CHAPTER TWO

Dealing with Natural Disaster: Role of the Market

Barun S. Mitra

NATURAL CALAMITIES HAVE been stalking humanity since the dawn of civilization. Natural phenomena in their myriad forms have periodically decimated the population on the planet. Primarily due to the slow killers such as droughts and diseases or sudden calamities such as floods and earthquakes, human population stayed stable at about a few million throughout much of history. Only in the last two millennia has the population begun to increase, shooting up in the past few centuries, as a result of unprecedented economic development. Economic development, coupled with scientific and technological innovations, has increasingly insulated mankind from the vagaries of nature.

Yet in recent years we have been hearing about the rising costs of natural disasters, particularly highlighted by the insurance industry, environmental organizations, and relief agencies like the Red Cross. The United Nations declared the 1990s the International Decade for Natural Disaster Reduction. Clearly it is important to get the facts right. It is even more important to keep the perspective right because it helps draw the appropriate response to the issue. In this chapter I attempt to outline the long-term trends of impacts of

natural disasters, then outline a perspective, and finally highlight the range of responses that have evolved in dealing with disasters.

My conclusion is as follows: Economic development is the best protection against natural cataclysms. Government intervention in the economy has adversely affected economic growth and retarded people's ability to effectively mitigate the impact of natural hazards. To the extent that market forces has been allowed the space to operate, a whole range of options has evolved to predict, prevent, and offset the costs of these hazards.

WHAT IS A NATURAL DISASTER?

The term *natural disaster* cannot be applied to all major natural events; it can only be applied to something that has suffered some adverse consequences from a natural hazard. *Natural cataclysms* are major natural phenomena that have been part and parcel of the planet Earth since its beginning. Natural disasters, on the other hand, prove disastrous to people (similar events in uninhabited parts of the world would not be called disasters).

From this classification it would seem that, irrespective of the scale of any specific natural geologic or weather-related phenomena, if the impact on human societies is progressively decreasing, other factors are responsible.

WHAT IS THE HISTORICAL TREND?

The history of human civilization encompasses a struggle to escape from the clutches of various vagaries of nature: disease, famine, floods, droughts, heat, cold, windstorms, earthquakes, volcanic eruptions, cyclones, tornadoes, tsunamis, fire, and the like. Historical documents contain many references to the havoc caused by such calamitous events, although the chronology of such events is rather sketchy. Time has eroded memory. For instance, even the

loss of the city of Pompeii in A.D. 79 was all but forgotten until archaeological discoveries about two hundred years ago substantiated what had been mythological tales. Clearly, for embattled humankind, striving to escape the clutches of nature on almost a daily basis, a natural disaster was not unique. In the midst of a continuous stream of hazards, the ones that remained etched in the collective memory were events of truly epic proportions such as the biblical flood.

The literature of ancient India has many references to droughts and famines, with authors recounting the attendant horror stories in some detail. The first major historical record of a drought in India, however, took place in Kashmir in the years A.D. 917–918. According to historical records, corpses filled the Jhelum River as people died in huge numbers and no one was left to carry out the last rites for the dead.[1]

Since then, the records of drought and famine in India in the past millenium have been quite detailed. Over the past century there are precise records of the havoc caused by the shortfall in rain, crop losses, impact on prices, and estimates of the number of people affected.

Two conclusions can be drawn from these data. One is that record keeping has greatly improved over the centuries and that the increasing reports of drought reflect this trend, rather than any real increase in the incidence of drought. Two, the impact of drought has been lessening over the century, despite higher reported incidence. This is best illustrated by the fact that, as late as the 1920s, India's population actually decreased, due to combined effects of drought and disease, for the last and only time in this century. Clearly, the Indian population, with all its poverty, has

1. A. Loveday, *The History of Economics of Indian Families* (London: G. Bell and Sons, 1914), p. 11.

nevertheless succeeded in insulating itself from one of the worst natural hazards. No mean achievement that.

Compare this with reports of major droughts in many parts of the country in the years 1999–2000. Media had to struggle to find stories of deprivation; despite their best efforts they could not find deaths that could be reasonably attributed to this drought. (The role of the media in propagating disaster will be looked into later.)

The Indian experience is not unique; it is only the latest. For instance, the early European settlers in North America could barely survive the climate and had to thank the indigenous population for helping them tide things over, thereby giving birth to the uniquely North American festival of Thanksgiving. The United States has come a long way from those precarious days. Today, even a major drought, even while destroying crops in many areas, has hardly any impact on the prices of food products. Consequently, the population has acquired complete immunity from drought.

In Europe, there is hardly any scope for a repeat of the Irish potato famine. Agricultural science has advanced so that even a nonnative plant like the potato has been successfully adopted in India; today India is one of the world leaders in potato production.

The trend is virtually the same for every kind of natural hazard. The San Francisco earthquake in 1906 and the ensuing fire destroyed millions of dollars in property and had a death toll that ranged between four to six thousand. The death toll in the last major earthquake in the California area was barely a fraction of that.

Over the past century in the United States, the annual death toll from floods has fallen from over a thousand to less than a hundred in the past few decades. Six to eight thousand people, almost a fifth of the population, perished in the hurricane that hit the small town of Galveston in 1900 and damaged property worth about $400 million in current value. In contrast, the death toll from Hurricane Andrew in 1992 was less than fifty, even though Andrew was the

most destructive storm yet to hit the United States and the estimated cost of damage was upward of $17 billion.[2]

For economically less developed regions of the world, the trend is quite similar, although not as dramatic. A strong tropical storm in the Indian subcontinent, in the nineteenth century and even in the twentieth century, could leave tens of thousands dead. Nevertheless, the annual death toll from floods in countries like India has been falling, from tens of thousands in the earlier decades to a couple of thousand today. Being poor, the cost of damage to property is, of course, much lower.

One can draw the following conclusion from this trend in the richer and poorer countries. When societies are poor, they are ill-equipped to deal with natural hazards and therefore pay a much higher cost in terms of lives lost. As societies become richer, the loss of lives due to natural hazards tends to fall and the economic cost of damage to rise.

The absolute cost of damage, however, is not a good indicator, because values of property in richer societies will by definition have to be higher. For international comparison, a better figure is the ratio of damage due to natural hazards as a share of the gross national product in particular countries. The International Red Cross occasionally publishes such data in its annual *World Disaster Reports*. From these it can be seen that, in richer countries, this ratio is typically lower than in poorer countries.[3] (Some of the island nations are exceptions to this because of their higher incidence of exposure to certain kinds of disasters.)

Most recent disaster reports point out that 95 percent of deaths from natural hazards occur in poorer countries. But a look at the

2. Munich Re Group, *Natural Catastrophes—the Current Position: Topics 2000* (München, Germany: Munich Re Group, 1999).

3. Red Cross, *World Disaster Report—1997* and *World Disaster Report—1999* (Geneva, Switzerland: International Red Cross and Red Crescent Societies, 1997, 1999).

cost of natural hazards as a share of GNP shows that poorer countries bear much higher costs relative to their smaller economies. (The poor, of course, are most vulnerable.)

With improved agricultural techniques, humankind has been able to contain to a significant extent the perpetual threat of drought and famine. Likewise, improved understanding of health and hygiene has almost removed the threat of epidemics that were the worst killers. If pockets of population are still vulnerable to famine and epidemics, it is primarily due to the kind of policies pursued by these societies, rather than any peculiar natural hazards.

The trend is the same in the case of other natural phenomena such as earthquakes, eruptions, storms, and so on. The higher the level of economic development, the lower the threat from natural hazards.

WHY DO WE CONTINUE TO PERCEIVE NATURAL HAZARDS AS THREATS?

If the trend is so clear, and the relationship with development so unequivocal, why does the perception of threat continue to dominate discussions on natural disasters? The answer may lie partly in the way we perceive change, and partly in the groups that have an interest in perpetuating a sense of crisis. Let's look at the first part of the reason. We seem to perceive events and ideas by contrast. When disasters were a constant companion of humanity, they didn't stand out. In contrast, the rare good times have been retained in the collective memory. This perhaps explains the universal appeal of the golden past, although all the evidence points to the fact that such a past was more a myth than a reality.

Today, when mankind has never had it so good, the fear of a disaster is much more pervasive, perhaps because, when most people today are safe from the vagaries of nature, the few who fail to escape stand out in sharp contrast; as a result, these fewer instances

have come to dominate the discussion. This trend is reflected in the popular media. In India, for instance, the media quickly dubbed the drought in 2000 as the worst of the century and struggled to identify even one victim, while quietly forgetting the past famines that cost the lives of millions. This perception assumes a greater significance because it shapes our responses to natural hazards.[4]

WHAT IS THE ROLE OF GOVERNMENTS?

Just as disasters have been with us from the beginning, so too has been our struggle to deal with them. One of the earliest Indian texts on governance, Kautilya's *Arthashastra*, written some two thousand years ago, around the time Alexander reached the gates of India, suggests that state granaries be opened to the needy in times of crisis and that private holdings be confiscated to feed the hungry.[5] Conscientious rulers did what they could to relieve the suffering. Although the frequencies of such calamities are not known, poor communications meant that even the most well-intentioned kings could only do so much. Consequently, when droughts or famine struck, the result was often disastrous. The problems were often compounded by misrule, heavy taxation, and forced labor.

Historical texts also recognized the possibility of the moral hazards of state-sponsored charity. One suggests that relief should be offered as a loan to the people, with an obligation to return it to

4. "Perception by contrast"—this is like the "man bites dog" phenomena. Although very infrequent, the phenomena attract great attention because the unique event stands out in contrast to the much more common occurrences—that of people bitten by dogs. The latter remain almost invisible because it doesn't stand out in general perception.

5. A. L. Basham, *The Wonder That Was India: A Survey of the History and Culture of the Indian Sub-Continent before the Coming of the Muslims* (New Delhi, India: Rupa & Co., 1981), p. 192.

the state in the years when going is better.[6] During later periods modern concepts such as food for work or workfare rather than welfare were practiced in some areas. There are other historical examples of rulers engaging a large workforce in times of famine and crisis to build large monuments and palaces, which had very little functional value but provided some relief to the workers and their families.

In times of crisis, poor communication, transport, and storage facility reduced the efforts of the most energetic rulers to symbolic gestures, meaning that private agencies and charities probably played a greater role in dealing with a crisis in their immediate vicinities. But because of its diffused character, this activity has not received the kind of attention that it deserved. Again perception by contrast focused attention on what the state did or did not do, rather than on what the people could and did do to mitigate the hardships.

In our times, this role of the state in times of crisis has become almost a touchstone for determining the state's legitimacy. Of course, even in ancient times, many rulers had the foresight to seek legitimacy from their subjects, and disaster relief was a visible way in which the kings could legitimize their administrations.

In more democratic times, politicians seek to legitimize their role by offering similar patronage to their constituencies. As Amartya Sen has pointed out, democratic governance, along with a relatively free media, has played its part in mitigating some of the worst effects of natural disasters.[7] Democratic India has a much better record in dealing with droughts and famine than either its colonial masters or its feudal predecessors. Competitive politics, along with pressure from the media, has by and large ensured that the state

6. Mohinuddin Alamgir, *Famine in South Asia* (Cambridge, Mass.: Oelgeschlager, Gunn, & Haine Publishers, 1980), p. 56.

7. Jean Dreze and Amartya Sen, *India: Economic Development and Social Opportunity* (New Delhi, India: Oxford University Press, 1995), p. 76.

agencies have acted early enough to prevent the development of full-scale famines.

Likewise, long before the advent of the welfare state, even feudal and colonial states recognized that, in times of emergency, measures (other than charity) such as food for work, providing citizens an opportunity to work, and similar efforts are often more effective in helping the needy.

THE IMPACT OF STATE INTERVENTION

In times of major crises, it is natural to look to the largest or the most powerful or the most visible organization. The organs of the state or government have logically fit that bill from the earliest times. The "invisible hand" of the market, after all, is rarely deemed capable of dealing with such visible crises.

Accepting the role of the state in times of natural calamities, however, comes with certain other costs. First, the entry of the state as the most visible agent only reinforces our mode of perception by contrast, no matter how distorted the actual picture may be from this perception. Second, once the role of the state comes to the center stage, various other measures that people have been taking to mitigate the disaster's effects go out of fashion. On the one hand, this intervention by the state distorts the scope of the market in dealing with natural catastrophe. On the other hand, there is a scramble to seek political favors to get relief and rehabilitation benefits, which in turn triggers the politics of patronage, with political establishments and their constituencies vying to corner a greater share of the public pie.

Thus, both the United States, one of the richest countries, and India, one of the poorest, have in the past few decades declared an increasing number of natural catastrophes as natural disasters in order to gain political mileage. Historically, the number of people actually affected by natural disasters has fallen, but political inter-

vention has created the opposite impression, leading to the justification of this tendency, contrary to actual experience. This political intervention has in turn diverted attention from the various private initiatives that have evolved but that, by their nature, are diffused and many times location-specific.

This is best seen in contemporary discussions on methods to mitigate natural disasters. The literature is dominated by technological quick fixes. For instance, there has been much focus on building codes and earthquake-proofing of various structures. Of course, the most vulnerable people can afford only shanties, meaning that, for them, such technological solutions are rarely if ever practical.

More seriously, such efforts could lead to even greater tragedies if these panaceas fail in the face of a natural calamity. The 1989 earthquake in the then Soviet republic of Armenia not only left tens of thousands dead but also reportedly destroyed many buildings, particularly those built during the Soviet era. This highlights the clear danger of legalizing mandatory standards in the hope of promoting safety. First, if the standards are sanctioned by state agencies, then there is little incentive to improve on the existing standards. But, even mort important, should these standards fail at some point in the face of some natural hazard, the impact will be much more widespread and devastating.

Discussion on protection from natural calamity also focuses on preserving the local ecosystems in the hope that these will act as barriers to some forms of calamities like floods or cyclones. This may look sustainable and a cheaper alternative, but in reality this discussion on ecology too is more often than not quite off the mark. Take the case of flooding in the coastal areas. Every year thousands die, particularly in the developing countries, due to tropical cyclones that hit the coastal settlements.

Would the natural mangroves and other ecological barriers be more effective in reducing damage? Not if one looks back at history. One of the areas most vulnerable to tropical storms is the

Gangetic delta between India and Bangladesh. A storm in this region in 1864 left more than 70,000 people dead in and around the city of Calcutta. In 1876, the toll in Bengal was 200,000. At that time, the much-valued mangroves were at their pristine best. Yet the destruction was far in excess of the current average. Clearly, the focus on ecological barriers is no panacea.

Intervention by state agencies also poses other kinds of hazards. The problem of moral hazards of state intervention in disaster relief was recognized by President Grover Cleveland of the United States who, denying federal aid to some drought-stricken counties in 1887, wrote that "federal aid in such cases encourages the expectation of paternal care on the part of the government and weakens the sturdiness of our national character, while it prevents the indulgence among our people of that kindly sentiment and conduct which strengthens the bonds of common brotherhood."[8] But what is not usually recognized is that there are other serious social consequences of such well-meaning interventions.

The race for political patronage inevitably increases the prospect for corruption in distribution of relief and management of rehabilitation programs. Virtually every major natural calamity in India has been followed by reports of mismanagement and corruption. What is worse is that political intervention also politicizes the flow of information. Depending on the circumstance, political establishments may seek to blame nature, political opponents, other government agencies, or even the people for the disaster. There is also a tendency to play the crisis up or down in the hope of gaining political mileage. The result of all this is distortion in the flow of information, making the management of the crisis even more difficult. The victims, of course, are worse off as they get kicked like a political football. Truth is the natural casualty in this process.

8. John W. Sommer, "Disaster Unlimited," *The Freeman*, April 1986, pp. 134–38.

The supercyclone that hit the coast of the eastern Indian state of Orissa in November 1999 left more than ten thousand people dead (unofficial reports put the figure at more than double that number). The media reported that the Central Government in Delhi was reluctant to seek international help as it might reflect on the credibility of the national government, despite the fact that, even two weeks after the tragedy, many villages remained cut off, with no information coming out or relief reaching the survivors.[9]

Discussions on moral hazard are generally restricted to the impact of state-sponsored relief on the recipients and the victims. But even donor agencies are not immune. For instance, state governments of regions affected by a natural calamity often claim that things are under control and that everything that could be done is being done to help the victims. At the same time, the same governments often make grossly inflated claims of loss when seeking help from the central government. In many instances, the local agencies fail to spend the money allocated to them for disaster relief.

This process of politicization leaves a long trail. For instance, one of the first impacts of state-sponsored rehabilitation is to enable the survivors to rebuild virtually the same structures at the same spot, leaving the population again vulnerable to a similar tragedy next time round.

This process of politicization is the same in developed countries. For example, in the United States, in many states property developers and insurance companies seek political protection at the cost of others. In areas prone to natural hazards, insurance premiums tend to go higher. But this normal economic practice is seen as bad for business by the property developers because it could raise the cost of their property and deter prospective buyers. The govern-

9. S. Parasuraman and P. V. Unnikrishnan, eds., *India's Disaster Reports: Towards a Policy Initiative* (New Delhi, India: Oxford University Press, 2000), pp. 199–200.

ment would of course like to balance the two interests. But the result is that a decision that could have been taken in the marketplace by buyers and sellers now becomes a political football, and it is the ordinary consumers who must bear the additional costs.[10]

Another form of threat arises out state-sponsored charity. State intervention distorts the social fabric. In times of crisis, the natural tendency of many members of society is to try and help those affected. But when the state takes on that responsibility, it destroys the fellowship and camaraderie among citizens. Since the state seeks to take the prime responsibility to mitigate the effects of disasters, achieving this through universal taxation, citizens feel that they no longer have any need to be involved in the process of relief and rehabilitation.

In India, in the 1960s and even in the 1970s, a natural disaster in one part of the country evoked enormous sympathy in other parts. Even with poor communications, people followed events closely. Thousands of volunteers from political and nonpolitical organizations went from house to house collecting money and any other kind of relief material possible. Today, live commentaries from disaster zones evoke hardly a cursory glance. It is not uncommon to hear people say that, if the government is collecting taxes to help people in distress, no further assistance should be needed.

COMPETITIVE POLITICS AND THE ROLE OF THE MEDIA

Competitive politics, particularly that manifested in democratic societies, coupled with a free media, has shaped not only the way a natural calamity is perceived but also the response.

Competitive politics has meant that the establishment in power

10. Scott E. Harrington, "Rethinking Disaster Policy," *Regulation* 23, no. 1 (April 2000): 40–46.

constantly has to look over its shoulder to see whether its political opponents are trying to discredit it. No issue creates a groundswell of public opinion like that of natural disasters and the plight of victims. It is indeed no coincidence that the spread of democratic governance has over the past hundred years significantly contributed to minimizing the impact of one of the worst natural scourges—famine.[11] This explains the different experiences of India and China in the 1950s and 1960s. Famines and devastation on the scale witnessed in China did not develop in India. The political will to get people and material to the affected regions has come, to a substantial extent, from political pressures. The presence of relatively free media has also contributed to this development by bringing to light the tragic aftermath of a disaster, highlighting the human plight, and helping mobilize resources to deal with the immediate crisis.

However, the focus of this analysis rests on the role played by the state in alleviating a crisis. Not surprisingly, this analysis takes attention away from the historical trends of the impact of natural disaster, including the role of economic development in mitigating the impacts of natural calamities, the role of the various local and private initiatives in dealing with a crisis, and the evolution of various economic tools under the market system that made many of the disaster-mitigation techniques affordable.

Most important, this focus on state agencies as prime players in disaster mitigation also led to the growth of the disaster interests. The competitive politics and free media that helped highlight the aftermath of a natural calamity also fueled the interest groups' lobbying for an ever larger share of the relief and rehabilitation pie.[12]

11. Jean Dreze and Amartya Sen, *Hunger and Public Action* (New Delhi, India: Oxford University Press, 1989), pp. 257–79.

12. Kuldeep Mathur and Niraja G. Jayal, *Drought, Policy and Politics: The Need for a Long Term Perspective* (New Delhi, India: Sage Publications, 1993), pp. 97–125.

In this tussle, the interests of ordinary citizens affected by the disaster often get lost.

Ironically, increased political competition along with faster modes of communication have tended to aggravate the problem. Improved communication brings live coverage of natural disasters to people in all corners of the world; political competition brings them to center stage. But this flow of information and analysis more often than not seems to have hindered our understanding of the issue and colored our perception of the events. For instance, advances in information technology have magnified the current calamities by overwhelming reportage. As a result, our perception is distorted and an impression is created that the situation is getting worse.

This development makes a mockery of real historical trends. The relatively few surviving records of historical catastrophes are cited as evidence that natural disasters were less severe in the past. In contrast almost daily reports of natural disasters affecting one or another part of the contemporary world are taken as evidence that people today may be exposed to a greater degree of natural hazards. Thus, the frequency of reports is being misinterpreted as incidence of events. This misinterpretation shows how competitive politics and free media are both prone to perception by contrast and therefore contribute to political interventions that at best may be unnecessary and at worst give rise to politics of patronage. Two sets of errors have contributed to this distortion. One is the nature and role of government. Second is the capacity of the market to respond to such calamities.

THE ROLE OF GOVERNMENT

The basic purpose of the state is to protect the rights, liberty, and property of its citizens. A representative government derives its legitimacy from the consent of the governed, under the assumption

that the state organs will place their use of coercive force under an objective set of laws. Using state powers to tax all citizens to provide relief to the victims of disaster raises the prospect of some people seeking protection at the cost of others. The rise of the disaster lobby, and the rapid growth in the number of events that the political establishment declares as disasters to qualify for one kind of relief or another, is actually a manifestation of the process of the politicization of disaster management.

If one accepts the classical liberal tradition of political theory, and recognizes the limited role of government in protecting the rights of the citizens from domestic criminals and foreign conquerors (that is, the basic police and military functions), then the question is how to interpret a natural calamity.

Should a natural calamity be seen as a disaster when citizens are affected and therefore the state called in? The state agencies are not usually called in to protect and rehabilitate single individuals who may be affected by a natural disaster. For instance, a lightning strike on a private home normally does not evoke the same response from the state agencies as a tornado or a cyclone ripping through large areas, destroying many lives and damaging many properties. But should mere differences in scale justify different responses from state agencies? Could it be said that this difference in scale disrupts the normal private processes, social and economic, and that only the state organs are large enough to deal with a crisis of such magnitude?

If one keeps the fundamental role of government in mind, and does not look at state power as primarily a tool for redistributing resources through political intervention, then the role of the state in dealing with natural calamities will become clear. Just as the state agencies are entrusted with protecting rights, liberty, and property from criminals and aggressors, so too the state agencies must try to reduce imminent and immediate threats to life and property as a result of some natural calamity.

Just as protection against crime does not oblige the state to provide relief and ensure rehabilitation of the victim of a crime, so too a victim of a natural disaster cannot expect economic rehabilitation after the disaster. One has to perform some intellectual gymnastics to show that political intervention by the state to protect life and rights naturally extends to economic intervention to provide relief and ensure rehabilitation.

As has been argued above, intervention to redistribute resources, using the political tools of governance, is economically inefficient and ethically disastrous. Such interventions not only disrupt the ability of the marketplace to evolve a diverse range of strategies to deal with natural calamities but also reinforce the justification for state intervention for the alleged market failures. But since these market failures are primarily the result of state intervention, such interventions only draw the state agencies in to ever-deepening political quagmire. The politics of patronage and corruption is an inevitable outcome of such intervention.

SCOPE OF THE MARKET IN DISASTER MITIGATION

We must understand the historical trends and appreciate the perspective to be able to draw the right conclusions. A distorted perspective based on impressions created by the front-loaded nature of reports of natural calamities inevitably raises doubts over the ability of the markets and private initiatives to deal with the apparently increasing frequency of disasters. The only institutions that seem capable of rising to the task appear to be the agencies of the state. On the other hand, if one of the basic characteristics of progress is the increasing success in insulating populations from the vagaries of nature, then one would have to recognize the role of private initiatives in dealing with such natural crises.

First, economic development has been the single most important factor in helping to insulate humankind from the periodic havoc

caused by natural elements throughout history. The significance of economic development is borne out by the fact that today the developing countries and poorer societies are much more prone to suffer nature's wrath than richer countries. According to some estimates, 95 percent of deaths from natural calamities today occur in developing countries. Richer societies, therefore, are better placed to deal with natural calamities. It seems tragic that with the increased attention to natural calamities in recent times and the declaration of the 1990s as the International Decade for Natural Disaster Reduction, the role of economic development in mitigating catastrophes gets little mention.

There has, however, been a general recognition that giving markets a free rein in many spheres of activity helps improve economic performance. In many parts of the world there is trend toward dismantling many of the legal restrictions and regulations that are thought to have restrained economic performance. But there has been little recognition of the need for economic development to secure humankind from nature's fury. Indeed, if anything there are increased calls for the state to intervene to mitigate the effects of natural disasters.

Historically, the role of the state in disaster management has been marginal, although some ancient texts do mention various strategies the agencies of the state could adopt in the face of a natural calamity. Nevertheless, the actual capacity of the state to mitigate disasters in far-flung areas was limited because of lack of communication, transportation, and facilities, coupled with a lack of economic and technological resources.

The earliest records of private initiatives to mitigate risks from disasters come from ancient Greece, Rome, and India, which show forms of insurance being used as a financial tool to offset different forms of hazards.[13] Ancient traders were among the most vulnerable

13. Susan L. Cutter, ed., *Environmental Risks and Hazards* (Englewood Cliffs, N.J.: Prentice-Hall, 1993), pp. 33–54.

to natural disasters, for their wealth depended on trade with distant lands. And every consignment could be lost to either some natural calamity like stormy seas or man-made hazards such as banditry. Because they risked so much, the traders were the first to try and hedge their risks by adopting various financial strategies, some of which were little more than gambling. A rich trader in those ancient times could be ruined if a ship carrying his goods were lost. (Centuries later Lloyds of London would be created out of this need to secure the increasing number of ships at sea.)

Today, of course, insurance plays a great role in mitigating risks in the face of a wide range of uncertainties. As Henry Ford reportedly said at the beginning of the twentieth century, but for insurance companies, no investor would have put his money in building New York City when one cigarette butt could have turned that investment to ashes.[14]

Despite the advances of technology and the better collection of information, however, some degree of uncertainty will always remain in all situations. Therefore there will always be the need to hedge one's risks, natural or man-made. The insurance companies, realizing this need, came up with a new form of insurance for the insurers—reinsurance, which allows insurers in one area to disperse their risks over a much larger base. Although reinsurance developed mostly in the nineteenth century with the possibility of international capital flows, elements of reinsurance have also been found in twelfth- and thirteenth-century Europe.[15]

The development of financial instruments to deal with the unforeseen natural hazards underscores the primary role of capital in alleviating some of the effects of such disasters and highlights the need for economic development to make such capital investments affordable. In the contemporary world, apart from some of the

14. Swiss Re, *An Introduction to Reinsurance* (Zurich, Switzerland: Swiss Reinsurance Company, 1996), p. 4.

15. Ibid., pp. 3–20.

island nations, the percentage share of gross national product affected by natural disasters annually in richer nations tends to be much smaller than in poorer countries, although in absolute terms the losses in richer nations tend to be much higher than in poorer nations. Clearly, poverty means that the population is that much closer to nature's occasional fury and consequently that much more vulnerable.

Availability of capital is, of course, only a part of the story because even the best insurance policy cannot prevent a natural calamity. But this capital does make possible interventions through the development of science and technology that can increasingly predict and even prevent a natural calamity from turning into a disaster. It can also make the rescue, relief, and rehabilitation more effective.

Let's take a look at how the market, if unrestrained by state regulations, would deal with natural calamities. Economic development increases the value of property, which means that the risk of potential loss also rises. Of course, increasing property value also increases the premium that the owner has to pay for any kind of insurance. The property owner can thus decide whether to pay a higher premium for building in an area more prone to natural hazards or to adopt measures that would make his building more secure against the hazards or to move to a safer location. Insurance companies and other stakeholders evaluate a similar range of options in order to ensure that their propositions remain attractive to the property owners.

In a competitive market, there is constant pressure on insurance companies to find ways of lowering risks and thereby keeping the premiums low. In the same way, property owners have to constantly find ways of equating the benefits of higher premiums to cover the higher property value and search for other ways of lowering risks. This continuous tussle provides the impetus for search-

ing for alternative investments to reduce the exposure to risks. And this is where advances in science and technology play a major role.[16]

For instance, take the case of weather forecasting. A century ago, forecasting was in its infancy. With the development of radar, satellites, and computers, however, weather is being tracked around the clock, all over the world. From farmers, ordinary citizens, and airlines to insurance companies, all have become serious consumers of weather bulletins. This growing demand provides a new impetus to the science of meteorology as well as new modes of communicating the information to those who need it as quickly and as appropriately as possible. A correct weather prediction, be it of rainfall, a storm, or a tornado, goes a long way in preparing to meet the crisis.

Although effective prediction can help reduce losses from a natural calamity, in many instances prediction is not yet possible (e.g., earthquakes). Advances in building sciences, structural engineering, and material sciences, however, have helped substantially reduce the risk from collapsing structures and fires in the aftermath of a major earthquake.

In other situations, such as volcanic eruptions, ability to predict may be low and possibility of lowering damage not viable. But with adequate monitoring, a certain basic level of preparedness could be maintained so as to divert the flow of the magma from a volcanic eruption and prevent the destruction of life and property. In other cases, such as avalanches, it is possible to trigger controlled explosions to disperse the buildup of snow and prevent the possible avalanche by continually monitoring the situation.

The bottom line in all this is economic development, for it enables people to adopt a wide range of measures to insulate themselves and prevent natural calamities from turning into human dis-

16. Robert M. Hamilton, "Science and Technology for Natural Disaster Reduction," *Natural Hazards Review*, February 2000, pp. 56–60.

asters. Economic development increases the value of life and property and therefore makes such financial and technological measures to reduce losses affordable. Indeed, economic development even enables private charities to mobilize much greater resources much more efficiently to reduce the suffering of victims and help them rebuild their lives.

The competitive environment of an open market provides the best incentive to all the players: the financial sectors, the weather forecasters, the scientists, the engineers, the businesses, the homeowners, and everyone striving to find better and cheaper ways of dealing with natural catastrophes. Yet there have been constant attempts by governments in most countries, particularly in this century, to intervene in the marketplace and consequently to hamper the ability of the people to deal with natural calamities effectively.

Faced with a crisis, such as a drought or famine, one of the first things state agencies do is to institute price control and restrict the movement of goods. It is thought that, by putting a ceiling on the prices of basic food products, people will have better access to these goods. What is ignored is that, in a condition of scarcity, price control achieves exactly the opposite. Without the price signal, there is no way of knowing the enormity of scarcity and therefore no incentive to move goods to the affected areas. It is no coincidence that price control in a crisis situation inevitably leads to the growth of black markets and profiteering on a level that would be impossible to sustain in free-market conditions.

Contrast this situation with the experience of richer countries in the world today. Economic development and dramatic improvements in agricultural practices have created a situation in which food production is no longer a major concern. Expenditure on food as a percentage of family income has been falling. The result is that even a major drought or a flood makes hardly a blip on the price of food products. For the first time in history many societies have

reached a place where famine and hunger have all but been eliminated.

Nevertheless, the attraction of price control has continued. Restrictions on capital flows and the insurance markets reflect this desire to lower the cost of disaster mitigation through state intervention. Not unexpectedly, the results are exactly the opposite. Poor policies adopted by poorer countries have extracted a particularly heavy price. State monopoly over meteorological information has meant that there is no incentive to disseminate the information in a useful manner. Restrictions on channels of communication and state monopolies have discredited these channels to the extent that many people discount the information merely because it comes over nationalized broadcasting media. Restrictions on access to technology mean that even those who could have found the information from independent sources do not find it easy to do so. After the calamity, the thin spread of the channels of communication and technology means that few of these channels survive the disaster. This leads to a situation where even weeks after the disaster many of the affected areas remain cut off, without any relief or protection.

It could be said that many of the safety regulations, such as building codes mandated by the government and effectively enforced, particularly in developed countries, have played a significant role in mitigating the effects of natural calamities such as earthquakes or fires. Two points stand out here. One, being richer has meant that these societies have been able to afford these measures. Two, there are few reasons to think that these safety measures have been cost-effective. On the other hand it could be argued that an open market in property and real estate would have incorporated many of the safety features as part of a process of value addition and would do it in a much more cost-effective manner than the regulatory approach.

This is why more than twenty million people can afford to stay

in the greater San Francisco area in California despite the possibility of an earthquake or why two million people choose to live in the shadow of Mount Vesuvius in Naples or why authorities can spend upward of $30 million to evacuate people from coastal areas in Hawaii in the face a tsunami warning. On the other hand, ten thousand people perish in sparsely populated hills of the Himalayas when the earth shakes; even greater numbers die in tropical cyclones even after the storm has been tracked for days because either people remain ignorant or they can't afford to take any precautions. Even as the worst manifestations of famines have been all but eliminated, malnutrition remains one of the most deadly but silent of all killers.

The sharp contrast between the experiences of developed countries and developing ones in the face of natural calamities of similar types and magnitude leads to only one conclusion. Economic development provides the best protection against natural hazards. A free market is much more efficient in allocating resources to meet the requirements of all participants. Disaster mitigation is a value-added product that becomes increasingly affordable in a competitive economic environment. In contrast, greater levels of government intervention in the economy not only retard economic development but also make people more vulnerable to natural calamities.