In fact, the generally negative view of life in large cities in developing countries echoes what used to be commonly said about eastern cities in the United States in the late 19th and early 20th centuries. Sociologists in the late nineteenth and early twentieth centuries such as Tonnies, Simmel, and Wirth, took the view that much of urban life was pathological and rife with social problems (see Light, Keller, and Calhoun 1989: 231-235). However, later more specific social science studies showed that what seemed widespread social disorganization and personal pathology was an inaccurate misreading of life in urban America (e.g., Gans 1962 and Suttles 1968). There now seems to be the beginning of a recognition that the situation is not a totally negative one even in urban communities in developing societies. Thus, a recent review notes that perhaps a distinction ought to be drawn between social problems at a community level and the perception of recent migrants to a city:

> Whereas additional numbers of migrants may bring more costs than benefits to the city, migration improves the conditions of the rural migrants who view the economic and social benefits of moving to a large city as substantially outweighing the costs.
>
> The point above was frequently overlooked in the early literature on urban growth in developing nations where giant cities were often depicted as abnormal and unhealthy and life-styles of the residents were cast in appalling terms. Even today, some popular press and academic writers appear surprised when they observe the high degree of optimism and satisfaction elicited by recent migrants residing in the most densely compacted, impoverished Third World cities. Residents of these cities, in turn, often are puzzled by the Western, middle-class perspectives writers apply to the economic, social, and environmental circumstances confronting the inhabitants. As one participant from Mexico City stated at the Barcelona Conference on Giant Cities: "We didn't feel we were in such dire straits until you told us how awful our conditions were." Perceived deprivation, no doubt, is relative. (Dogan and Kasarda 1988a: 21-22)

To indicate that rural migrants to cities might have a better life than remaining where they were born, of course does not deny that at the community level their migration could create social problems. If this is true, for our purposes it is important. For the reasons indicated above, even if the problems are only at the community level, they almost ensure that there will be a magnification of any impacting disaster. Unfortunately there is every reason to believe that the urban social problems indicated will get worse, so it follows that future technological disasters in those communities will also be worse.

3. The social organizations and group configurations that emerge in metropolitan areas are not particularly well suited for coping with disasters.

For reasons already indicated, metropolitan areas will be more likely than ever before to be the impact locus of technological disasters. In general, many social characteristics of such localities tend to increase the difficulties in coping with many kinds of crises. We particularly want to note two such factors: the highly bureaucratic nature of urban organizations, and the heterogeneous sociocultural patterns of urban groupings. Since both make crisis planning and managing more difficult, the more there are disasters in metropolitan areas, the more there will be problems (in this instance, this applies equally well to natural disasters).

Urban bureaucracies

It is necessary to avoid stereotypical and negative notions of bureaucracies when discussing such types of social organizations. In principle, bureaucratic social arrangements

whether in public or private groups are intended to standardize and routinize many of their operations to achieve certain specified goals. Thus, it has been noted that: "by providing for the performance of tasks on a regular and orderly basis, bureaucracies permit the efficient planning and coordination of activities" (Vanderzanden 1988: 124).

Given this, it is nevertheless true that bureaucracies are not the best adaptive social organizations to cope with fluid and ambiguous occasions, among the very hallmarks of the emergency periods of crises. Disasters involve nonroutine occasions. In those kinds of situations, as disaster studies have consistently reported, new or emergent rather than traditional or standard behavior patterns are more adaptive for the problems that surface (see Kreps 1991). In line with this, DRC research has found that decentralized organizational decision making and ignoring of rules is often the best coping behavior in the early stages of a disaster. For example, hospitals and the hospital system can better provide emergency medical services if the bureaucratic authority structure, the usual decision making process, and even the traditional division of labor, are not completely followed (see Quarantelli 1983).

The situation does not seem to be any better in developing countries. A recent examination of some government agencies stated that flexibility, adaptability, creativity and speed were found wanting in most centrally managed development efforts. Although focused on bureaucracies dealing with rural problems:

> To make matters worse, central offices of bureaucracies are slow in responding even in routine support tasks and responsibilities, not to mention extraordinary ones. (Wunsch 1991b: 10-11)

Urban bureaucracies certainly could not be expected to perform better or as has been said: "there are few defenders and many critics of the centralized, bureaucratic, hierarchical organizational strategy dominant since independence in Third World administration" (Wunsch 1991a: 431). In fact, some analysts argue that in most developing countries, the local governmental structures are weaker now than they were several decades ago being devoid of revenues, autonomy and technical capabilities (see Cohen 1991: 93).

Put another way, since municipal bureaucracies are not the best social organizations to prepare for and respond to disasters, their presence in the midst of such crises, can only magnify the problems that will appear. But in the main, it should be anticipated that urban bureaucracies in developing societies will magnify emergency problems, and as such make populations more vulnerable to disaster impacts.

Heterogeneous subcultures

Heterogeneity tends to be the outcome of large population size. That is, the larger the population in a community, the more there will be social dissimilarities among the members (Wilson 1986). This is true both in terms of individuals and groups.

Now, as already noted earlier, it is widely believed that many segments of urban populations live in very disorganized and anomic social settings. But as previously discussed, this is incorrect. Particularly when there are many dissimilar groups in a community, there is a tendency for officials and some groups to see collective lifestyles other than their own as reflecting a high degree of social disorganization if not pathology. This perception usually reflects the view of the dominant and the majority groups when they look at the nonmainstream social groupings that increasingly live in urban areas. But far from disorganization and anomie, what is usually present are different social worlds and subcultures whose members have different group values and beliefs than the dominant social pattern and culture, many of these stemming from different ethnic and/or religious backgrounds. Many of the cities in developing countries are the end point of migration from different ethnic and tribal groups. It has been said about African communities that: "Even in cities and towns, tribal loyalties are still

meaningful" (Leslie 1963: 32). A major consequence is that heterogeneity and different subcultures characterizes the urban communities of such societies.

These kinds of population mix can affect disaster response in a variety of ways, make disaster planning even more complicated than usual, and generally raise the risks and vulnerabilities for the persons and groups in the mix. We cannot paint a systematic picture of all that could be involved. But let present some general examples (for research studies supporting the following assertions, especially see Bolin 1982; Perry and Greene 1982; Perry, Greene, and Mushkatel 1983; Bolin and Bolton 1986; Drabek 1986; and Perry 1987). Although most of the specific work deals with developed societies, the general principles derived should be equally applicable in developing societies.

For instance, some ethnic and minority groups see risks differently from other groups, with some assuming hazards can be overcome and others assuming human beings have to accept and adjust to threats. Depending on the belief, this can affect efforts at disaster mitigation or prevention, with for example, those having a fatalistic cultural ideology unlikely to take any actions (for different cultural ideologies, see Thompson, Ellis, and Wildavsky 1990). People from different cultures can also vary in their support for protective actions, with some taking a somewhat fatalistic and resigned position because of some religious values. Adoption of emergency preparedness measures can be affected by this. Also, some groups have very extended kinship systems which can provide considerable support at times of crises; conversely, other disaster victims because they trust no one other than their own kind, may have few or none to turn to for social support. As another example we may note that studies show some minorities often have the most problems recovering from disasters because they frequently are not that socially visible to those providing help.

These kinds of intergroup subcultural differences may be especially exacerbated in developing countries because some are the source of civil strife and disorder. Thus, the urban areas of such countries as Lebanon, Afghanistan, Sudan, Iraq, Sri Lanka, Somalia and Myanmar, to mention but a few obvious examples, are often the locus of open conflict and violence. Cities also are often the end point of refugees from such strife. In both cases, the end result are the existence of many subcultural enclaves and neighborhoods in urban communities in developing countries.

The particular heterogeneous subcultural mix that will exit in any metropolitan area will differ somewhat from one locality to another. However, our point is that any kind of sociocultural mix along any of the lines indicated will complicate and generally make less efficient and effective any aspect of disaster planning or managing. A relatively homogeneous population is much easier to plan for and will have less risks and vulnerabilities in disasters.

4. Certain lifestyles of urban populations leave them especially vulnerable to disasters.

Populations in future disasters, because of social changes associated with urban living, will be more vulnerable to negative effects. We cannot provide a systematic coverage of all factors, but we will illustrate three of them: the large number of socially disadvantaged people, the varied household composition and the youthful age distribution of urban populations.

The socially disadvantaged

It has long been observed that for a variety of reasons, the socially disadvantaged—essentially the poorer, less well educated, and less skilled segments of populations—usually suffer the most from disaster impacts. In urban communities they are more likely to be initially impacted because they live in more dangerous areas or zones. While this is probably true for any kind of disaster agent, it is very likely for technological hazards. This is because the risks from them are not evenly distributed throughout any

society. As Britton notes, the social geography of technologically risky sites in Australia:

> is quite explicit. They correspond to the nation's major population centres . . . . All these centres are major distribution locations from which hazardous materials either commence, or complete journeys, and hence represent important locales for related hazardous materials transport and storage.

More important, is the urban location of technological hazards as Britton notes:

> Hazardous industries are not randomly distributed within cities. Industrial zones in general, and hazardous industry sites in particular, tend to be located in less-affluent areas characterized by low socio-economic residents less able to capably deal with, or respond to, crises . . . .
>
> For instance, when the LPG storage tanks exploded at the Boral Gas depot in Sydney's inner western suburb . . . the residential group most endangered was markedly over-represented in terms of the classification of youth and adult unemployment: overseas born non-English speaking background; unskilled: low income: and the least formal qualifications. (1991a)

While this is a description of a situation in a developed society, the situation in urban communities in developing countries is likely to be even worst. A UN report said that in 1990 roughly a billion people lived in slums and squatter settlements. In a typical expanding city in a developing society, it is not uncommon for over one third of the entire population to live in substandard housing, while thousands more are forced to live on the streets where they find shelter in makeshift shacks. Or has been written:

> in highly congested cities like Bangkok, Bombay, Calcutta, Cairo, Lagos, Mexico City, and Rio De Janeiro, industrial plants are located in the middle of established residential neighborhoods—and, when they are not, they are surrounded by slums and shantytowns populated by rural immigrants who cannot find housing elsewhere. (Shrivastava 1987: 33)

Not surprising also, there are estimates that "40 per cent of the work force in many developing countries are unemployed" (*Population and the Environment* 1991: 9). Overall, this suggests that these urban dwellers are overwhelmingly made up of socially disadvantaged individuals. In that sense, major components of future urban populations at risk will be less able to cope with the losses and disruptions to be expected in disasters.

While social class differences have yet to be found to be significant in emergency time behavior by the research undertaken up to now (e.g., practically no such differences are cited in Drabek 1986), the evidence is considerable that those at the bottom of whatever socioeconomic levels exist in a given community will both suffer the most and be least able to rebound from disaster impacts. The problem is compounded by the fact that certain of these populations in urban areas are particularly heterogeneous, as discussed earlier. That is, all the socially disadvantaged do not come from one particular ethnic or tribal group. This preimpact variety in behaviors, attitudes and values necessitates different approaches to them for disaster planning, difficult enough to undertake even in wealthy communities in developed societies and all but impossible in impoverished cities in developing countries.

Household compositions

Ongoing changes in family patterns and in lifestyles can increase vulnerabilities to disasters. The form of the family typically changes in an urban setting. For example, more and more, the traditional type of the family in developing countries, the extended kinship one, becomes generally less important in urban settings. Much disaster planning everywhere implicitly assumes either the nuclear or extended kinship family type. But both are a diminishing social pattern. In

particular, the kinds of households more likely to be seen in cities of the future, are those whose members are likely to have less psychological and social support available for crises than was true when extended family systems predominated.

Furthermore, the other types of growing kinds of urban households we have mentioned all present different kinds of issues and problems for disaster planning and managing. For example, on the whole, they are less likely to get involved in any kind of preparedness planning. They also are more difficult to warn about impending dangers. They are not as likely to be found and serviced by disaster relief organizations. For these and other reasons, the newer forms of households have greater vulnerability to disaster impacts.

Age distributions

As a last example we may note that there have been and are changes occurring in the demographic characteristics of populations in developing societies. These can result in qualitative changes in vulnerability. For instance, we are increasingly getting a young population in at least the majority of developing societies around the world. In fact: "40 percent of the people living in developing countries are under 15 years of age" (*Population and the Environment* 1991:9). It is not by chance therefore, for example, that deaths were disproportionately concentrated among children, especially infants, in Bhopal (Bowonder, Kasperson, and Kasperson 1985: 10). Overall the age distribution makes for vulnerability.

5. Because of the complex social links in the modern world, certain future disasters will have catastrophic potential even if they result in no casualties nor have physical impact.

We are initially talking here of disasters that in terms of their direct effects, would be primarily economically costly. Slovic, for instance, has written:

> Some events make only small ripples; others make big ones. Early theories equated the magnitude of impact to the number of people killed or injured, or to the amount of property damaged. Unfortunately, things are not this simple. The accident at Three Mile Island (TMI) . . . provided a dramatic demonstration that factors besides injury, death, and property damage impose serious costs.

He goes on to note that although there was not a single death at TMI and that few if any latent cancer fatalities are expected:

> . . . no other accident . . . has produced such costly societal impacts. The accident . . . certainly devastated the utility that owned and operated the plant. It also imposed enormous costs (estimated at 500 billion dollars . . .) on the nuclear industry and on society.

It did this through stricter regulations and the reduced operation of reactors worldwide, greater public opposition to nuclear power and greater reliance on more expensive energy sources, and increased costs of reactor construction and operation. Slovic further notes:

> It may even have led to a more hostile view of other large scale, modern technologies, such as chemical manufacturing and genetic engineering. The point is that traditional economic and risk analyses tend to neglect these higher-order impacts, hence they greatly underestimate the costs associated with certain kinds of mishaps.
>
> Although the reaction to . . . TMI . . . was extreme, it is by no means an isolated example. Other recent events that have had enormous indirect impact include . . . the discovery of pollution from chemical wastes at Love Canal . . . and Times Beach . . . the disastrous launch of the space shuttle Challenger . . . . Following these extreme events are a myriad of lesser incidents events varying in the

breadth and magnitude of their impacts. (1987)

As a variant of this, we may note that some future disasters will be very socially disruptive, less because of their direct physical effects, but from consequences because of the way they will be perceived. We had a very good example of this in Brazil a few years ago. A cancer treatment machine abandoned in a junkyard released some dangerous cesium 137. The radioactive contamination killed about four people and seriously affected about 44 others.

But far more consequential was the perceived risk to anyone in the affected locality, namely Goiania, Brazil, a city of 1.2 million. The occasion is almost a classic case of the potential negative impacts of perceived risk. Over 100,000 residents out of a total population of about one million in the area underwent Geiger counter examinations to detect possible contamination; it was reported that bout 8,000 formal certificates were issued to counter the effects of being stigmatized as a hazardous carrier of radiation. This was not an unreasonable coping effort since the anxiety over potential contamination led hotels elsewhere in the country to cancel reservations of persons from Goiania, buses and airplanes to refuse to take Goianians as passengers, and some doctors and dentists to take new patients who did not have the certificates. There was also cancellations of scheduled conventions in Goiania. One estimate was that regional tourism fell over 40 percent and it was reported that property values fell, with salves levels for the entire city and state being affected. Possible as much as 50 percent of the state's export sales were lost during one month with the area's agricultural products being boycotted (or purchased at 50 percent of value). Even textiles and clothing manufactured in Goiania were affected—some losing nearly 40 percent of their value (from press accounts and observations in 1987 by John Petterson of Impact Assessment).

These kinds of future disasters resulting mostly in nonphysical but massive social, economic and/or psychological disruptions present many and major planning problems. For obvious reasons, they are more likely to occur in urban centers. There is every reason to think that such communities in developing countries will be increasingly vulnerable to such disasters. Views that take the position that, for example: "the so-called disaster of Seveso in 1976 did not claim one victim: phoney catastrophe presented to the world through the media as a chemical apocalypse" (Tazieff 1991: 14) would seem to equate disasters only with fatalities, a rather narrow and almost completely discarded notion in most of the social science research literature.

The disaster planning in place and necessary

Clearly a major way of coping with the kinds of technological disasters that have been projected will occur in the future is to have good disaster planning in place. Planning can make a significant difference in preventing disasters from occurring, help to better prepare for their occurrence, improve the emergency response to them, and make better the recovery after their impacts. This has occurred to a degree in Western societies for all kinds of disasters. In principle such planning should be as equally possible in developing societies. In fact, along some lines, some countries in the developing world have materially improved their disaster planning for natural disasters.

Disaster planning in place

The degree and kind of disaster planning that is in place in developing societies varies considerably. In some societies such as India and Iran it is significant; in other countries, there is not even a national disaster plan for any kind of crisis. There is also considerable variation in planning for any aspect of technological disasters within whatever more general planning exists. Thus, a recent survey of mitigation and other preparations for disasters in many developing countries in Asia and around the Pacific found that while there was at least minimal planning for natural disaster events in almost all societies, there was almost none for technological disasters

(*Disaster Mitigation* 1991). In a few nations there is planning for both kinds of disasters. Despite this variability, nevertheless, it is possible to make some generalizations about the kind of disaster planning, and the organizational and institutional capabilities that exists for technological disasters in developing societies.

First, we are not talking of a static situation insofar as such planning is concerned. In fact, just looking at the historical situation from the past to the present, one might be encouraged in terms of dealing with future disastrous occasions. The present is certainly better than the past if one looks at most developing countries around the world. In the last few decades planning for and responding to disasters has improved. There has been a particular acceleration of the process in countries such as Bangladesh and Mexico. Where nothing once existed, much has been created; where there was something in place it has been made better. Actually almost anywhere, except perhaps sub-Saharan Africa, that one looks the present as compared with the past is an improvement (Quarantelli 1990).

There is no reason to think that the indicated improvements will not continue to occur. Major or image creating disasters in particular (such as a Chernobyl or a Bhopal) tend to generate efforts at crisis planning whether the occasions occur in western Europe (see Lagadec 1982), in the Soviet Union (see Porfiriev 1991b), or in a developing country. Additionally, general social conditions such as greater expectations by citizens that they should be protected against environmental threats, as well as particular happenings such as the UN Decade for Natural Disaster Reduction, assure that in almost all societies we can anticipate, at a minimum, symbolic if not actual increased attention to disaster planning.

In fact, it could be argued as suggested earlier, that the developing world has a particular advantage over the developed world with respect to planning and managing disasters of any kind. They can directly apply the more current advanced models of disaster planning that exist in developed societies and avoid the trials and errors efforts and the simplistic plans attempted in Western societies during the course of the last half of the twentieth century. Planners in the developing world can also use the social science research on disasters accumulated over the last four decades, which only slowly and erratically became available to crisis mangers in the West.

Thus, the potential of "short-circuiting" some of the historical evolution of disaster planning undoubtedly exists. However, knowledge of problems and how they might be handled does not automatically translate into concrete implementations of policies and programs. In addition, even if disaster planning is in place, it does not mean that it will necessarily be administered and managed well. This is presently true even in many Western societies where disaster planning and emergency managing often falls far short of the ideal. Given this, with the usual lack of resources married to sometime unawareness of hazards and of good disaster planning, and inefficient and ineffective management and organizations, it should be expected that planning for disasters will almost necessarily always be worst in cities in developing countries.

Now some in-plant planning to cover the emergency time period is not unknown in the operations of many transnational chemical companies, but as Bhopal showed this is far from a universal pattern. Even when something exists, it seldom is at the level found in developed societies. Moreover, such organizational planning typically focuses almost only on some aspects of the preparedness and response phases and not the mitigation and recovery time periods of chemical disasters. In addition, as found even within Western societies, there is little linkage to community emergency management systems; the plans often stop "at the plant gate" (Quarantelli 1984b).

Overall then, disaster planning has improved and will improve further in developing countries. Nevertheless, when all is said and done, the planning is not that good and it is difficult to see it soon approaching the level that presently it is at for technological hazards

in cities in developed societies, which itself is far from ideal (Quarantelli 1984b). But there is a social base upon which improvements can be made if the proper disaster planning is undertaken, the essence of which we will now discuss.

Good disaster planning

As any number of researchers on the basis of their studies have concluded, good disaster planning typically has a number of characteristics that can be stated as general principles. Presently in the West, for example, it is generally recognized (Sorensen 1988: 242, and Quarantelli 1991a) that the best planning to have in place

(a) views disasters as quantitatively and qualitatively different from accidents and minor emergencies;
(b) is multihazards rather than single in focus, generic rather than agent specific;
(c) includes all four time phases of the planning process rather than just one time phase;
(d) aims at multiple rather than single hazard or risk reduction goals;
(e) focuses on general principles rather than specific details;
(f) highlights a continuing process rather than an end product, such as the production of a written plan;
(g) builds on research findings derived from systematic data rather than just personal experiences;
(h) emphasizes the need for intra- and interorganizational as well as community coordination rather than control;
(i) assumes potential victims will react rather well times instead of poorly during the emergency time periods of major crises; and
(j) distinguishes between planning and managing, between the strategies and the tactics necessary.

There might be a question if these general principles are equally applicable in developing countries given that they were primarily derived by Western researchers doing studies mostly in developed societies. The evidence is that these notions can be reasonably imported to developing systems from developed ones, in the same way as the principles for the building of bridges or inoculating against particular diseases can also be used anywhere. The principles at the level at which they are stated are seemingly universal, applicable across different social systems.

Along some lines, the above listing can be used as a checklist to evaluate whatever general planning is in being or being considered. The principles enunciated do not specifically mention technological disasters. But of course that is one of the points (no. 2) being stressed—overall there should be general planning initially for all disasters whatever their agent source. This does not preclude additional specific planning for technological risks and hazards within the larger framework.

In fact, we turn now to noting what are more specific planning principles, again research derived, principally addressing mitigation, preparedness, emergency response, and recovery planning for technological disasters, mostly at the local community level. Now one general guidebook on planning just for chemical emergencies and disasters outlined 71 pages of topics and dimensions which should be considered in the process (*Planning Emergency Response* 1981). Clearly we cannot address here the full spectrum of issues involved in the range of specific planning necessary. Thus, we confine ourself to those that are major, that we think can make a significant difference, and that are more or less realistic in the context of the average city in developing countries. Some communities can do more than we suggest, others could not reach the proposed level.

Mitigation planning

With respect to disaster mitigation the ultimate prime goal is to eliminate the threat. But this is mostly an ideal. Apart from the eradication

of a few diseases which could take epidemic form, such as smallpox, there are almost no cases in which this has happened historically and usually the elimination of any threat has been only along very narrow lines (e.g., what used to be frequent explosions of boilers, has been because of some safety features introduced, reduced to a rare occurrence). As such, reduction of risk is a much more viable possibility. It can and does occur. For example, strengthening building practices, structural codes, housing standards and inspections, etc. have substantially lessened the number of deaths and injuries after earthquakes in cities in developed countries. In the area of our concern, the effort would aim at preventing or reducing those disasters and their effects which are associated with industrialization and urbanization, as discussed earlier. However, we primarily discuss technological matters in what follows since mitigation/preventive measures are far easier and more likely to be accepted for the industrialization process, than for the urbanization one.

1. It is important that there be local awareness of the technological threats that exist in the community.

Unfortunately along some lines, in many cases community agencies often can only react to a threat that is already in place. For example, much if not almost all technology is often imported from the outside into developing countries. Siting decisions about nuclear power plants are typically made at the national rather than local level (Towfighi 1991: 107). In the instances where this is the case, it is even more crucial that urban municipalities be at least cognizant of the kinds of threats that are entering into their communities. For this they need a local agency which can monitor the advent or increase of such risks. While a local organization with disaster responsibility would be the ideal choice, community planning agencies could carry out the task since it is somewhat relevant to their normal operations.

In some countries however there is the possibility of relevant local input. In these cases there should be consideration of the options usually available for the kinds of technologies to be installed in urban areas. With respect to most technologies, there are almost always alternatives available which can be used to produce, store, transport or dispose the waste of the chemical, nuclear or biological substances involved. Some are more inherently risky than others, although the decisions that will be made are more likely to involve social rather than technical factors. If so, it follows as Bowonder observes:

> In the case of pesticides and other toxic materials, governmental decision making systems for technological choice decisions should examine the various alternative routes. (1985: 93)

which are less hazardous. Furthermore, while decisions about the specific location of industries have to be made considering other than just safety criteria, certainly reduction of risk could be deemed as one important element. In developed countries, for example, the concentration of hazardous facilities in industrial complexes or parks is one way dangerous chemical operations have been segregated.

2. Greater attention needs to be paid to the safety of the neighborhoods around the siting of hazardous plants in urban areas.

Even where the local community might have little input on the placement of technological hazards in their local area, they can often undertake actions which will reduce the risk to vulnerable populations. Clearly an important step would be to keep large population concentrations away from dangerous facilities. There are difficult political considerations that can enter into any decision about keeping people away. Nevertheless, it is simply a fact that restrictive/exclusionary land use measures and zoning codes can be used to attempt to reduce risk.

Furthermore, it is possible to project some of the degree of risk that is present by the undertaking of environmental impact assessments before locating a plant in a

particular location, and by an impact assessment if a facility is already in place. At Bhopal, two of the largest slum colonies in the city lived across from the Union Carbide plant even though the area was not zoned for residential use (Shrivastava 1987: 4).

3. Plant designs and operations in urban communities can sometime be made safer by local monitoring and inspections.

Again, because of governmental structures and assigned levels of responsibility this is not always possible for local agencies. However, in some cases it is well within their prerogatives. In these instances there should be efforts toward the use of safety technology and an effective regulatory system. Although we indicated some of the possible unwanted negative effects earlier, it is nevertheless true that technology can be used to increase the probability that key installations are properly designed and run, and that appropriate monitoring systems be used. A regulatory system controlled by community authorities, if correctly administered, can increase social pressure for proper maintenance and correct procedures.

> As was said of Bhopal:
>
> Had the plant been properly operated and maintained the whole tragedy would have been avoided. Design lacunae were amplified by poor maintenance factors. (Bowonder 1985: 96)

It is of course possible to overregulate as many have said is the case of the American nuclear industry, but that said, it is true that even including the Three Mile Island disaster, there has been no nuclear plant accident in the United States that has resulted in casualties outside of the facilities. Current regulations and supervision of lifelines in developed societies, although far from perfect, also seem to make a difference in increasing safety and reducing accidents.

It might be said that none of the three recommendations we make regarding disaster mitigation are either unusual or likely to be fully implemented. This may be true, but a start has to be made for without awareness of local risks, for instance, nothing else is even likely to be considered. Furthermore, as we shall indicate later, a case can be made that mitigation measures are not necessarily those that should have the very highest priority in planning. Creating resiliency to react to disasters when they occur perhaps should be greater weight in the process than just trying to achieve unattainable levels of elimination and reduction of risks. If so, preparing for disasters becomes very important.

Preparedness planning

This kind of planning is intended to improve the emergency time response if a disaster were to occur. It includes a number of long ahead of time activities as: (a) might minimize disaster damage—such as the creation or improvement of forecasting and warning systems, or training people ahead of time on how to safeguard themselves at times of impact, and also (b) which could enhance response operations at emergency times—such as the prior stockpiling of medical supplies and food stocks, or the conducting of disaster exercises or drills.

1. Urban communities have to at least put preparedness planning for technological disasters on their community agenda.

Apart from areas that are frequently subject to disasters and have a disaster subculture expectation (such as for typhoons in southern Bangladesh), it is very rare to find populations to be self interested much less concerned about such threats before they materialize. The great majority of people in all societies are oriented to the "here and now." As such, the idea of a possible future disaster in which they will be directly involved is seen as so remote, unlikely and uncertain that the threat does not enter into consciousness, or if it does, is usually quickly dismissed. Human beings are unlikely to be engaged by something they do not see as personally involving themselves (or what they value such as their family), which is not immediately