

As If Exposure to Toxins Were Not Enough: The Social and Cultural System As a Secondary Stressor

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A growing body of evidence indicates that toxic contamination, both indoor and outdoor, negatively affects sociocultural systems and that this in turn affects the social and psychological response to the contamination. Using secondary case studies and primary survey, interview and observation data from three toxic contamination situations, this paper conceptualizes and summarizes the findings to date. We argue that using a sociocultural perspective helps us to understand much of the seemingly inexplicable behavior that accompanies cases of toxic contamination. Using examples from primary and secondary case studies, four areas in which the sociocultural system affected by toxic contamination can influence the outcome of the response are described: *a*) engineering options may be frustrated by sociocultural systems; *b*) communications may be frustrated by sociocultural systems; *c*) cultural images and social structural patterns of space usage can affect response; and *d*) sociocultural systems can affect medical outcomes. Given the nature of sociocultural systems and human behavior, measuring the relationship between contamination, social response, and individual behavior is difficult. An example of one approach using the concept of alienation is discussed, wherein linkages have been found between toxic contamination, alienation, and psychological coping difficulties. Implications for professionals responding to toxic contamination cases are also discussed. We conclude that a sociocultural perspective provides a necessary complement to medical and engineering perspectives if we are to fully understand human reactions to toxic contamination and move toward alleviating human health problems associated with these risks.

Introduction

The effects of indoor air quality have received considerable study and attention from scientists in recent years. This paper is somewhat different from the others presented at this conference because of the areas of expertise of the authors. We are not physical scientists, nor are we physicians. We are sociologists, that rather different cross-breed of intellectual that combines some of the traits of hard scientists with others of humanists. Some say this interesting intellectual history has given us quite superior peripheral vision, allowing us to make sensible pictures of sights that appear blurred to others. On the other hand, some would see, as very appropriate, the story which has a sociologist overhearing his housekeeper answering the telephone and saying to the caller, "Yes, this is where the doctor lives, but he's not the kind of doctor that does anybody any good."

We hope we do people some good. More specifically, we hope that our paper in this volume can add an important dimension to the study of technological hazards, such as indoor air pollution. That dimension has to do with the importance of the sociocultural perspective in affecting the impact of toxic contamination on

humans and in shaping the efforts we make to cope with this contamination.

In recent years, we have witnessed a proliferation of technological hazards and disasters that have had major impacts on human populations. Ranging from toxic chemical contamination to radiation leakages to underground mine fires, many of these hazards and disasters have included issues of indoor air quality (1-4). And many have resulted in serious problems for engineering and medical officials who have attempted to alleviate the technical and health problems that have accompanied these hazards and disasters. From the point of view of these professionals, their job has often been hampered by what appear to be very odd behavioral patterns of many in the affected population.

In a community plagued by an underground coal mine fire, a federal mining engineer speaks at a public meeting to inform the residents of the progress of a borehole study designed to discover the scope of the fire so that rational remedial action can be taken. The engineer is shouted down by hostile residents demanding to know what the government will do to protect their health right now, a question he was not prepared to field nor trained to answer (Kroll-Smith, unpublished data). He believed he was trying to help the community by sharing information in an open manner with them. Residents perceive him as the enemy.

In Memphis, rumors were initiated that a residential area was built on what had once been a toxic waste dump. Neighborhood residents visited their physicians, complaining of various maladies that they attributed to this dump under their houses. Eventually, it was discovered that the dump never existed (5).

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In response to concerns over the health effects of chemicals leaking from a toxic waste dump at the Love Canal, New York State's Health Commissioner announces a plan that he believes will remedy the problem and protect the health of the residents of the area. He believes he is acting in a responsible, professional manner. After announcing the plan, a young woman from the audience shouts, "You're murdering us!" (2).

Behaviors such as these are very frustrating to scientists and engineers concerned with understanding and alleviating technological hazards and their results. These behaviors seem inexplicable, irrational, and counterproductive. Indeed, they are far from what we would expect, given what we know of behavior following natural disasters.

Social and Psychological Response

Natural disasters in developed countries are frequently experienced as emotional shocks, but only rarely do they result in long-term psychosocial impairment (6-8). The trauma of technological hazards that disrupt the relationship between people and the biosphere, however, frequently last for years, impeding the psychosocial development of victims (9-11). Chronic psychosocial impairment does not fit the common core of expected post-hazard responses and must give us pause to consider the unique problems posed by willful or negligent contamination of the environment. Kasperson and Pijawka (12) observe that the "major burden of hazard management in developed societies has shifted from risks associated with natural processes to those arising from technological development and application."

Why do technological disasters diminish the long-term psychosocial health of victims to a greater extent than natural disasters? Perhaps it is because toxic spills, asbestos decay, or core meltdowns "contaminate rather than merely damage. . . they pollute, befoul, taint, rather than just create wreckage and they scare human beings in new and special ways. . ." (13). The primordial antipathy to the thought of being poisoned requires little commentary. Surely, here is the essential reason for the prolonged impact of environmental contamination. Indeed, if more complex forms of human development are contingent on gratification of the need for physical safety (14), the perception of one's house, backyard, or neighborhood park as poisoned would interfere with such growth. But we will complicate the picture considerably if we ask an additional question: Where does the perception of contamination come from?

There are two quite different answers to this question. If people behave as engineers, as some have argued (15), then they will seek all the facts and deduce from them the degree of threat posed by the contaminant. The image is of an objective world to be known and a rational knower sorting and assessing the facts. Assumed here, however, is that all the facts are known and are communicated in a manner that make them knowable to the nonscientist; also assumed is that people act as isolated individuals and that behavior naturally follows the rational accumulation of facts. A major criticism of the rational actor answer, however, is that the scientific formulation of reality does not exhaust the possible range of human actions, most of which are based on nontheoretical or commonsense assumptions about the world (16). Indeed, the post-modern view of science itself now assumes the subjective biases of scientists as critical in understanding how "rational" inquiry is accomplished (17).

If ordinary people do not engage solely in logico-deductive reasoning to make sense out of their world, what else do they do? Another answer suggests that they construct reality in concert with others. "Humans experience their environment," Douglas (18) writes, "mediated by conceptual categories fabricated in social interaction." Assumed here is that "safe" and "hazardous" are socially constructed categories of meaning. The sense people make out of their world, in other words, is shaped more by the activities of others than by "objective facts."

Between events and behavior formed in response to those events, there is a social process of definition (19). Persons experiencing a flood or hurricane are not just responding to the physical events themselves, but to what those events mean and represent to them as socially constructed crises. Between the physical environment and human response is a social process that constructs the meaning of a situation or event as dangerous, hazardous, challenging, or benign. A social constructionist view of the perception of risks and threats suggests that although psychosocial distress is experienced by concrete individuals, it arises from and is resolved or intensified in a social context. A comprehensive interpretation of disaster trauma, in other words, will include an account of the sociocultural processes that shape the experience of distress. We "are disturbed," wrote Epictetus, "not by things, but by the views which [we] take of things."

To this view of the person as appraising and fashioning a world in concert with others, we modify the traditional disaster stage model to fit the case of biospheric contamination and add the complementary notion that it is more than an objective sequence of event-bounded steps; it is also a moral vocabulary encouraging, discouraging, and justifying responses to the event.

When natural disasters are the cause of extreme environments, the unstructuring of routines and common coping modes can begin with the warning stage, the apprehension that a calamity may occur (20). By the threat stage, when there are unequivocal signs of the approaching disaster force, the extreme situation is underway. During impact, a maelstrom of flying debris or raging floods or towering walls of fire rip apart the last vestiges of "business as usual" in the full force of nature's wrath. The impact stage is temporally significant because it marks the most intense point in the disaster sequence, after which there may be considerable pain and grief, but the destruction is over.

During the inventory and rescue stages immediately following impact, survivors begin to assess their losses and gradually piece together a picture of what has happened. Survivor groups spontaneously emerge—small altruistic communities whose goals include treating the wounded, extinguishing fires, and freeing trapped victims. With the onset of the remedy stage, the extreme situation begins to subside as outside relief agencies take control of the disaster scene and impose a formal structure (not always with the approval of the survivors) on the inventory and rescue stages. During the recovery stage the extreme environment has been replaced with either the reconstitution of the old structure or the implementation of a modified pattern of personal and collective life.

Note that in this stage model, the time lapse between the warning, threat, impact, and inventory and rescue stages can be very brief, in some cases, only several minutes. The stage most likely to be extended in time is the warning stage. The eruption of Washington State's Mount St. Helen's volcano in 1980, for example, had been anticipated for several weeks. The time lapse

between the threat stage and inventory-rescue, however, was less than an hour. The extreme environment created by natural disasters is typically short lived, a horrendous moment in time bounded by two periods of stability—one historical, the other emergent. At that point, the disaster enters the collective memory, recalled only on those occasions deemed appropriate for remembering a shared experience of horror.

Chronic Technological Disaster

The type of extreme environment created by a long-term, humanly caused disaster (termed a “chronic technological disaster,” or CTD) is considerably different from that described above. The Centralia study and the work on Love Canal (1,2) speak of a protracted, seemingly endless period of time between the discovery of the aversive agent and the realization that its worst consequences have past. There is no brief moment of terror followed by an easily defined sequence of inventory, rescue, remedy, and recovery. Indeed, for many Centralians and residents of Love Canal, relief from fear came only when they were permanently removed from their homes and towns, a process that took several years.

CTDs tend to trap a portion of a population in the warning and threat stages, freezing them in extended periods of apprehension and dread. A mine fire that moves slowly through accessible veins of toxic chemicals that leach invisibly through underground swales may at times give signals that danger is near, but the signals are frequently vague and open to dispute. Long-term exposure to warning and threat, particularly when it is unevenly distributed throughout the population, places severe demands on the coping resources of a population.

Occasionally, individuals or families experience the impact of the agents in the form of subsidence, a chronic cough, or lassitude. But since the experience rarely extends beyond the person or the family, it is not likely to become the occasion for communal action. Indeed, the source of the impact—the reason a family is always tired or a person is having upper respiratory trouble—is itself frequently vague to the point of inviting multiple interpretations. In other words, the impact of the CTD, to borrow a distinction from C. W. Mills, is more likely to remain a “trouble,” a personal problem, than to become an “issue,” a socially recognized occasion for communal response (21).

Trapped in the first two stages of the disaster cycle, a population is prevented from progressing to the point of reassembling a distribution of itself into complementary understandings and tasks. Any attempt at what we might call efforts at remedy and recovery are not humanistic efforts directed toward the affected population but technical activities aimed at disposing of the aversive agent. More likely than not, as we witnessed at Times Beach, Centralia, and Love Canal, remedial and recovery technology, however confounded by political game playing, will be unable to stop the advance of the disaster agent. Residents are rescued only by relocation, which does not allow the settlement to reestablish itself. The web of social positions woven by common understandings is ripped apart before there is an end to severe social and ecological disruption. The more the stages of warning and threat become institutionalized, that is, the more these normally temporary stages take on the character of permanence, the greater will be the toll on affected populations. A CTD does not create a moment between points of stability;

rather, it imposes a fixed, seemingly permanent period of instability, a time within which conventional patterns of behavior no longer seem to work. Extended periods of ambiguous warning and threat destabilize the traditional pattern of social relationships and call into question the commonly held beliefs upon which social life is based. Objective reality can no longer be agreed upon, as some claim to be in grave danger, and others claim the situation is not that serious. These different claims about danger can have a negative impact on the ability of individuals to deal with the situation at hand.

Interpreting the deleterious effects of these claims about danger on the individual begins with the idea that in toxic contamination cases “subjective evaluations are closely tied to the development of physical and mental health problems” (10). Subjectivity is related to uncertainty. People facing the threat of chemical contamination or asbestos poisoning live in a chronic stage of contingent loss. The greater the degree of contingency or uncertainty, the greater the need to construct symbolic claims of the scope and seriousness of the threat. “In situations . . . involving exposure to invisible contaminants . . . one finds that invisible health threats are met by the development of nonempirical belief systems about the nature of the threats” (22,23). Several studies suggest that these symbolic claims “may be more important in determining chronic stress and mental health effects than is the actual threat or danger posed” (1,9,22,24). Thus a key question in the study of the social sources of trauma concerns the meaning of beliefs in victims’ emotional and behavioral response to threat or loss.

Beliefs—Certainty and Reality

In earlier articles we called nonempirical or symbolic constructions of danger “threat belief systems” and distinguished them from risk perceptions (23,25). Most studies of risk rely on the concept “perception” to convey the link between the hazard and the person’s appraisal of danger. While we have learned a great deal about the individual’s potential response to risk situations through the study of perception, the ego orientation of the concept has tended to narrow interpretations to the psychological makeup of the perceiver. Beliefs, we suggest, more profoundly influence the believer than perceptions influence the perceiver. To perceive is to become aware of something directly through the senses; to believe, on the other hand, is to commit with conviction to a publicly ratified view of some aspect of the world. Beliefs are internalized, they are located deeper in the psyche than perceptions and are far less easily modified.

The tenacity of beliefs is explained in part by the fact that they are social phenomena. While perceptions issue from sensory stimuli, beliefs are constructed in conversation among people who agree that the world or a portion of it is sacred, safe, dangerous, worthy of trust or distrust, and so on (26,27) [the classic statement on the sociology of belief remains Durkheim’s (28)]. Collective agreement strengthens the hold beliefs have on believers. Perceptions are more private matters, easier to revise; to violate a belief, however, is to risk censure and disapproval. Thus, embedded in beliefs is a moral claim on believers. They are required to emote and behave in ways consistent with the social reality symbolized by the beliefs.

CTDs result in the estrangement of victims from their normal community support networks. The more the claims of con-

tamination are believed in by members of the support network, the more likely they are to avoid and withdraw from claims makers. Victims tend to respond to this avoidance by forming groups of their own. The core members of these new support networks are usually other people who claim to be poisoned or fear the threat of contamination. Together they frequently affirm one another's fears, developing a set of cognitive and emotive assumptions about danger that place them farther outside the boundaries of ordinary community life. The first and most important grassroots group to emerge at Love Canal was organized on the basis of a shared belief system regarding the amount and kind of danger the area was facing and what its members were entitled to as tax-paying citizens (2). Similarly, Love Canal residents talked about chemical migration and risk using "the conditional language of belief . . ." (24). Residents of Centralia, Pennsylvania, responded to the risks of an underground mine fire with a "shared set of linked ideas concerning the amount and kinds of dangers facing their families" (1,23). Similarly, people residing near the Three Mile Island (TMI) nuclear facility developed coherent beliefs about safety and trust in government after the TMI accident (22). Several families in a trailer park contaminated with asbestos "developed new linguistic/emotional definitions of the situation" and "a new basis from which to view and respond to their environment" (29).

Beliefs confer certainty on reality. They reduce the hazard that accompanies the acute experience of uncertainty. Technical experts may disagree over the presence of PCBs or dioxin in people's backyards, but believers are certain the chemicals are there. Certainty is also extended to the ambiguous events and incidents coincident with technological hazards. For believers, the meanings of a power surge in a gas monitor, a neighbor diagnosed with cancer, or an agency official who cites evidence that the risks are not as severe as first indicated, does not reside in the events themselves but in the logic of the belief system. Believers can stop asking questions about the scope and degree of danger. Certain of the "true" extent of the danger, they require little supporting information to confirm their threat beliefs and an extraordinary amount of contrary evidence to disconfirm them. A heavy cigarette smoker in Centralia scoffed at the idea that his two-pack-a-day habit might be the source of a chronic, productive cough. "I've been smoking all my life," he reasoned, "but it's only been since this mine fire that I started to cough" (Kroll-Smith, unpublished data).

The certainty with which believers believe in the reality of loss and threat appears to be independent of the statistical frequency of the losses or threats themselves. Interviews with Centralia residents who constructed a threat-belief system discovered that not every believer could recount personal experiences to confirm the reality of the threat of poisonous gases and subsidences, and the personal encounters some people did have with the fire varied in number and intensity. While personal experiences were not available to all believers, two sources of accredited public information were: the worst case situations of seven families who experienced persistently high gas readings in their homes, and the three crisis events that occurred in the vicinity of the fire. These atypical cases were frequently talked about as if they were the typical experiences, as if the most extreme was also the most representative. Claims of damage and loss were based on the relatively few catastrophic events and clearly dangerous situa-

tions in the history of the blaze, not the long and tedious chronology of events that might have encouraged a less dreadful apprehension of the situation (1).

There is, of course, a sound ecological basis for this apprehension. Extreme cases may be statistically unrepresentative of people's experiences at the moment, but there is no way of providing unqualified assurances that the next day or the day after that new victims will not be discovered. Seemingly simple questions defy empirical answers: How much, if any, of the toxic substances are present? What is a dangerous dose? Am I absorbing any? Probabilities and professional opinions are the best answers the scientific community can provide. Beliefs, however, are definitive.

Adding to the difficulties is the fact that not everyone shares in these definitive beliefs. In toxic contamination incidents no one interpretation of the amount and scope of danger can monopolize the public imagination. The sources of this plurality of interpretations originate in the geographic particularism of the largely invisible contamination plume. Most studies of air, water, and soil contamination report the uneven, erratic course of the contaminants (2,30,31). Not everyone is immediately affected. In this type of crisis divergent sectors and subsystems of a community can be expected to be experiencing different levels of environmental disruption and stress. Underground swales, wind currents, streams, and past engineering practices are among the variables that result in the absence of a uniform dispersion of pollutants. "Well, in our area there was none (chemicals)," remembers a Love Canal resident, "We never even thought of it. It's probably at the south end but we're at the north end . . ." (24). "I was born and raised in Globe (Arizona)," observes one man; "I've had sulfur smoke on one side and the asbestos mill on the other, and I'm as healthy as a new horse" (29). Consider the case of the Centralia mine fire (1): "Burning eyes, the taste of sulfur, and an acrid odor accompanied by headaches, lassitude, and respiratory troubles were unequivocal evidence for residents on the 'hot side.' . . . that the gases caused by the fire were circulating in the borough. For residents on the north side of town, however, gas was not 'in the air'"

For some residents the threat of contamination is remote or simply nonexistent. For others, however, contamination is not a remote possibility but an immediate reality. For believers it is no longer a matter of paying attention to warning cues, to signals of danger, for they are already in the impact stage. In a water pollution case, a woman recalls listening to a 16-year-old girl tell of her fears that the creek's contaminants would affect her ability to have children. "I was standing over at the door, crying with her, and I thought then, 'Lord Jesus, this can't go on!'" (32). For other residents, however, the problem is not as immediate, perhaps not as severe, and calls for a less volatile and drastic response. A resident of Love Canal recalls spending "a lot of time down in the creek (purportedly contaminated) and I never got any skin rash . . . We've had so much wildlife . . . schools of fish, rabbits" (24). Biospheric contamination creates a crisis requiring a choice as to which of several competing experiences of the same world, each of which tacitly claims to have faithfully reflected that world, will be credited as the valid version.

Thus, a segment of a neighborhood or an office floor is now experiencing its environment as the source of disease, adverse generational effects, and human loss; their homes or work stations are viewed as dangerous, and certain areas in their neighborhoods or offices are redefined as life threatening and

to be avoided. Groups emerging around a threat-belief system cycle quickly to the impact stage and talk about the possibility of "suffering," "fear," and "death." With a firm belief in their status as victims of contamination, believers are likely to use the emotionally charged vocabulary of impact to place moral demands on neighbors, friends, and others to accept their claims that adverse effects are now occurring and immediate action is necessary. People who define the problem as at worst a warning or perhaps as no problem at all are likely to begin viewing believers and their emergent groups as threats to property values or jobs (1,24,33). Those who do not find in the environmental cues warrant for extreme concern are likely to see themselves as victims of a fictive or at best exaggerated crises.

A challenge to a community's primitive belief in a safe environment (perhaps best pictured as the bottom block in Maslow's hierarchy of needs) tears at the seams of a cultural theme basic to social survival. If the water, soil, or air is contaminated, there is little reason for me to continue investing in my community or job. However, the evidence of contamination is likely to be less than certain. Perhaps my experience of the local biosphere does not lead to the conclusion that an immediate threat exists. In that case, continued investment in my community for job makes sense and challenges to that investment are likely to be interpreted as threats to my civil rights. Both interpretations are likely to evolve into competing belief systems, with believers in one interpretation disliking other believers the more intensely they are felt to threaten their view of the world (1,24). Biospheric contamination more often than not creates situations where no one interpretation of the crisis is agreed upon by all the parties, and competing interpretations evolve into competing belief systems. What emerges are competing views of the same local world: it is dangerous and uninhabitable; you should be concerned; no, the environment is safe and habitable; you should get control of yourself.

Phenomenologists refer to this type of cognitive conflict as a "reality disjuncture" and suggest that it can be the source of considerable psychosocial stress (34,35). Disputants in a reality disjuncture look at what they perceive to be the same world and experience it in contrary ways. The social validation necessary to affirm the individual's trust that the world is as he or she sees it is transformed into a source of social conflict. The very nature of claims-making activity ensures that the conflict is not waged over whatever verifiable information is available about the hazard. Rather, the dispute is between people who perceive their antagonists as able but unwilling to cooperate in a "realistic" and "justifiable" definition of the threat. Thus, disputants are defined as persons with special motives to make false claims. Fear, hysteria, and greed are among the several labels antagonists apply to one another to explain away opposing claims (1,24,29). Negative labeling heightens the emotional intensity of the conflicts exacting a toll on the psychosocial stability of disputants.

Toxic chemicals leaking through underground swales or asbestos fibers floating through the air do not destroy buildings or level houses. But they do damage the moral rules for local community or office life. When the presence of contamination is defined by a segment of a neighborhood as "impact," the high degree of uncertainty accompanying this type of hazard ensures that competing definitions will emerge, creating a marked crisis in the local culture. Insofar as each of the disputants in this crisis maintains his or her own experiences as the ineradicable grounds

for further action, dispute resolution is all but impossible as potentially endless cycles of reciprocal blaming, censure, and condemnation ensue.

Conclusions

We began this paper by pointing out a number of instances where victims of toxic contamination behaved in seemingly inexplicable ways. We have argued that using a sociocultural perspective in looking at toxic contamination situations can help us to understand behavior in such situations. This behavior is shaped less by statistical probabilities of danger than by the subjectively lived experiences of people under objectively ambiguous circumstances.

In most toxic contamination cases, the degree of danger cannot be known with certainty. This opens the door for the construction of radically differing interpretations of reality; the development of threat-belief systems; the differential cycling through of disaster stages; the breakdown of shared beliefs about and patterns of social interaction; and the creation of destructive social conflict. The results of this process include a high level of social and psychological stress on the affected social groups, be they families, communities, or offices.

If we want to ameliorate this stress, we must begin from an understanding of the operation of this sociocultural process. Such an understanding includes the realization that individual and group coping with indoor air problems may itself exacerbate psychological stress and adverse health effects. Intervention techniques of health professionals should not be limited to physical and psychological dimensions, but should also be concerned with sociocultural processes, being ever aware that certain coping processes may make the health situation worse rather than better.

Finally, of course, contamination victims are not the only people who construct their reality socially; we all do, even those of us who call ourselves scientists. We must remember that the human animal is forever hunting for vocabularies that will be faithful descriptions of reality, but always ends up by using a vocabulary that selects from only a portion of that reality. This is as true for the epidemiologist studying the health of a PCB-contaminated workplace as it is for employees trying to make sense of the amount and kind of danger the chemicals pose. Each is selecting from the multiple realities that constitute the chemical danger. And in order to approximate a more complete understanding of that danger each needs the other's interpretation.

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