Chapter 5
Financial Implications of Disasters

(Analysis of Data)

5.1 Introduction

Both natural and manmade disasters cause loss of lives, injuries and severe destruction of property and infrastructure. They disrupt the living style of citizens. These impacts have various implications on various sectors of the economy and on organizations. The risks emanating from the disasters should be incorporated in the economic policy for three reasons. First, there is high opportunity cost associated with the diversion of scarce financial resources into relief, reconstruction and rehabilitation efforts, second, disasters can pose burden on the budgetary planning process and third, disasters place high demands on international aid resources, diverting resources away from developmental uses. This chapter brings out the financial implications in short term and long term caused due to impacts of the major natural and manmade disasters at national level.

The implications of disasters depend upon the type of disaster, the vulnerability of population and assets as well as the intensity and frequency of disaster. Different kinds of disasters produce different kinds of financial implications. Natural disasters affect the economy immediately and directly, and have a long-term impact. In most disasters, the bulk of immediate damage comes from destroyed assets such as buildings, infrastructure, inventories and growing crops. Disasters generate short-term and long-term losses in economic activity and income in the affected area, as people and companies lose their means of production and access to markets. The implications caused by the manmade disasters such as fire or terrorist attacks are comparatively short lived even though their psychological impacts may be grave and long lasting.

The financial implications of disasters depend on a number of factors, starting with the resources of a country or community. The type of economy influences the impact of a disaster. For example, small and poorly diversified economies whose productive assets are spatially concentrated are highly vulnerable to economic loss from disasters. Developed countries have many advantages in prevention, mitigation, response and recovery: they can design and enforce
building codes, develop early warning systems, provide effective disaster relief when a disaster occurs. Moreover, people living in developed countries have more access to insurance. But the relationship is not completely straightforward; people with higher incomes not only have more expensive homes (and thus more to lose) but they may also be living in areas more vulnerable to disasters – for example on coastlines or near forests which are susceptible to wildfires. Disasters impact development and the long-term impact of children missing out on education and suffering long-term health effects can impede a country’s development efforts. But development itself can lead to destruction of natural barriers, such as mangrove forests. For example, the damage to New Orleans from Hurricane Katrina was at least partly due to the clearing of the marshes south of the city which had provided a buffer from the Gulf of Mexico. Moreover, the growth of cities increases the demand for water. Taking water from the ground can increase vulnerability to flooding.

The financial implications of disasters are increasing for several reasons the most important being the rising number of population with rising requirement for shelter and livelihood. This requirement necessitates them to build more and more structures in risky or disaster prone areas or live in cities where built structures tend to be more expensive. As The Economist points out, “economic activity is being concentrated in disaster-prone places: on tropical coasts and river deltas, near forests and along earthquake fault lines.” A 2010 World Bank study led by Apurva Sanghi estimated that between 2000 and 2050 urban populations exposed to tropical cyclones or earthquakes will be more than double, rising from 680 million in 2000 to 1.5 billion in 2050.

Asian and Pacific countries have a high vulnerability to the impacts of disasters. With increasing urbanization, migration patterns and population growth in general, people are occupying high-risk areas in greater numbers than ever, increasing their vulnerability to disaster impacts. “There is no country in the world that is as vulnerable on so many dimensions to climate change as India is,” Environment Minister Jairam Ramesh said in a climate-change report prepared by 220 scientists in the country in 2010. Every Indian region is expected to see more rainfall by the 2030s, each with 5 to 10 more days annually of “extreme precipitation. Flooding will have a “very severe implication for existing infrastructure such as dams, bridges, roads.” the report said.
5.2 Impacts of Natural Disasters Vis-a-Vis Manmade Disasters

Recently, a number of high-profile natural and man-made disasters have hit both developed and developing countries alike. In 2010, the volcanic eruption in Iceland affected the European airline industry and the 2010 oil spill in the Gulf coast cost about 6.1 billion in the short term (Reuters, 2010). Hundreds of thousands of lives were lost in the Indian Ocean tsunami, Hurricane Katrina, and the earthquakes in central Chile, Haiti, Sichuan province of China, northern Pakistan, and Japan. The occurrence of manmade disasters can be prevented to a great extent but the prevention of natural disasters is not under the control of human beings many a times. Natural disasters, which are caused due to nature’s fury, leave little in the hands of human being to control their occurrence. Even though the manmade disasters such as terrorist attacks or fires or riots keep occurring throughout the world, their occurrence can be controlled by establishing effective law and order and security mechanisms in the respective country. The disasters like flood or tsunami cause a great destruction and require immediate evacuation and relief measures for a large population. With the use of science and technology, today the human beings are in a position to predict disasters such as hurricanes, flood etc. to some extent but the disasters such as earthquake catch us unaware many a times. The ill effects of manmade disasters such as Bomb blast, terrorism can be minimized by providing training to citizens, creating awareness and imbibing a sense of peace and harmony. The incidences and the consequent ill effects of disaster such as fire can be diminished with the usage of preventive measures such as usage of fire extinguishers, training for fire extinguishing, fire fighting mock drills etc. However, the training and mock drills do a little in case of natural catastrophes where the intensity, geological and climatological causes, demographic factors and frequency of occurrence play a key role. As a result, the losses caused due to natural disasters have a higher quantum as compared to the losses caused by manmade disasters. This trend is evident from the following diagram pertaining to the period between 1970 to 2010:

Insured catastrophic losses (1970-2010)
An opinion was taken from the sample of 50 respondents to understand which type of disaster causes more financial loss and the outcome was as follows:

**Opinion of Respondents**

![Pie Chart](image)

Pie Chart drawn by the researcher on the basis of data collected from respondents
60% of the people were of the opinion that natural disasters cause more financial losses. 32% of the people opined that manmade disasters are causing more loss than natural disasters and 8% people found both equally responsible for loss making.

To arrive at the conclusion, we test the hypothesis

Let \( P_1 \) denote proportion of people who were of the opinion that natural disasters cause more financial losses

Let \( P_2 \) denote proportion of people who were of the opinion that manmade disasters cause more financial losses

H0: There is no significant difference in the proportion of people who were of the opinion that natural disasters cause more financial losses and who were of the opinion that manmade disasters cause more financial losses.

i.e. \( P_1 = P_2 \)

H1: Natural disasters have more significant financial implications than the manmade disasters.

i.e. \( P_1 \geq P_2 \)

Two sample proportion test (one sided large sample) z test can be used

\[ Z \text{ statistic} = \frac{(P_1 - P_2)}{SE_{(P_1-P_2)}} \]

For S.E. Consider \( P = \frac{n_1P_1+n_2P_2}{n_1+n_2} \)

\[
\begin{align*}
P &= ((50*.60) + (50*.32))/100 \\
&= (30+16)/100 = 0.46 \\
Q &= 1-P = 0.54 \\
S.E. &= \sqrt{PQ \left(\frac{1}{n_1} + \frac{1}{n_2}\right)} = 0.099679
\end{align*}
\]
Z == (P1-P2)/S.E.

Z = (0.60-.32)/ 0.099679 = 0.28/ 0.099679 =2.80902

Critical values at 5% l.o.s. =1.64 and 1% l.o.s. =2.33

Since $Z_{\text{calculated}} > Z_{\text{table}}$

$H_0$ is rejected. i.e. $H_1$ is accepted

**Conclusion:**

Natural disasters have more significant financial implications than the manmade disasters.

5.3 **Long Term Financial Implications Caused by Disaster Impacts:**

A) **GDP fluctuations**

For purposes of national and international use, disaster damages are commonly presented in relation with GDP. The ratio of a stock indicator (assets accumulated over a long period and suddenly damaged in the affected region) to a flow indicator (goods and services produced in the whole country within a year) is calculated in order to relate the scale of different disasters among different countries.

Natural disasters adversely affect the country’s natural environment and ecosystem. They cause displacement of people staying in vulnerable areas, due to impacts on property and infrastructure. Huge funds are required to be allocated towards reconstruction, rehabilitation and developmental aspects. All these outflows of funds create implications on a country’s GDP as shown in the following table:
Implications of Disasters on GDP of various countries in 2010-11

<table>
<thead>
<tr>
<th>Date</th>
<th>Country</th>
<th>Economic losses</th>
<th>Economic losses as % of GDP</th>
<th>Insured losses</th>
<th>Insurance industry contribution $</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.03.2011</td>
<td>Japan</td>
<td>up to 300</td>
<td>up to 5.4%</td>
<td>35</td>
<td>up to 17%</td>
</tr>
<tr>
<td>27.02.2010</td>
<td>Chile</td>
<td>30</td>
<td>18.6%</td>
<td>8</td>
<td>27%</td>
</tr>
<tr>
<td>22.02.2011</td>
<td>NZ</td>
<td>15</td>
<td>10%</td>
<td>12</td>
<td>80%</td>
</tr>
<tr>
<td>12.01.2010</td>
<td>Haiti</td>
<td>8</td>
<td>121%</td>
<td>0.1</td>
<td>1%</td>
</tr>
<tr>
<td>04.09.2010</td>
<td>NZ</td>
<td>6</td>
<td>5.3%</td>
<td>5</td>
<td>81%</td>
</tr>
<tr>
<td>06.04.2009</td>
<td>Italy</td>
<td>4</td>
<td>0.2%</td>
<td>0.5</td>
<td>14%</td>
</tr>
<tr>
<td>23.10.2011</td>
<td>Turkey</td>
<td>0.75</td>
<td>0.1%</td>
<td>0.03</td>
<td>4%</td>
</tr>
<tr>
<td>04.04.2010</td>
<td>Mexico</td>
<td>0.95</td>
<td>0.09%</td>
<td>0.2</td>
<td>21%</td>
</tr>
</tbody>
</table>

(USD BILLION AT 2011 PRICES) (Source: Swiss Re’s Sigma)

While the September 11 attacks on the United States caused major activity disruption, the direct economic damage was relatively small in relation to the size of the economy. The direct costs resulting from the terrorist attacks were estimated by the Organization for Economic Cooperation and Development at $27.2 billion (Bruck and Wickstrom, 2004), which represented about ¼ percent of the U.S. annual GDP. Man-made disasters can generate serious negative impacts not only on lives, but on the survivors' livelihoods (Barro, 2009). As to man-made disasters, the number of complex economic crisis also seems to be increasing. The disaster such as terrorist attacks, whether local or international, causes immediate human, economic and psychological impacts of differing intensity. However, most costs come from the indirect repercussions, which can be seen to vary greatly, as “the indirect costs of terrorist attacks vary in their distribution across activities, sectors, countries and time” (Brück, 2007: 5). The impact of international terrorism is not only due to the consequences of the attacks but it is also due to the constant possibility of an attack. This concept is described by Ulrich Beck as the risk society. The risk society as a concept implies that humans have always been subjects to several dangers,
mostly some they could not control, such as natural disasters. However, Beck argues, modernisation has introduced new risks, coming as consequences of globalisation. He identifies three “layers of danger” within the risk society: the environmental crisis, the global economic crisis and, since 9/11, the new risk associated with international terrorism. According to Beck, transnational terrorist attacks do not just represent regular crimes, and cannot be dealt with through the usual mechanism of national justice, which makes them unpredictable and thus puts them at the same level as the two other risks.

Japan’s north east coast, known as the Tohoku region, suffered the greatest damage as a result of the Earthquake followed by tsunami. The impact in terms of damaged capital stock was ¥16.9 trillion, or US$204 billion, equivalent to 4.0 per cent of Japan’s total stock. Although the area directly affected by the disaster contributed only around 2.5 per cent of Japanese GDP and manufacturing output, the broader negative economic impact was expected to be substantially more, due to supply chain linkages.

**Impact of Great East Japan earthquake on Japan’s Real Gross Domestic Product**


During 2001-2010, the economic damages in the Asia Pacific region were at 38% of the world total (based on damages in 2005 US dollars). However, even that proportion exceeds the
world average in terms of the Asian and Pacific share of global production or GDP, which is currently about 29% in constant 2005 US dollars.

**India: Natural Disaster Risk Hotspots (Weighted by Proportion of GDP Impacted)**

(Figure 5.4)

(Floods and droughts significantly impact the majority of India though they are most prevalent in the northwestern and eastern regions respectively. Cyclones influence a relatively small area of the country but have high-ranking mortality and GDP weighted impacts. The GDP maps demonstrate that almost the entire country is significantly impacted by hazards and mortality impacts are particularly concentrated in the north and northeastern regions.)
India-Economic Exposure
Modeled amount of GDP (Gross Domestic Product) present in hazard zones that are thereby subject to potential losses.

<table>
<thead>
<tr>
<th>Hazard type</th>
<th>GDP exposed (billions-US$)</th>
<th>Percentage of GDP</th>
<th>Country ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclone</td>
<td>5.78</td>
<td>![bar graph]</td>
<td>9th out of 89</td>
</tr>
<tr>
<td>Flood</td>
<td>9.39</td>
<td>![bar graph]</td>
<td>4th out of 162</td>
</tr>
<tr>
<td>Landslide</td>
<td>1.07</td>
<td>![bar graph]</td>
<td>9th out of 162</td>
</tr>
<tr>
<td>Earthquake</td>
<td>21.00</td>
<td>![bar graph]</td>
<td>25th out of 153</td>
</tr>
<tr>
<td>Tsunami</td>
<td>0.64</td>
<td>![bar graph]</td>
<td>16th out of 76</td>
</tr>
</tbody>
</table>


From the above data it can be observed that the country ranking is 4 for flood hazard. However, earthquake hazard has more GDP exposure followed by the GDP exposure due to flood hazard.

The devastating tsunami of 2004 caused heavy losses in Andhra Pradesh, Kerala, Tamil Nadu and Pondicherry in India as follows:
The GDP loss in the short run is inevitable but research findings regarding the long-term impact of disasters on GDP are mixed. In some cases disasters initially affected the GDP but eventually brought benefits such as agricultural production, industrial output and capital formation picked up in greater scale and volume than before. Economic activity picks up gradually throughout the years of reconstruction, starting with emergency response and humanitarian assistance. Capital assets can be regenerated through reconstruction investment, which generates income as the work progresses.

As per the World Bank Report 2009, the impacts of natural disasters on countries like India are likely to be significant as about 20 percent of India’s GDP is attributable to the agriculture sector which employs 58 percent of the total workforce. With agriculture contributing to 17% of India's GDP and providing employment to 58% of the population, any impact of monsoons on agricultural growth would feed into prices, incomes and GDP growth. (How

In case of manmade disasters, direct economic costs are likely to be proportionate to the intensity of the attacks and the size and the characteristics of the economy affected. A Study of Israeli Economy found that GDP was 10% to 15% lower than it would have been between 2001 and 2003 had there been no terror attacks there. (Rupa Subramanya Dehejia, 14 th July, 2011, The Wall Street Journal, Economics Journal, Mumbai 2011, What is the Cost of Terrorism http://blogs.wsj.com/indiarealtime/2011/07/14/economics-journal-mumbai-2011-what-is-the-cost-of-terrorism/)

Following issues need to be addressed while using GDP change as an indicator to assess indirect losses. These issues are, among others:

(i) The question of appropriate scale between the scale of the event and the scale of GDP measurement,
(ii) The capacity of GDP to be a good proxy for welfare (ref: CMEPSP, 2009; Council and European Parliament, 2009).

**Conclusion:**

Natural Disasters adversely affect the country’s GDP. In case of manmade disasters, direct economic costs are likely to be proportionate to the intensity of the attacks and the size and the characteristics of the economy affected.

**B) Increase in poverty and impact on income level**

Disaster and poverty are mutually reinforcing. Poor people have few or no savings and cannot afford to pay the insurance to protect themselves in crises as a result of disasters and the like. They have few options in escaping a crisis, even if the crisis was predicted, for such options are prohibitively expensive. The poor mostly subsists in less well-constructed houses susceptible to destruction by natural disasters such as the Tsunami or an earthquake. As Kellenberg and
Mobarak point out, “low-income countries that suffer from frequent disasters are at risk of becoming stuck in a poverty trap. They continually replace damaged capital with capital similar to what existed before the disaster in order to resume prior levels of productivity as quickly as possible. This, however, limits the possibility of future increases in productivity.”

The poor are constrained to accept some disaster risks—those including unhealthy environment—for income opportunity (Sinha and Lipton, 1999). Limited resources and social power also make the poor vulnerable to disaster, incurring direct losses from damages to their limited assets, or indirect losses through the disaster’s impact on the overall economy. The ‘realist’/techno scientific perspective broadly seeks to define risk and responses to it in terms of measurable, calculable probabilities. The risk-poverty interaction from this perspective is seen as the (in) capacity of households and individuals to ‘manage’ their response to the consequences of an adverse shock or stress event, such as a natural hazard. The ‘response’ has been typically defined as the function of a household’s asset endowment and access to insurance mechanisms (World Bank, 2002: 135). This perspective is dominant among economists, planners and advisors in international monetary and financial institutions and donor agencies.

Wisner et al described disasters as being a “complex mix of natural hazards and human action… for many people disaster is not a single, discrete event” (ibid 2003: 15). This perspective presented ‘social causation’ as a framework for assessing risk-poverty impacts with evidence of how repeated and cumulative shocks from famine, disease, wars and displacement erode whatever attempts are made by people to accumulate resources and savings.

In 2004, UNISDR with UNDP/BCPR and partners in Africa published a review of disaster risk reduction and poverty reduction strategies for Africa, whereby it captures the risk-poverty link: “increased poverty in Africa means increased disaster risk”. (2004:1). Further, it suggests that because the poor have few options regarding where to live and how to survive, they are most exposed and vulnerable to disasters. In addition, funds dedicated to poverty reduction are generally diverted to disaster response and relief work. Poverty reduction strategies should therefore seek to reduce both the level of risk and poverty in a community.

Later in 2006, Department for International Development (DFID) prefaced its policy paper on ‘Reducing the Risk of Disasters – Helping to achieve sustainable poverty reduction in a
vulnerable world’ with the statement that it is the poorest that are worst affected and suffer most. The capacity to cope and to reduce risk is much more limited in poorer countries. Disasters damage infrastructure and affect productivity and growth.

It is crucial to take into account the possibility that natural disasters increase poverty. In particular, because they destroy assets and wipe out savings, they can throw households into “poverty traps”. These micro-level poverty traps can also be created by health and social impacts of natural disasters: it has been shown that disasters can have long-lasting consequences on psychological health (Norris, 2005), and on children development (from reducing in schooling and diminished cognitive abilities; see for instance Santos, 2007; Alderman et al., 2006). These poverty traps at the micro-level (i.e. the household level) could even lead to macro-level poverty traps, in which entire regions could be stuck. Poor regions have a limited capacity to rebuild after disasters; if they are regularly affected by disasters, they do not have enough time to rebuild between two events, and they end up into a state of permanent reconstruction, with all resources devoted to repairs instead of addition of new infrastructure and equipments; this obstacle to capital accumulation and infrastructure development lead to a permanent Disaster-related under-development. This effect has been analyzed by Hallegatte et al. (2007) with a reduced-form model that shows that the average GDP impact of natural disasters can be either close to zero if reconstruction capacity is large enough, or very large if reconstruction capacity is too limited (which may be the case in some least developed countries).
Disasters do not respect borders or distinguish between income levels; however, the effect of disasters on human lives tends to be the lowest in high-income countries. In Asia-Pacific high income countries, about 1 person in every 1,000 people was affected by disasters and 1 in 1 million died during the 10 years from 2001 to 2010; in low-income countries nearly 30 in 1,000 people were affected and 52 in 1 million people killed. More people in the lower-middle income group were affected than people in the low-income countries, although the mortality ratio in the lower-middle group was lower.

**Impact of disasters on population having various income levels in Asia Pacific region**

(Source: Statistical Yearbook of Asia and the pacific 2011)
From the above chart it is evident that lower income class people followed by lower middle income group people have to suffer more economic damage.

**The per capita impact of Tsunami on affected provinces**

<table>
<thead>
<tr>
<th>Province</th>
<th>Population (million)</th>
<th>Per Capita GDP (US$)</th>
<th>Total Impact (million US$)</th>
<th>Per Capita Impact (US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>78.88</td>
<td>378</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Kerala</td>
<td>32.74</td>
<td>371</td>
<td>101</td>
<td>3</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>61.20</td>
<td>618</td>
<td>615</td>
<td>13</td>
</tr>
<tr>
<td>Pondicherry</td>
<td>1.03</td>
<td>1246</td>
<td>52</td>
<td>50</td>
</tr>
<tr>
<td>Indonesia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aceh</td>
<td>4.04</td>
<td>1137</td>
<td>4451</td>
<td>1102</td>
</tr>
<tr>
<td>Maldives</td>
<td>0.32</td>
<td>2271</td>
<td>637</td>
<td>2009</td>
</tr>
<tr>
<td>Thailand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Krabi</td>
<td>0.39</td>
<td>1079</td>
<td>504</td>
<td>1292</td>
</tr>
<tr>
<td>Trang</td>
<td>0.64</td>
<td>1622</td>
<td>82</td>
<td>98</td>
</tr>
<tr>
<td>Phuket</td>
<td>0.78</td>
<td>1870</td>
<td>754</td>
<td>1047</td>
</tr>
<tr>
<td>Phang Nga</td>
<td>0.24</td>
<td>5649</td>
<td>1201</td>
<td>5090</td>
</tr>
<tr>
<td>Ranong</td>
<td>0.14</td>
<td>1656</td>
<td>88</td>
<td>628</td>
</tr>
<tr>
<td>Satun</td>
<td>0.27</td>
<td>1848</td>
<td>31</td>
<td>113</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>18.17</td>
<td>1054</td>
<td>1454</td>
<td>76</td>
</tr>
</tbody>
</table>


The above table shows per capita impact caused due to the tsunami in 2004. The highest per capita impact was in Phang Nga. Pondicherry has highest per capita impact followed by Tamil Nadu in India. Even though the total impact was highest in Tamil Nadu, the per capita impact is lower due to the comparatively higher population.

**Conclusion:**
Disasters do not make any distinction between income levels; however, the effect of disasters on human lives tends to be the lowest in high-income countries. The poor people are vulnerable and most affected due to the disasters.

C) Loss to insurance sector:

Natural disasters across the globe have made 2011 the costliest on record in terms of property damage according to a report released by a leading insurer that tracks disasters. The first six months saw $265 billion in economic losses, well above the previous record of $220 billion set for all of 2005 (the year Hurricane Katrina struck); according to Munich Re, a multinational that insures insurance companies. For the United States, 98 events (storms, flooding, fires and earthquakes) left $27 billion in economic losses, more than double the 10-year average of $11.8 billion, Munich Re stated. The vast majority of U.S. damage, $23.5 billion, was from twisters and other severe storms. The enormous losses results in more payouts by insurers, which reduce their bottom lines. This causes higher insurance rates for consumers. Japan's earthquake and tsunami in March 2011 account for $210 billion, as well as most deaths but even without that cost factored in, overall losses still exceed the 10-year average, the company stated. Munich Re also calculated that the Australia flooding left $7.3 billion in economic losses, making it the fourth costliest natural disaster in the first half of 2011.

Lloyd's, a specialist insurance market made up of 87 underwriting syndicates, reported that profits fell 43% to £2.2 billion in 2010 after being hit by a string of natural disasters including the earthquake in Chile.

Table 5.4 shows the 20 most costly insurance losses due to disasters in 2010. Most of these losses have occurred in developed countries.
The 20 most costly insurance losses in 2010

<table>
<thead>
<tr>
<th>Insured loss (in US$ m)</th>
<th>Victims</th>
<th>Date (start)</th>
<th>Event</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>8,090</td>
<td>662</td>
<td>27/02/2010</td>
<td>Earthquake (Mw 8.8 triggers tsunami, over 200 aftershocks)</td>
<td>Chile</td>
</tr>
<tr>
<td>4,473</td>
<td>1</td>
<td>04/09/2010</td>
<td>Earthquake (Mw 7.0, over 300 aftershocks)</td>
<td>New Zealand</td>
</tr>
<tr>
<td>2,754</td>
<td>64</td>
<td>21/02/2010</td>
<td>Winter storm Xynthia, winds up to 183 km/h</td>
<td>France, Germany, Belgium et al</td>
</tr>
<tr>
<td>2,195</td>
<td>-</td>
<td>04/10/2010</td>
<td>Thunderstorms, tornadoes, hail, floods</td>
<td>United States</td>
</tr>
<tr>
<td>2,050</td>
<td>1</td>
<td>23/12/2010</td>
<td>Floods caused by heavy rain, tropical cyclone Tasha</td>
<td>Australia</td>
</tr>
<tr>
<td>2,000</td>
<td>-</td>
<td>12/06/2010</td>
<td>Storms, winds up to 130 km/h, hail</td>
<td>United States</td>
</tr>
<tr>
<td>1,231</td>
<td>-</td>
<td>13/08/2010</td>
<td>Storms, winds up to 120 km/h, heavy rain, floods</td>
<td>United States</td>
</tr>
<tr>
<td>1,079</td>
<td>-</td>
<td>21/03/2010</td>
<td>Storm, winds up to 120 km/h, hail, rain, mudslides</td>
<td>Australia</td>
</tr>
<tr>
<td>700</td>
<td>-</td>
<td>06/02/2010</td>
<td>Storms, hail, rain, floods</td>
<td>Australia</td>
</tr>
<tr>
<td>690</td>
<td>11</td>
<td>20/04/2010</td>
<td>Explosion on Deepwater Horizon oil rig</td>
<td>Gulf of Mexico, United States</td>
</tr>
<tr>
<td>820</td>
<td>32</td>
<td>30/04/2010</td>
<td>Floods caused by heavy rain, storms</td>
<td>United States</td>
</tr>
<tr>
<td>818</td>
<td>22</td>
<td>15/06/2010</td>
<td>Floods caused by heavy rain</td>
<td>France</td>
</tr>
<tr>
<td>735</td>
<td>-</td>
<td>20/02/2010</td>
<td>Storms, floods, hail, tornado</td>
<td>United States</td>
</tr>
<tr>
<td>711</td>
<td>240</td>
<td>29/06/2010</td>
<td>Floods caused by heavy nonseasonal rain</td>
<td>China</td>
</tr>
<tr>
<td>695</td>
<td>22</td>
<td>10/06/2010</td>
<td>Storms, winds up to 97 km/h, hail, heavy rain, floods</td>
<td>United States</td>
</tr>
<tr>
<td>620</td>
<td>22</td>
<td>17/06/2010</td>
<td>Thunderstorms, heavy rain, floods</td>
<td>United States</td>
</tr>
<tr>
<td>610</td>
<td>-</td>
<td>10/05/2010</td>
<td>Tornadoes, hail</td>
<td>United States</td>
</tr>
<tr>
<td>610</td>
<td>-</td>
<td>01/02/2010</td>
<td>Winter storm, winds up to 80 km/h, snow</td>
<td>United States</td>
</tr>
<tr>
<td>611</td>
<td>14</td>
<td>06/08/2010</td>
<td>Floods caused by heavy rain</td>
<td>Germany, Czech Republic et al</td>
</tr>
<tr>
<td>&gt; 500</td>
<td>-</td>
<td>12/07/2010</td>
<td>Hailstorm, heavy rain, damage to buildings and cars</td>
<td>Canada</td>
</tr>
</tbody>
</table>

Source: Swiss Re Economic Research and Consulting

Table 5.4

In India, losses from weather-related catastrophes have risen strikingly since the early 1990s. The largest insured loss was generated by the Mumbai Floods in 2005 (US$ 770m). There were claims from damages to and losses of motor vehicles, flooding in ground-level homes and bungalows, damage to assets in shops and stocks in godowns, machinery, and loss of profit for businesses. Though this is a case, in India, most of the losses suffered in natural disasters are not insured, for reasons such as lack of funds, apathy about insurance, theory of karma attitude and ignorance about availability of such covers.

In case of man-made disasters such as terrorism, the possibility of international terrorist attacks occurring with important facilities and locations being their main target has had a
significant impact on the way that insurance is underwritten and has shown a need to come up with new insurance mechanisms.

The insurance industry was affected by large claims resulting from the 9/11 attack in USA that generated losses estimated at more than $50 billion (PricewaterhouseCoopers, 2001).

The Organisation for Economic Cooperation and Development (OECD) 2002 report states that the economic consequences of international terrorism on the insurance sector is one of the most likely to remain a medium to long term issue, as insurance coverage for terrorist-related activities is more difficult to obtain and premiums have considerably increased.

Incidents of terrorist attacks increase the risk perception. This causes demand for higher rates in terrorism insurance. In India, General Insurance Corporation of India (GIC) is the body which manages the terror pool and terror loss claims are paid out of this pool. After the Mumbai terror attack on 26th November 2008, claims worth Rs. 600 crore were paid from the pool.

In case of other manmade disasters such as the fire at Oil and Natural Gas Corporation’s Bombay High platform on 27 July 2005, the oil production dropped from 261 000 bpd (barrels per day) to 142 000 bpd. The platform was insured for 195 million dollars, and the multipurpose support vessel that sank after colliding with the oil-drilling platform was insured for 60 million dollars – a total of 255 million dollars.

**Conclusion:**

Disasters cause heavy insurance loss due to damages to and losses of vehicles, flooding in ground-level homes and bungalows, damage to assets in shops and stocks in godowns, machinery, and loss of profit for businesses.

The manmade disasters such as terrorist attacks and fire cause heavy loss of property and goods resulting in insurance losses.
**D) Money laundering:**

International terrorism uses a variety of means to collect money from different sources in order to fund their training and plan their attacks. According to the FBI, the 9/11 terrorist attacks cost between $303,672 and $500,000” (Levitt, 2002). While Iran and Syria continue to back international terrorism, terrorist groups increasingly finance their own activities through a network of charitable and humanitarian organisations, criminal enterprises, front companies, illicit and unregulated banking systems, and the personal wealth of individual militant Islamists (Levitt, 2002). The finance and business committee of Al Qaeda comprised of professional bankers, accountants and financiers-managed the group’s funds across four continents.” (Gunaratna, 2003: 81). Through this network of professionals, Al Qaeda had managed to prove itself to be financially robust, having developed multiple sources of support, and was able to maintain its organisation. Al Qaeda, Hamas, Hezbollah and other terrorist groups appear to “have relied on a core group of financial facilitators who raised money from a variety of donors and other fundraisers” (www.9-11commission.gov). In 2008, a Texas-based charity called Holy Land Foundation for Relief and Development, once the largest US Muslim charity, was proven guilty of giving more than $12 million to support Hamas (www.news.bbc.co.uk). In parallel to these charities, terrorist groups also often take advantage of what is called the zakat. This term is used in “Islamic finance to refer to the obligation that an individual has to donate a certain proportion of wealth each to charitable cause” (www.investopedia.com). In order to move the money coming from states, individuals and charities, terrorist groups use a number of clandestine ways such as e-currencies, online banking, or hawala, which is described by the Interpol website as an “alternative or parallel remittance system.” (www.interpol.int). Hawala relies mostly on connections such as family relationships or regional affiliations and often used to launder money, as it is very hard to trace and to make the distinction between a legitimate and illegitimate hawala. In addition to this, there is an extensive part of terrorist funding that comes from a diverse array of criminal activities, from money laundering to drug trafficking, especially for groups such as the Taliban in Afghanistan. The weak border control in the Middle East makes money, drugs or arms smuggling easier for international terrorist groups. According to S.B. Bloomberg, economic outcomes can influence the rise of terrorism through simple channels and recurring events, especially economic weakness and low level of rights and representation. In effect, he describes terrorism as having political demands but economic roots. It is a fact that
globalisation enhances the capabilities of international terrorist groups. Terrorist attacks generally cause a negative impact on economic growth.

HSBC Holdings PLC, Europe’s biggest bank, had its Long-term Issuer Default Rating downgraded by Fitch Ratings to AA- from AA. A Senate committee said in July that failures in HSBC’s money-laundering controls allowed terrorists and drug cartels access to the U.S. financial system. The bank said it may face criminal charges from U.S. anti-money-laundering probes and the cost of a settlement may significantly exceed the $1.5 billion. (Ref: Howard Mustoe, 7th December 2012, Bloomberg, http://www.bloomberg.com/news/2012-12-07/hsbc-rating-cut-one-step-by-fitch-on-regulation-compensation.html)

**Conclusion:**

International terrorism finds various means to collect money for its operations which causes an illegal alternate remittance system.

**E) Increase in the prices of oil:**

**Impact on crude oil prices due to terrorist attacks**


![Figure 5.8](http://www.turnermason.com/Publications/petroleum-publications_assets/NPRA-CrudeOilPriceForecast.pdf)

As shown in above figure, the jump in price since 2004 for WTI crude, a key benchmark in the industry, is unprecedented. For most of the period between mid-1986 and mid-1999, this crude stayed consistently within a band, around the $20 mark. A sudden increase in 2001 took place as a consequence of the 9/11 events.
The political and economic volatility in West Asia has led to a massive rise in crude oil prices. Increasing oil prices create obstacles in the development especially fast growing economies like India and China as they are already under pressure to control inflation.

**Conclusion:**

The terrorist attacks cause increase in the prices of crude oil, which creates obstacles in the economic development.

**F) Funding requirements for Reconstruction and Rehabilitation:**

All major types of disasters (including drought) can disrupt longer term investment plans for both physical and human capital in several ways. Ability to finance losses following a disaster is crucial to recovery and affects how quickly a country can resume its growth path. Governments may divert resources away from planned investments to fund relief and rehabilitation. Reconstruction efforts may also be funded through domestic or external borrowing increasing future debt servicing payments. After the evaluation of the extent of direct damage and collateral damage, the reconstruction phase involves spending towards restoration of damaged facilities, transportation, communication and overall infrastructure.

According to the OECD report of 2002 on the economic consequences of 9/11 terrorist attack in USA; the immediate costs were the following: $14 billion was allocated to private enterprise, $1.5 billion to State and local government enterprise and $0.7 billion to Federal government. Moreover, $11 billion were spent for additional costs such as rescue, cleaning, and so on. A very important role of this money was allocated to cleaning, in order to provide a basis for possible reconstruction of World Trade Tower.

**International funding for natural disaster response 2011**
In India under the Central Scheme for Assistance to Civilian Victims/Family of Victims of Terrorist, Communal and Naxal violence, the following assistance was given to the affected family under the scheme, for each death or permanent incapacitation of the victim:

**Financial Assistance given to the victims/ family of victims of terrorist, Communal and Naxal violence**

<table>
<thead>
<tr>
<th>Year</th>
<th>Rupees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008-2009</td>
<td>2,13,00,000</td>
</tr>
<tr>
<td>2009-2010</td>
<td>4,56,00,000</td>
</tr>
<tr>
<td>2010-2011</td>
<td>4,14,00,000</td>
</tr>
<tr>
<td>(Upto 31.12.2010)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10,83,00,000</strong></td>
</tr>
</tbody>
</table>

(Source: Government of India, Ministry of Home Affairs, Annual Report 2010-11)

This was in addition to the assistance given for reconstruction of damaged property and infrastructure and other special plan assistance and relief and assistance for strengthening police force and other security aspects.
Costs of reconstruction and rehabilitation are crucial, as they participate in the reduction of available consumption, and therefore in the impact on welfare. For example, if a $100 m plant is destroyed and immediately rebuilt, the total loss would be $100 m; whereas, if reconstruction is delayed by 1 year, the total consumption loss will be the sum of the replacement cost (the direct cost) and the value-added of 1 year of production (the indirect cost). Here, the estimates of indirect costs include business interruption in the event aftermath, value added losses during the reconstruction period and loss in housing services. The value of such production losses, in a broad sense, can be very high in some sectors, especially when basic needs are at stake (housing, health, employment, etc.). The longer the reconstruction period, the larger the total cost of the disaster. The reconstruction phase, and the economic recovery pace, will ultimately determine the final cost of the natural disasters. The reconstruction pace is linked to the constraints to the reconstruction phase, which are of two types. First, they can be financial. This concerns situations in which households and businesses can simply not finance the reconstruction. This is of particular importance in countries with limited resources (Freeman et al., 2002; Mechler et al., 2006). Constraints are also technical. Technical limits to the ability to increase production are obvious in the construction sector, which experience a dramatic increase in demand after the disaster. In spite of this demand, production does not follow, because there are strong constraints on reconstruction. This explains why reconstruction often takes several years, even for limited damages (e.g., the 2004 hurricane season in Florida; see McCarty and Smith, 2005).

The real cost of a disaster is not only financial, and also includes fatalities, injuries, moral damages, historical and cultural losses, environmental losses, societal disruptions. In this study, however, the focus is on the financial losses.

**Conclusion:**

The impacts of disasters cause diversion of resources from planned investments to fund relief and rehabilitation.

5.4 Short Term Financial Implications Caused by Disaster Impacts:

A) Impact on Share Market
It is observed that the financial markets usually show fast rebounding tendencies after major natural hazards. First and foremost reason for this reaction is that the impacts are mainly felt in the most vulnerable areas which have little economic influence due to poverty, lack of businesses and industries and lack of infrastructure. Second main reason is that the major components of share markets are stocks of prime companies which are usually insured against business interruptions. Their business operations can be resumed in comparatively lesser time. Even though the impact of disaster causes impact on the profitability in the short run, the profits surge in the long run given the size of the organization and its operations. Another reason can be attributed to the redevelopment and reconstruction initiatives of the government and financial institutions. These initiatives support the industries and businesses in the long run thus offsetting the short term impacts.

However with the globalization, these impacts have become multifaceted. A biggest earthquake that hit in 2011 Japan since records began 140 years ago triggered a 10-metre tsunami that swept away houses, ships, cars and set farms and buildings on fire. The 8.9 magnitude quake caused many injuries, sparked fires and a wall of water. Some nuclear power plants and oil refineries were shut down and a refinery and a major steel plant were ablaze. Around 4.4 million homes were without power in northern Japan, media said. Due to this disaster, share markets in Asia and Europe dipped as investors, already worried about a series of sliding economic developments in other markets, further panicked. The Australian dollar lost ground against a basket of currencies. Having barely managed to survive a prolonged spell of economic recession, the world had to face another bout of dangers that threatened growth across nations.

**Impact on stock markets in the countries affected due to 2004 tsunami**
The initial direct economic impact of the Tsunami came through the negative effects on consumption and business activity in the areas affected followed by the positive effects associated with new investments in the subsequent months. The magnitude and length of the initial negative effects vary depending on the sector affected, and how the recovery process is managed.

In Mumbai flooding of 26th July 2005, the Bombay Stock Exchange and the National Stock Exchange of India, the premier stock exchanges of India could function only partially. As most of the trading is e-Trading, trading terminals of the brokerage houses across the country remained largely inoperative. Ironically, in partial trading, the Sensex, closed at an all time high of 7605.03 on 27 July 2005. The Exchanges, however, remained closed on the subsequent day.
Striking at the core of the world’s main financial center, the terrorist attacks of September 11 aimed at undermining the stability of the U.S. and international financial system. On the capital markets, because of the timing of the attacks (around 9:00 a.m. eastern daylight time), the New York Stock Exchange and the NASDAQ Stock Market did not open for trading on September 11. In the aftermath of the attacks, the financial markets were not only confronted with major activity disruptions caused by the massive damage to property and communication systems, but also with soaring levels of uncertainty and market volatility. In terms of market volatility, the U.S. stock markets were down during the first day of trading and continued to drop in the following days. Between September 17 and September 21, Standard and Poor’s 500 index fell by 11.6 percent (IMF 2001b) and NASDAQ index by 16.1 (IMF 2001b). The impact of the September 11 attacks was visible worldwide on the major equity markets, which experienced sharp and rapid declines, as the market participants perceived the event as a global shock. The
decline in the European stock markets was even greater after September 17th, because of spillover effects. The Dow Jones Euro STOXX index was down 17.3 percent between September 11 and September 21 (IMF 2002). Numerous key market players had substantial operations in or around the World Trade Center that were destroyed or damaged in the attacks, causing a widespread closure of the New York financial markets. The biggest disruption to the trading infrastructure was caused by damage to the communication system of the world’s largest custodian and settlement bank, the Bank of New York (IMF, 2001b). Both Bank of New York and J.P. Morgan Chase, the two main clearing banks for government securities, had to relocate to backup sites as their main centers of operations were located just a few blocks from the World Trade Center (Lacker, 2004). Manual processing of securities and payment transactions resulted in significant delays in clearing and settlement, raising uncertainty about the completion of trades and demand for liquidity (IMF, 2001b). On the repo market, the initial incapacity to trade caused by damage to trading infrastructure, combined with the growing reluctance of market participants to lend out securities, resulted in a lack of supply that demanded immediate intervention by the authorities (IMF, 2001b). Also, several federal funds brokers were disabled in the attacks, some ATM networks crashed entirely, and the facilities of the New York Board of Trade were destroyed (Lacker, 2004). Because of widespread disruption in the payment systems, many market participants became unable or unwilling to execute payments, causing a growing liquidity shortage.

Despite having been the direct target of terrorism, which materially affected the market infrastructure and operations, following the September 11 attacks, the financial markets showed resilience and a capacity to return to normalcy quickly. The financial markets digested the information on the economic and financial impact of the terrorist attacks after an initial shock and efficiently incorporated the information into asset prices so that it could be integrated into decisions about the future. While the initial effect of any major crisis may involve a financial market overreaction because of higher levels of uncertainty as the new information is being assessed and absorbed, once the long-term impact of the crisis is assessed, markets return to their pre-crisis condition. Thereafter, financial markets shift up or down according to investors’ perceptions of how the crisis will be resolved (Taylor, 2004).
In comparison with the impact of the 2001 terrorist attacks on the United States, the effects of the March 11, 2004, terrorist attacks on Spain were felt much less by the capital markets, and by the financial markets in general. The Dow Jones EURO STOXX fell by about 3 percent on March 11, and continued to drop during the following days but recovered almost completely by the end of the month. Similarly, after a small decline, the Standard and Poor’s 500 returned to the pre-March 11 levels in less than a month. In the aftermath of both terrorist attacks investor confidence deteriorated beyond the national boundaries because of contagion effects. Likewise, in both cases the U.S. markets seem to have suffered less and also recovered faster from the attacks, proving enhanced resilience. The differences in stock market behavior in the aftermath of the two terrorist attacks have several possible explanations. First, while the attacks in New York raised uncertainty about the stability of the global financial system, the attacks on Spain were perceived as mostly having a regional effect. Second, unlike the events of 11 September 2001, which occurred in the midst of a global economic downturn, the terrorist attacks in Madrid occurred at a time when the world economy was growing strongly (European Central Bank, 2004). The market uncertainty was even stronger in the first case as doubts raised about U.S. capacity to drive the global economy out of recession. The terrorist attacks in Madrid did not directly target the financial markets and therefore did not damage their infrastructure and communication systems.

After the 2008 terrorist attack in India, the sensex was down by 1.3% (Source: The Economic Times). The FIIs saw it as a big opportunity to invest and to buy the shares. Due to this reason and due to the feeling of patriotism, when the sensex reopened, markets gained. The same trend was observed more or less in other cases:
### Sensex performance after terror attacks in India

<table>
<thead>
<tr>
<th>Incident</th>
<th>Open</th>
<th>Close</th>
<th>Prev Close</th>
<th>Chg (%)</th>
<th>MFs *</th>
<th>FIIs*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mumbai blast (13/07/11)</td>
<td>18,564</td>
<td>18,618</td>
<td>18,596</td>
<td>0.12</td>
<td>N.A</td>
<td>N.A</td>
</tr>
<tr>
<td>Varanasi blasts (7/12/10)</td>
<td>19874.3</td>
<td>19696.48</td>
<td>19934.6</td>
<td>-1.2</td>
<td>-33.6</td>
<td>-1298</td>
</tr>
<tr>
<td>German bakery blast (13/02/10)</td>
<td>16186.9</td>
<td>16227.04</td>
<td>16152.6</td>
<td>-0.71</td>
<td>-300</td>
<td>217.5</td>
</tr>
<tr>
<td>Mumbai/ Taj attacks (26/11/08)</td>
<td>8889.18</td>
<td>9092.72</td>
<td>9026.72</td>
<td>0.73</td>
<td>606</td>
<td>419.4</td>
</tr>
<tr>
<td>Assam blasts (30/10/08)</td>
<td>9361.66</td>
<td>9788.06</td>
<td>9044.51</td>
<td>8.22</td>
<td>-42.9</td>
<td>1183</td>
</tr>
<tr>
<td>Malegaon blast (29/09/08)</td>
<td>12178.18</td>
<td>12860.43</td>
<td>12595.8</td>
<td>-3.87</td>
<td>402</td>
<td>84.5</td>
</tr>
<tr>
<td>Delhi blasts (13/09/08)</td>
<td>13666.28</td>
<td>13531.27</td>
<td>14000.8</td>
<td>-3.35</td>
<td>131</td>
<td>-629</td>
</tr>
<tr>
<td>Ahmadabad blasts (26/07/-8)</td>
<td>14267.03</td>
<td>14349.11</td>
<td>14274.9</td>
<td>-3.4</td>
<td>204</td>
<td>-609</td>
</tr>
<tr>
<td>Jaipur bombings (13/05/08)</td>
<td>16691.3</td>
<td>16978.35</td>
<td>16752.9</td>
<td>1.35</td>
<td>133</td>
<td>729.9</td>
</tr>
<tr>
<td>Mumbai trains blasts (11/07/06)</td>
<td>10604.64</td>
<td>10930.09</td>
<td>10704.8</td>
<td>2.98</td>
<td>132</td>
<td>375.3</td>
</tr>
</tbody>
</table>

(*Open and close numbers and MFs, FIIs figures in crore are of the first trading session after the blast.)*

(Source: Moneycontrol Bureau

Table 5.6
Of the nine incidents since July 11, 2006 (when serial blasts occurred on Mumbai trains that killed 200 and injured 700), the markets closed positively on four occasions and negatively on five occasions. Both, Mutual Funds (MFs) and Foreign Institutional Investors (FIIs) have been net buyers on six out of these nine days.

**Conclusion:**
The financial markets usually show fast rebounding tendencies after major natural hazards. In case of manmade disasters such as terrorist attacks, financial markets shift up or down according to investors’ perceptions of how the crisis will be resolved. While the initial effect of any major crisis may involve a financial market overreaction because of higher levels of uncertainty, once the long-term impact of the crisis is assessed, markets return to their pre-crisis condition.

**B) Impact on Tourism Industry:**

The following chart depicts the fall in foreign visitor arrivals to Japan and Japanese resident departures in the months following the disaster. After peaking in July 2010 at over 878,000 visitors, foreign visitor arrivals to Japan fell to around 296,000 in April 2011; the lowest level since May 2003.

**Impact of earthquake and tsunami on Japan’s tourism industry**

Hotels, restaurants, travel agencies and other tourism-related businesses faced a sharp drop in demand (immediately after 9/11), in the United-States and also in the many other countries, in particular in the Caribbean and in the Middle East (http://www.oecd.org, 2002).

Tourism of an economy gets affected due to the fear and panic caused by the terrorist activities. Terrorist attacks are a body blow to tourism,” admits Nakul Anand, Divisional Chief Executive (Hotels), ITC. According To him, the occupancy drop rate in Mumbai’s hotels was at almost 50 per cent, and at 25-30 per cent across hotels in India’s major cities in the aftermath of the 26/11 terrorist attacks. After the 26/11 terrorist attack, the hotel industry had to face several booking cancellations which not only resulted in loss of business but also in the loss of employment opportunities. Not only the actual terrorist attack but the perception of it also reduces the number of tourists in the tourism area. As regards the manmade disasters such as terrorism or riots, it was observed that the impact of terrorist activities on tourism and hospitality industry is always severe but short term.
Trend analysis of occupancy and average rates for the industry over the last ten years indicates that hotel occupancies and rates were under pressure in the immediate short term period after these events. During the Five Year period, FY99 to FY04, when the industry observed three wars, the worst terror attack in history on 9/11, and the SARS outbreak, the response has been quick and effective resulting in hotels witnessing positive growth both in terms of occupancy and average rates in four out of the five years, the only exception being FY01. While the impact of 2008 terrorist attacks lead to cancellations from the international travel segments, it needs to be highlighted that foreign tourist arrivals account for less than 5.0% of the total travel and tourism market across star categories. In 2001, post 9/11 and in 2002, post SARS, while international
tourist arrivals witnessed a negative growth trend, the outbound tourist market in India decided to travel to leisure destinations within India and was instrumental in helping industry sustain itself through tough times.

It was observed that the tourism is Darjeeling was affected after the violence in Gujarat in 2003. This was due to the fact that 30% of the tourists were from Gujarat who cancelled the bookings.

**Conclusion:**

The impacts of the manmade disasters such as terrorism and riots on tourism and hospitality industry are always severe but short term. A drop in the number of tourists was also observed at the world level after the occurrence of disasters.

C) **Impact on banks and other industries**

Japan accounts for 4.5% of the global trade. The natural disaster of 2011 led to a ripple effect affecting production and supply chains of various industries through-out the world. The northern Tohoku region, most affected by the disaster, accounts for about 8% of Japan’s GDP, and has a number of factories making different products. In case of companies like Sony, Toshiba Corp, Toyota Motors, Honda Motors, Nissan Motors, Mitsubishi Motors Corp, Suzuki Motor Corp, refiner JX Nippon Oil & Energy Corp, Cosmo Oil, Tokyo Electric Power Co, East Japan Railway Co., Shin-Etsu Chemical Co., Nippon Paper Group, Nippon Suisan Kaisha, Nippon Steel Corp, Canon, beer maker Sapporo Holdings, convenience store operator Lawson, etc. operations were either affected or were forced to shut down their plants in northern Japan. The effect of the record 9.0 earthquake was compounded by the ensuing tsunami that caused widespread destruction and that spread out across the Pacific. It caused tens of millions of dollars of damage in Hawaii, as much as $40 million in damage in California and millions of dollars of damage primarily to harbors and boats in Oregon. The earthquake and tsunami that struck Japan caused the following impacts on the industrial production in selected sectors:
A number of automotive products have been affected by the Japan disasters, especially certain microprocessors and a unique paint pigment, which are produced mainly in the earthquake-stricken region. Due to the shortage of imported parts as a reason of devastation, the Japanese carmakers had to cut down the production in other countries as well. The disaster of earthquake and tsunami in Japan damaged ports and an airport in the region and the overall transport infrastructure, severely hampering exports. Vehicle exports, which account for 10% of Japan's total shipments, pushed down by 27.8% in March, as per the finance ministry report.

However, swift reconstruction minimized the long-term impact on production. As shown in Figure below, the tsunami also destroyed or damaged aquaculture facilities in prefectures quite distant from the epicenter. The damage compounded by the nuclear contamination from the Fukushima Daiichi Nuclear Plant plus a shortage of gasoline and electricity that caused rolling

blackouts in Japan’s industrial centers. Over and above the devastation and the heavy death-toll caused by the earthquake, the following tsunami, and the nuclear crisis, in 2011, Japan's economy had to bear the burden of reconstruction expenditure, fall in production, problems of supply chain, loss in tourism, etc.

Tsunami Damage to Seafood Cultivation in Japan

Due to the flooding in Mumbai on 26\textsuperscript{th} July, 2005, the banking transactions across the counters were adversely affected and many branches and commercial establishments were unable to function from that evening. ATM networks of several banks, which included the State Bank of India, ICICI Bank, HDFC Bank, and several foreign banks like Citibank and HSBC, stopped functioning from the afternoon of 26 July 2005 at all the centers of Mumbai. ATM
transactions could not be carried out in several parts of India on 26 July or 27 July due to failure of the connectivity with their central systems located in Mumbai. The flooding caused loss of 10 billion rupees to the pharmaceuticals industry, and 1 billion rupees to airlines. (Reference: The Indian Insurance Industry and Climate Change, The Energy and Research Institute, 2006). The export loss due to the flood was to the extent of Rs. 800 crores as per the Report of Concerned Citizens Commission on Enquiry into the Mumbai Floods 2005.

As against the above effects, it was observed that in the aftermath of 2008 terrorist attack in Mumbai, in view of the rising security concern, there was a big push for market of security products.

**Conclusion:**

The operations of several industries such as banking, airlines, automobile etc. get affected due to natural disasters. The aquaculture gets damaged due to the disasters such as earthquake and tsunami in that area. Swift reconstruction can minimize the long term impact on production. As a result of terrorist attacks, there is a big push to the market for security products in view of rising security concerns.

D) **Loss of livestock**

Due to the flooding in Mumbai and Konkan in 2005, 26,339 cattle were lost. The worst affected was Mumbai itself where more than 15,321 cattle losses were reported, followed by Ratnagiri (3,983), Raigad (2,783), Thane (1,285), and Parbhani (1,153). A large number of buffaloes died in Mumbai and Thane, causing a serious loss to the local milk-selling industry. The cost of live stock loss was to the extent of Rs. 100 crores as per the Report of Concerned Citizens’ Commission on Enquiry into the Mumbai Floods, 2005. In the Kosi Flood on 18th Aug, 2008 868 cattle were killed.

**Cattle loss due to natural disasters in India**

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle Lost (In number)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001-02</td>
<td>21269</td>
</tr>
<tr>
<td>2002-03</td>
<td>3729</td>
</tr>
<tr>
<td>2003-04</td>
<td>25393</td>
</tr>
<tr>
<td>2004-05</td>
<td>12389</td>
</tr>
</tbody>
</table>
Cattle loss due to natural disasters in India

The above data shows a very high amount of cattle loss due to natural disasters in India during 2005-06 to 2007-08.

Livestock availability and their security are very important to economic development and welfare in many low-income countries. When there is an impact of disaster on people, their animals (and thus their livelihoods) are also affected. In many rich countries, livestock are mainly treated as a financial asset and one of many sources of food. This is in contrast to low-
income countries, where livestock have a number of functions. People get meat, milk and eggs from animals. They assist in ploughing fields; they can be sold for cash. Livestock in low-income countries have significance as far as food, agriculture, savings and cultural values are concerned. Loss of livestock in a disaster is a direct cost as the same can be estimated using market prices that are generally considered in assessing the cost of the losses. Financial estimates of the cost of disasters refer to direct impacts i.e. the cost of physical damage to the factors of production such as people and animals, land and capital. However, such estimates seldom incorporate the indirect values of livestock, which can be more difficult to observe, but often more important than the direct financial loss.

**Conclusion:**

Disasters cause loss of livestock. This affects the people of rich countries where the livestock is treated as financial asset and the people in low income countries where the livestock is used for provision of food and for ploughing.

**E) Impact on trade and investments**

In Australia, as per the figures of the Bureau of Statistics at the quarter ending March, 2011, the corporate sector profits have gone down by 2%. The main reason for this fall is the floods in eastern Australia and cyclones in Queensland and Western Australia. The floods and cyclones have affected Australia's key commodity exports, as reported by Treasurer Wayne Swan. He further explained that the exports volumes dropped by 8.7 per cent in the quarter ending March, 2011, and represented the biggest quarterly fall in 37 years.

Kargil war of 1999, Attack on Parliament in 2001 and the attack of 26th November, 2008 on Mumbai had severe impact on the trade relations between the two countries. The terrorist attacks such as that on Taj and Oberoi where high profile business people and officials visit cause a situation of panic and discomfort. Due to this, the level of foreign investments and confidence in government falls. This affects the economic growth. In short term the obstacles like loss suffered due to the diversion of business away from the city to other locations, lost earnings of public due to disability and trauma among survivors etc. drains out the productivity levels & impact the respective economy adversely. Post 26/11 the Taj & Trident Hotels incurred heavy loss as operations were closed for few months. The terrorist attacks cause social, political
and economic instability. The economic instability caused by the terrorist attacks can affect the economic growth in the long run.

Many a time investment ratings and terrorism indexes are published by various organizations for different countries. If the rating is poor or the terrorism index is high, it may affect the Foreign Direct Investments (FDI) of that country.

**Conclusion:**
The level of foreign investments and confidence in government falls due to the panic and discomfort caused by the terrorist attacks. This has impacts on trade and investments resulting in adverse impact on the economic growth.

**F) Miscellaneous Financial Implications**
a) Disasters can cause demand for building materials, food, energy and water to increase at the same time that damage to infrastructure causes domestic production to fall. Damages to infrastructure such as transportation, marketing and communications reduce the ability of goods to circulate and result in demands for skilled workers, particularly in construction which can lead wages and prices to increase.

b) There are long-term costs as is malnutrition, which often affects populations after a disaster like drought and leaves people less able to work and more susceptible to disease. Other health costs may include decreased earning potential of people who sustain permanent injuries or disabilities from the disaster and for their family members who care for them.

c) In the long-term, the threat posed by climate change adds to the supply uncertainties and countries in South Asian region may stand to be among the most affected given their high exposure to floods and tropical cyclones. Areas currently used for food production may become unsuitable for agriculture or may require large investments (e.g. irrigation, weather-resistant seed varieties, etc) to continue productive, which could pose a threat to national food security resulting in hike in food prices.

d) In the aftermath of any terrorist attack, days and hours of work are lost due to full or partial absence from work. Extra time is taken at airports, malls, hotels, cinema halls, etc with lengthier
and more frequent checks. Business opportunities are lost as a fall-out of such attacks. Thus terrorist attacks cause overall inconvenience.

**Conclusion:**

There are miscellaneous financial impacts of disasters such as damage to infrastructure/transport which cause fall of domestic production, lesser circulation of goods and demand for skilled workers for construction causing rise in wages. Populations get affected due to mal-nutrition, injuries and disabilities as a result of disasters. The climate changes cause supply uncertainties causing threat to food security and rise in food prices. Terrorist attack causes overall inconvenience due to absence at work, long waiting time at places such as malls, airports etc. and loss of business opportunities.

5.5 Categorization of Disaster Losses-Direct Costs/Losses and Indirect Costs/Losses.

As per the studies conducted by the World Bank (Ref: www-wds.worldbank.org/servlet/.../WDSP/IB/.../WPS5507.pdf), after each of the disaster events, media, insurance companies and international institutions publish numerous assessments of the “cost of the disaster.” However these various assessments are based on different methodologies and approaches, and they often reach quite different results. Beside technical problems, these discrepancies are due to the multi-dimensionality in disaster impacts and their large redistributive effects, which make it unclear what is included in disaster cost assessments. This confusion translates into the multiplicity of words to characterize the cost of a disaster in published assessments: direct losses, asset losses, indirect losses, output losses, intangible losses, market and nonmarket losses, welfare losses, or any combination of those. It also makes it almost impossible to compare or aggregate published estimates that are based on so many different assumptions and methods. To clarify the situation, the World Bank Policy Research Paper of December 2010, ‘The Economics of Natural Disasters-Concepts and Methods’ proposes a definition of the cost of a disaster, and emphasizes the most important mechanisms that explain this cost.

- **Direct costs of Disasters**
Direct losses are the immediate consequences of the disaster’s physical phenomenon i.e. the consequence of high winds, of water inundation, or of ground shaking. Direct losses are often classified into direct market losses and direct non-market losses. Market losses are losses to goods and services that are traded on markets, and for which a price can easily be observed. Even though droughts or heat waves affect directly the economic output (especially in the agriculture sector), direct market losses from most disasters (earthquakes, floods, etc.) are losses of assets, i.e. damages to the built environment and manufactured goods. These losses can be estimated as the repairing or replacement cost of the destroyed or damaged assets. Since building and manufactured goods can be bought on existing markets, their price is known. Direct market losses can thus be estimated using observed prices and inventories of physical losses that can be observed or modeled. Non-market direct losses include all damages that cannot be repaired or replaced through purchases on a market. For them, there is no easily observed price that can be used to estimate losses. This is the case, among others, for health impacts, loss of lives, natural asset damages and ecosystem losses, and damages to historical and cultural assets.

Sometimes, a price for non-market impacts can be built using indirect methods, but these estimates are rarely consensual (e.g., the statistical value of human life). The direct economic damage done by terrorist attacks has several negative impacts involving destruction of buildings and infrastructure, loss of productive lives, responses to the emergency, restoration of the systems and the infrastructure affected, and the provision of temporary living assistance, that are most pronounced in the immediate aftermath of the attacks and thus matter more in the short run.

As per the report of Ecolarge on ‘The economic impacts of losing livestock in a disaster’ (ref: http://www.ecolarge.com/news/cows-home-economic-impacts-losing-livestock-disaster-new-report/) the direct cost can be classified with reference to the following:

**Land:**

Loss of crops, landslides, erosion of soil, Costs of repairing and restoring land stability and soil quality.

**Labour:**
Capital:

Physical damage, including that to productive capital and stocks (industrial plants, standing crops, inventories, etc.), economic infrastructure (roads, electricity supplies etc.) and social infrastructure (homes, schools, etc.). Cost to repair or replace damaged capital assets and infrastructure, rehabilitation / development post disaster.

- Indirect costs of Disasters

The direct economic cost, that is, the value of what has been damaged or destroyed by the disaster, is not a sufficient indicator of disaster seriousness and estimating indirect losses is crucial to assess the consequences on welfare. Indirect losses (also labeled “higher-order losses” in Rose, 2004) include all losses that are not provoked by the disaster itself, but by its consequences. Indirect costs include the costs of both medical expenses and lost productivity arising from the increased incidence of disease, injury and death. However, gross indirect costs are partly offset by the positive downstream effects of the rehabilitation and reconstruction efforts, such as increased activity in the construction industry. For capital-destroying hazards (flood, earthquakes, storms), the term “indirect losses” is often used as a proxy for “output losses,” i.e. the reduction in economic production provoked by the disaster. Output losses include the cost of business interruption caused by disruptions of water or electricity supplies, and longer term consequences of infrastructure and capital damages. Indirect losses are caused by secondary effects, not by the hazard itself. Indirect losses can be market or non-market losses (Ref. f.i., Government of Queensland, 2002). Sometimes, non-monetary indirect consequences of disasters are also included, like the impact on poverty or inequalities, the reduction in collected taxes, or the increase in national debt. There is a loss of manpower which decreases the working population of the nation which is a great loss. The indirect costs are dependent on the scale and timing of the event and on local conditions; as such, they are difficult to project. However, estimates of indirect costs must be included in decision-making to ensure a fair cost–benefit
analysis of protection infrastructures or mitigation actions. Understanding the key mechanisms that regulate indirect effects may also provide useful knowledge on how to respond to a disaster. To help identify indirect losses, the World Bank proposes the following criteria:

First, indirect losses are caused by secondary effects, not by the hazard itself. Indirect costs can be caused by hazard destructions or by business interruptions. In addition to this obvious criterion, costs are indirect if they are spanning on a longer period of time, a larger spatial scale or in a different economic sector than the disaster itself.

As per the report of Ecolarge on ‘The economic impacts of losing livestock in a disaster’ (ref: http://www.ecolarge.com/news/cows-home-economic-impacts-losing-livestock-disaster-new-report/), the indirect costs can be also be classified with reference to the following:

**Land:**

Reduced agricultural productivity resulting into imbalance in food grain availability, loss of manure, rising food prices, reduced crop residues leading to reduced livestock productivity and increased demands on other feed sources, such as communal grazing areas. Increased demands on these areas can lead to natural resource degradation.

**Labour:**

Lost wages of workers, reduced labour availability, reduced productivity of workers and industries due to injuries and psychological trauma

**Capital:**

Lost income from capital assets, reduced productivity in capital-intensive industries, reduced ability of governments and firms to provide services to the public, loss of savings and investments, impact on balance of payments and government budgets, downstream disruption to the flow of goods and services, e.g. lower output from damaged or destroyed assets and infrastructure and the loss of earnings as income generating opportunities are disrupted. Disruption of the provision of basic services, such as telecommunications or water supply, for instance, can have various implications.
• **Secondary effects of disasters**

These are short- and long-term impacts of a disaster on the overall economy and socio-economic conditions e.g. fiscal and monetary performance, levels of household and national indebtedness, the distribution of income and scale and incidence of poverty, the effects of relocating or restructuring elements of the economy or workforce.

(Ref: http://siteresources.worldbank.org/INTEAPREGTOPENVIRONMENT/Resources/PH_Disaster_Risk_Mgmt.pdf)

Reported data on the cost of disasters relate predominantly to direct costs. Figures on the true cost of indirect and secondary impacts may not be available for several years after a disaster event. The passage of time is necessary to reveal the actual pace of recovery and precise nature of indirect and secondary effects. Ongoing research suggests that the secondary effects of disasters can have significant impacts on long-term human and economic development.

Disasters affect the pace and nature of capital accumulation. The possibility of future disasters can also be a deterrent for investors. In examining the longer-term impact of disasters, it is also important to recognise that a disaster is not a one-time event but, rather, one of a series of successive events, with a gradual cumulative impact on long-term development. It is observed that the disaster losses mainly increase if there is a lack of attention to the vulnerabilities.

After an event, the total economic costs can be amplified through:

(1) spatial or sectoral distribution of direct costs into the wider economic system over the short-term (e.g. through disruptions of lifeline services, such as communication and transportation networks) and over the longer term (e.g. sectoral inflation due to demand surge, energy costs, company bankruptcy, job losses, larger public deficit, or housing prices);

(2) Social responses to the shock (e.g. loss of confidence, change in expectations, indirect consequences of inequality);

(3) Financial constraints impairing reconstruction (e.g. low-income families cannot finance rapidly the reconstruction of their home); and
(4) Technical constraints slowing down reconstruction (e.g. non-availability of skilled workers, difficulties in equipment and material transportation, difficulties in accommodating workers).

(Ref: The Economics of Climate Change Impacts and Policy Benefits at City Scale-A CONCEPTUAL FRAMEWORK, Dec.2008

http://www.oecd.org/environment/climatechange/45305874.pdf)

5.6 Implications Caused by Disaster Occurring in One Country for the Economy of Another Country

As per the report of The United Nations Economic and Social Survey of the Asia Pacific, the impact of disasters is felt throughout the region because of growing interdependence of countries. For instance, the earthquake in Japan and floods in Thailand caused severe disruptions in regional and global supply chains, particularly for industrial and manufacturing products. Severe floods in Asia and the Pacific resulted in production losses in the agricultural sector, which had an impact on food production regionally and globally. The report further added that there were clear and synchronized downturns in automotive and electrical production in Japan and a number of Southeast Asian countries including Indonesia, the Philippines and Thailand, as a result of the earthquake in Japan. Similarly, floods in the latter half of 2011 devastated the manufacturing sector in Thailand, as seven major industrial estates were inundated. The floods also destroyed large parcels of rice farmland in Thailand, resulting in a 17% rise in global rice prices. The earthquake and the tsunami of 2011 in Japan caused fires, disrupted transport and communication systems and endangered nuclear power plants. The tsunami damaged the cooling systems in the six core reactors that contained a mix of uranium and plutonium as well as radioactive waste. In Japan, after the earthquake, manufacturing plants were forced to shut down which affected Japan’s exports. Automobile and electronic industries around the world especially in Asia, Europe, and the US faced manufacturing delays as the Japanese production of components remained crippled for a long period. Japanese firms were pounded by last year's quake-tsunami disaster as well as flooding in Thailand, which disrupted operations for firms with plants in the Southeast Asian nation. Japan's electronics company Toshiba declared in May 2012
that its full-year net profit dropped by almost half to US$921 million on a strong yen, weak digital product sales, and earlier year's natural disasters in Japan and Thailand.
Analysis of respondents’ opinion about impact of disaster event occurring in one country on the economy of the other country

To find
Whether the disaster occurred in one country affects the economy of other country?

If proportion of opinion that ‘disaster occurred in one country affects the economy of other country’ is more than or equal to 0.70, we say that disaster occurred in one country affects the economy of other country.

For this purpose a survey of 50 citizens was conducted and they were asked the following question:

Do you think that the disaster occurred in one country affects the economy of other country?

Response Yes No
No of respondents 50 0

To arrive at the conclusion we test the hypothesis,

H0: The disaster occurred in one country does not affect the economy of other country.

Against the alternative

H1: The disaster occurred in one country affects the economy of other country.

Since all the 100% people felt that the disaster occurred in one country affects the economy of other country,

Conclusion:
Accept H1:
The disaster occurred in one country affects the economy of other country.
5.7 The Gainful Effect of Disasters

As per the World Bank Policy Research Paper of December 2010, ‘The Economics of Natural Disasters-Concepts and Methods’ post-disaster price inflation (also referred to as “demand surge”) can also have positive consequences. This inflation attracts qualified workers and creates an incentive for all workers to work longer hours, therefore compensating for damaged assets and accelerating reconstruction. It is likely, for instance, that higher prices after hurricane landfalls are useful to make roofers from neighboring unaffected regions move to the landfall region, therefore increasing the local production capacity and reducing the reconstruction duration. Demand surge, as a consequence, may also reduce the total economic cost of a disaster, even though it increases its burden on the affected population.

Disasters lead to a reduction of production capacity, but also to an increase in the demand for the reconstruction sector and goods. Thus, the reconstruction acts in theory as a stimulus. However, as any stimulus, its consequences depend on the pre-existing economic situation, or the phase of the business cycles. If the economy is in a phase of high growth, in which all resources are fully used, the net effect of a stimulus on the economy will be negative, for instance through diverted resources, production capacity scarcity, and accelerated inflation. If the pre-disaster economy is depressed, on the other hand, the stimulus effect can yield benefits to the economy by mobilizing idle capacities. In 1992, when hurricane Andrew made landfall on south Florida, the economy was depressed and only 50% of the construction workers were employed (West and Lenze, 1994). The reconstruction needs had a stimulus effects on the construction sectors, which would have been impossible in a better economic situation. The economic costs of a disaster need to be offset by contributions which post-disaster reconstruction brings to the country, including in many cases foreign disaster assistance. Reconstruction efforts can inject considerable resources into the community, generating new employment opportunities, often only for the short term. At the same time, relief and recovery spending can displace maintenance of infrastructure, increasing risk of future deaths and loss in future disasters.

According to Derek Kellenberg and A. Mushfiq Mobarak, June 2011, ‘The Economics of Natural Disasters’, http://faculty.som.yale.edu/mushfiqmobarak/disasters_annreview.pdf) In the
US on average, aggregate local employment falls by 3.4 percent following a flood event, but in a study of Florida, income increased by 4.35 percent in directly affected areas as a result of decreasing labor supply and a simultaneous increase in post-hurricane labor demand, particularly in construction.

According to the World Bank Report, When a natural disaster damages productive capital (e.g., production plants, houses, bridges), the destroyed capital can be replaced using the most recent technologies, which have higher productivities. Examples of such upgrading of capital are:
(a) For households, the reconstruction of houses with better insulation technologies and better heating systems, allowing for energy conservation and savings;
(b) For companies, the replacement of old production technologies by new ones, like the replacement of paper-based management files by computer-based systems;
(c) For government and public agencies, the adaptation of public infrastructure to new needs, like the reconstruction of larger or smaller schools when demographic evolutions justify it.

Also, there are always at least a few winners as well as many losers. For example, farmers whose crops have not been affected by a disaster can get higher prices for their food after a disaster.

5.8 Different focus areas for the assessment of financial impacts

Defining the cost of a disaster cannot be done independently of the purpose of the assessment as different economic agents are interested in different types of cost as follows:
1) Insurers are mainly interested in consequences that can be insured which encompass the cost of damages to insurable assets and short term business interruption caused by the disaster.
2) For affected households, along with insurable assets there are other important aspects such as loss of lives, health impacts, reduction in income generation due to business interruption or loss of jobs, the availability of goods and services etc.
3) To manage the recovery and reconstruction period and to scale the necessary amount of international aid, local authorities, governments and international institutions need information on the aggregated impact on economic production, on unemployment and jobs, on the impact of inequality and poverty, on local businesses market shares, on commercial balance, on collected taxes, etc. To assess whether investment in prevention measures are desirable, they need the broadest possible assessments of the total disaster cost to the population, i.e. an estimate of welfare losses.

4) A country may want to assess the losses in the affected region, disregarding all out of the region impacts, to calibrate the financial support it wants to provide to the victims. But it may also want to assess total losses on its territory, including gains and losses outside the affected region, for example to assess the impact on its public finance.