists' knowledge of which organizations have been linked in one way or another to the problem. Monocausal explanations, particularly those emphasizing individual actions, are favored over multicausal ones. Other studies on mass media and the social construction of risk (e. g. Gamson and Modigliani, 1989), provide additional insights on how particular models of causation come to be embedded in organizational and public discourse.

Risk as a Dynamic Process. A sociological perspective on risk also challenges the essentially static, closed-system approaches that analysts favor in their formulations of risk estimates. Assuming, as many analyses do, that employing data from past accidents and disasters permits the assessment of future risks runs counter to what sociologists know about risks and hazards. Disaster researchers have long pointed out that human activity and social change continually modify societal, community, and individual vulnerability levels; past experience is not an indicator of future crises and losses. This principle holds for all types of

hazards, from the most recurrent and well-understood natural hazards (e.g., floods) to the most rare and exotic technological agents. Since that is the case, it follows that risk levels also fluctuate, both over time and across different social units.

Like human settlements, airplanes, dams, power plants, manufacturing facilities, and other physical systems are inherently neither safe or risky; safety and risk are the products of the interaction between those systems and the social processes surrounding their use. At the simplest level, physical systems become more prone to failure as they age, and maintenance practices, the emphasis placed on safety, and other organizational factors also influence their failure probabilities. Changes in the social environment in which systems operate clearly affect their performance. The failure of the savings and loan system, for example, arguably one of the most catastrophic economic "accidents" in U. S. history, was not so much the product of individual greed and crookedness (although these factors certainly cannot be

discounted) as it was the result of gradual, incremental changes in the regulatory environment in which thrift institutions operated that gradually undermined their solvency and increased risk. Ten years ago, very few people would have viewed the decision to place money in a savings account as risky, but the risks increased steadily, mainly due to changes in the environment in which savings-and-loan institutions operated.

Risk analysts of course argue that they can "model in" the effects of system and environmental changes that influence risk levels and thus derive valid overall estimates of risk. But such estimates are themselves subject to the same biases as the other factors that enter into risk calculations. The fact that data based on past performance are reasonably good predictors of the future events does not in and of itself lend credence to scientific projections, even if those data are abundant.

The Social Allocation of Risk

Much of the literature on risk likewise downplays two other dimensions of risk that ought to be central foci for sociologists: the social allocation of risk and the unequal consequences hazards have for different segments of society. In the risk literature, people tend to be depicted as voluntarily "assuming" risks, either because of a need for the benefits accruing from risky behavior, or because of their poor understanding of actual risk levels. However, a more sociological approach would focus on the processes through which risks are imposed on people, either because they are denied access to information on risks, or because their choices with respect to risks are socially structured. Sociologists like Clarke (1985; 1988; 1989) point out that while members of the public are typically characterized as making choices about risk, organizations and institutions are actually far more important decision-makers in the risk area. Many (if not most) decisions about "acceptable" risk levels are made by organizations, not members of the general public, who may in fact know little about the risks they face. For example, facilities producing, transporting, and storing very hazardous materials obviously pose some risk to nearby community residents. However, prior to the passage of the Superfund Amendments and Reauthorization Act (SARA) of 1986, there was no legal requirement that chemical companies disclose to community residents any information whatsoever about the kinds of hazardous chemicals processed and stored at facilities. In what sense then did residents "assume" whatever risks they faced?

Although technological hazards are the most obvious examples, risks in the natural hazards area are also largely imposed, rather than assumed. For example, although the need for enhancing levels of earthquake safety is increasingly emphasized in the U. S., the kinds of measures most likely to be effective in reducing

earthquake losses are largely actions that cannot be undertaken by the average building tenant or worker, but that rather must be performed by a property owner or employer.⁴ Since hazard reduction decisions are made on economic grounds, and since real hazard reduction costs money, owners resist taking the necessary steps.⁵ As a consequence, many tenants, workers, and other building occupants in areas of high seismic risk involuntarily live and work in structures that could be highly hazardous in an earthquake situation. This occurs not because they have chosen to assume a risk, but rather because the choice has been made for them.

Low levels of seismic safety exist because they help contain costs and protect profits. Pro-development interest groups, landlords' associations, and the real estate lobby are among the groups that consistently oppose earthquake hazard mitigation measures when they are proposed and that try to weaken such measures when they are adopted (Olson, 1985; Alesch and Petak, 1986). Meanwhile, many of the individuals who live and work in hazardous locations may actually be unaware of the hazards they will face if an earthquake occurs.⁶ Similar patterns of opposition

⁴ Earthquake awareness, earthquake education, and earthquake preparedness are often emphasized as desirable goals in the public policy area. Not coincidentally, they are also relatively inexpensive. More potentially effective measures that are considerably more expensive are much more controversial, not only because of how much they cost, but also because of who would have to pay for them--i.e. important organizational and institutional actors. These measures include making appropriate decisions about land-use and the siting of structures away from seismic hazard areas; employing appropriate seismic design and construction practices; relocating structures, facilities, and activities when seismic hazards become apparent; retrofitting buildings constructed under earlier, less effective building codes; and anchoring wood-frame structures more firmly to their foundations.

⁵ The term "owners," as used here, does not refer only to private owners and landlords. Important institutional property owners in California that have historically been reluctant to take actions that would enhance the seismic resistance of the buildings they own include the University of California, the State of California itself, and the Federal government. The situation has improved marginally as a result of recent earthquakes, but change is occurring very slowly.

⁶ Although the earthquake hazard is more widely recognized in California, other parts of the U. S., including the New Madrid Fault Zone in the Central U. S., the Puget Sound area, and parts of Utah, South Carolina, and New England are also subject to the earthquake threat. When attempts have been made to put the earthquake problem on the political agenda outside

by development interests have been observed for other natural hazards (c.f., Burby and French, 1981; Godschalk, Brower, and Beatley, 1989). The typical strategy is to fight legislation when it is proposed, stretch out the timetables for implementation of laws that pass, and weaken enforcement.

The earthquake example illustrates another sociologically relevant point many risk analysts gloss over in their work: that risks are imposed unequally in society, and frequently those most exposed are least able to cope with risk. In general, the people most likely to involuntarily face hazards and least able to recover when disasters occur are those who lack socioeconomic resources. To continue with the earthquake example, the old masonry buildings in California that present the greatest collapse hazard in the event of an earthquake also constitute a major rental housing source for low-income residents. In the 1989 Loma Prieta earthquake, the cities of San Francisco and Oakland both lost a significant proportion of their low-income housing units due to earthquake damage; single-room-occupancy (SRO) hotels were particularly hard-hit in that event.⁷

California, organized opposition to upgrading building codes and improving construction practices has typically been swift and effective. The political economy works to discourage seismic upgrading throughout the country.

⁷ Following that earthquake, the Federal Emergency Management Agency (FEMA) was severely criticized for disaster assistance policies that unfairly discriminated against low-income households, members of the homeless population, and people in transient living situations (General Accounting Office, 1989). A class-action lawsuit filed against FEMA in 1989 resulted in an out-of-court settlement earmarking FEMA funds specifically for the reconstruction of housing for low-income tenants.

This case illustrates another flaw inherent in risk assessment/loss estimation studies. From a purely quantitative loss estimation perspective, the destruction of a \$1.2 million dollar structure in the Marina district of San Francisco that was home to two families prior to the earthquake would be considered equivalent to the loss of a \$1.2 million dollar structure in the Tenderloin district that was home to ten families. Marina tenants could have purchased earthquake insurance and would be able qualify for disaster loans, which would speed their recovery. The tenants in the Tenderloin would have no insurance would likely not be eligible for loans. Quantitative loss estimation techniques systematically downplay the losses experienced by the poor, which for those families are significantly greater than those the rich experience.

Low income and economically dependent communities and neighborhoods bear a disproportionate share of the risks associated with hazardous chemicals manufacturing and hazardous waste disposal (General Accounting Office, 1983; Couch and Kroll-Smith, 1985; Commission for Racial Justice, 1987). The need for tax revenues and jobs leads communities in less well-off areas like the South to compete to attract economic activity that also brings the potential for acute and chronic technological hazards. For example, Southern states with ailing economies have become depositories for hazardous wastes from more affluent regions of the country; of the five states that were leaders in attracting polluting industries during the 1970s, four were in the south (Bullard, 1990). Within those states, poor, minority, and less politically-organized communities end up as the "hosts" for such facilities.

Some researchers contend that "environmental racism" is a major element in corporate and government actions that put communities at risk from technological hazards. Bullard, for example, (1994) cites a number of studies suggesting that even when income is held constant communities with large minority populations are more likely to be exposed to toxic hazards and noxious facilities, and that government agencies also act more slowly and spend less to ameliorate toxic hazards affecting those communities. According to this perspective, the higher toxic risks minority communities face is yet another manifestation of the racism that pervades social life.

Although Bullard's arguments are compelling, it is not yet clear whether the siting of noxious facilities is a function of residents' ethnicity, their income levels, or the extent to which they are organized and politically influential. For example, middle-class white homeowners have a long history of organizing politically to fight against threats to property values and LULUs (locally unwanted land uses). Since they have more political clout than less well-off minority residents, they are more likely to prevail in conflicts over land use. Groups that lack political influence are less able to resist encroachment by LULUs and less able to get chronic environmental problems addressed in their communities. Minority and low-income residents may also have been more willing to tolerate the presence of noxious facilities if they brought the promise of jobs. While concern for the environment is widespread in society, the environmental activism in the U. S. has been largely a white, middle class phenomenon (Morrison and Dunlap, 1986). It is only in the last decade that blacks have begun to define environmental quality as an issue of racial justice; black mobilization against hazardous facilities is a new phenomenon (Bullard, 1990; 1994). It is likely that, in addition to race, income and organizational/political resources are important factors explaining the social allocation of the risks associated with toxic hazards. More research is needed to determine the processes through which these and other risks are socially distributed.

Concluding Comments

What is generally missing from the dominant perspective on risk is an analysis of the ways in which risk and power are related. Having political and economic power means being able to impose risks, influence public discourse about risks, sponsor and conduct research that presents risks in particular ways, and lobby for particular positions on the acceptability of risk. Rather than uncritically accepting risk assessments or trying to make risk estimates more accurate, sociologists should be studying those processes.

In his influential compendium of research findings, Drabek (1986) contrasts two approaches to conceptualizing disasters, which he calls the "event-focused" and the "social problems" perspectives. In adopting the latter perspective, he argues, researchers are beginning to place disaster events in a wider social context, "a context of ongoing social processes whereby some individuals enter into locations of greater risk--at times knowingly and voluntarily, and at times unwittingly" (1986:38). The social problems perspective recognizes that disasters--and risk in general--are not externally-generated agents that impinge on societies and communities, but rather are the products of social structure and dominant institutional practices. Sociology's contributions to the study of risks and hazards lie in its unique ability to uncover the societal and organizational sources of vulnerability.

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