

## A PUBLIC-PRIVATE PARTNERSHIP MODEL FOR MANAGING DISASTERS IN INDIA

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### ABSTRACT

The frequency of natural disasters across the globe has increased and the intensity of each disaster has only exposed all nations to the vulnerabilities associated with the occurrence of disasters. Rapid urbanization, climate change, the growing gap between the haves and have-nots, inability of the state machinery to meet the needs of the socially marginalized communities and exponential growth in population are some of the reasons for the occurrence of natural disasters and the adverse effects associated with them. The financial burden of disasters is something that the government alone cannot handle. Therefore there is a greater need for private sector participation in disaster management more than ever before. Disaster planning is equally important as response and recovery and the private sector can play a crucial role in this area. Public private participation in disaster management is needed to encourage greater involvement of the private sector in disaster management efforts. The main challenge is to make such partnerships more productive so that disaster management can be effective. This study has reviewed the body of work in this area to highlight the challenges associated with public private participation in disaster management and the key research areas emerging from the same. Limited insurance and reinsurance capacity has led to the need to examine alternative risk transfer mechanisms to meet the financial obligations in the aftermath of a disaster. This effort addresses the public private participation in disaster management from both angles viz. the involvement of private sector in disaster planning, response and recovery as well as involvement in alternative risk transfer mechanisms. Based on experiences of private sector in disaster management in various regions of the world, this study has recommended actions that need to be taken by the state machinery to evolve a regulatory framework so that greater value can be derived from public private partnerships.

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**Key words:** Public-Private participation, disaster management, disaster, disaster recovery, reinsurance, alternative risk transfer, resilience.

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### Introduction

In an increasingly fragile world, climate change, urbanization, exponential growth in population in some regions and environmental degradation has resulted in increase in the frequency and intensity of disasters. It has therefore become important to get risk management right. A recent World Bank report concluded that the cost of disasters has quadrupled over the last 30 years – from an annual average of around a year in the 1980's to annual losses of some US\$ 200 billion today.

Unpredictable nature of environmental hazards are challenging for governments, communities and individual households as they lack the capacity to manage the covariant risk presented by droughts, floods and hurricanes (Kelman & West, 2009; Mycoo, 2011, Campbell & Beckford, 2009).

Over 25 million people were affected by droughts in the Horn of Africa and the Sahel. Typhoon Haiyan in Philippines impacted over 16 million individuals. Developed countries are also equally becoming vulnerable to disasters like the hurricanes in USA and tsunami in Japan have proved. In Europe natural disasters resulted in 100,000 deaths over the last decade.

According to a 2012 World Bank report, the Thailand floods of 2011 for example, resulted in US\$46.5 billion of economic losses and required the Thai government to spend almost 5 per cent of its annual revenues for response and recovery efforts. ASEAN countries suffer annual damage of over US\$4.4 billion each year because of disasters an amount

equivalent to more than 0.2 percent of the region's total GDP (World Bank, 2012)

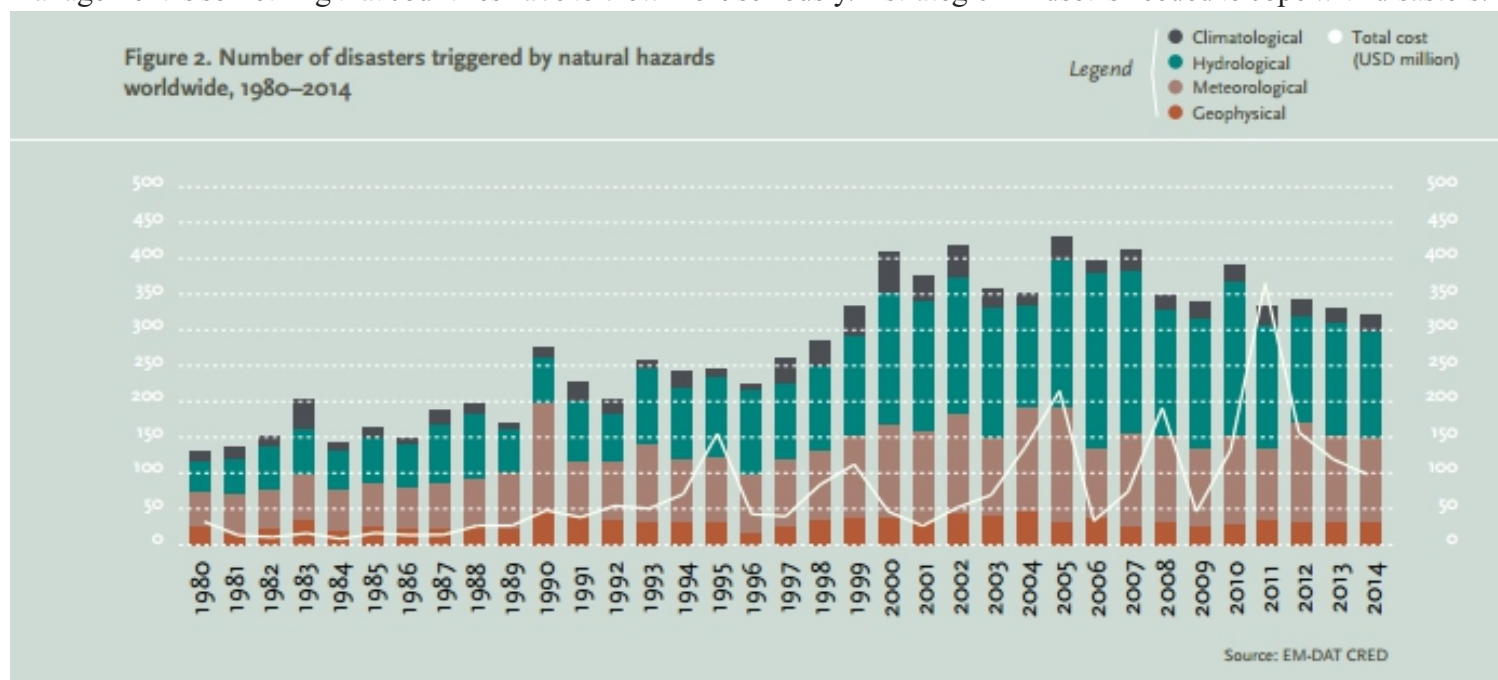


**Figure 1:** The aftermath of Hurricane Matthew.

Natural disasters caused a total of \$1.5 trillion in damage worldwide between 2003 and 2013, according to a study by the United Nations Food and Agriculture Organization (FAO) leading to more than 1.1 million deaths and affecting the lives of more than two billion people. In 2016, earthquakes in Japan, devastating floods in China and a deadly hurricane that swept across Haiti pushed the total damage caused by natural catastrophes to \$ 175 billion according to Munich Re.

Only 30% of the losses -- \$50 billion -- were insured. The costliest disasters were in Asia. Two earthquakes in Japan combined to produce \$31 billion in losses, while floods that struck China during the summer caused \$20 billion in damage. In North America, the costliest single event was Hurricane Matthew, which killed hundreds of people in Haiti and produced \$10 billion in damage. But the continent was hit by a total of 160 disaster events in 2016, which is more than any year since 1980.

As is clear from the above examples, the financial burden of disasters can be debilitating for nations. Therefore, disaster management is something that countries have to view more seriously. A strategic mindset is needed to cope with disasters.



**Figure 2:** Number of disasters triggered by natural hazards worldwide, 1980-2014

In this study, we attempt to understand the role played by private sector in supporting the disaster management efforts of government machinery and the need for public-private sector participation in disaster planning, response and recovery. The study highlights the need for a proactive approach in managing disasters. Challenges associated with public private participation in disaster management needs to be understood to work towards solutions. The research areas emerging in the area of disaster management have also been examined. The experiences of various regions across the globe in disaster management and the contribution of private sector in these regions have been studied. Additionally, this effort has highlighted the need for alternative risk transfer mechanisms to supplement the efforts of government and insurance industry in meeting the financial obligations arising in the aftermath of a disaster.

### **Disasters and Disaster Management**

Disasters present a broad range of human, social, financial, economic and environmental impacts with potentially long lasting, multi- generational effects (Wolfram et al, 2016).

Identification of what constitutes a disaster and examining the vulnerabilities that already existed and might/ might not require compensation (Sugarman, 2007). Often recovery funding incorrectly emphasizes housing rather than more comprehensive economic building and job creation. Infrastructure strengthening needs greater attention (Busch & Givens, 2013). Focusing attention on social vulnerabilities that predated a disaster is as equally important as disaster relief and response (Masozera, Bailey & Kerchner, 2007). Disaster response can often fail to reach minorities and poor due to reasons like complex application process and transportation problems (Burby et al, 1999) (Dash, Peacock & Morrow, 1997). Middle and higher income disaster victims are more comfortable than low income groups in negotiating disaster recovery bureaucracy for assistance and aid (Fothergill & Peek, 2004). The effects of a disaster can persist into the next generation (Adger, 1996).

Disaster management involves a complex network of interdependent agencies consisting of numerous and unprecedented interactions within and between various relief agencies (Bigley & Roberts, 2001). Increase in frequency and severity of extreme events along with concentration of people and assets in vulnerable locations has resulted in extensive social, economic and environmental impacts from extreme events (Wolfram et al, 2016) (Van der Berg, 2015). Disaster management is a complex social problem due to the frequent disasters and substantial damage to communities and often involves inter-sector collaboration. Disaster management invests organisations and population with resilience capacity to minimize damage and loss. Key elements of disaster management are prevention, mitigation, preparedness, response and relief, rehabilitation (Bretan, 2007) (Baur & Parker, 2015) (Lapolli, 2013) (Atmanand, 2003) (Koven & Strother 2016). Understanding disaster risk management process (Figures 3 & 4) is essential.

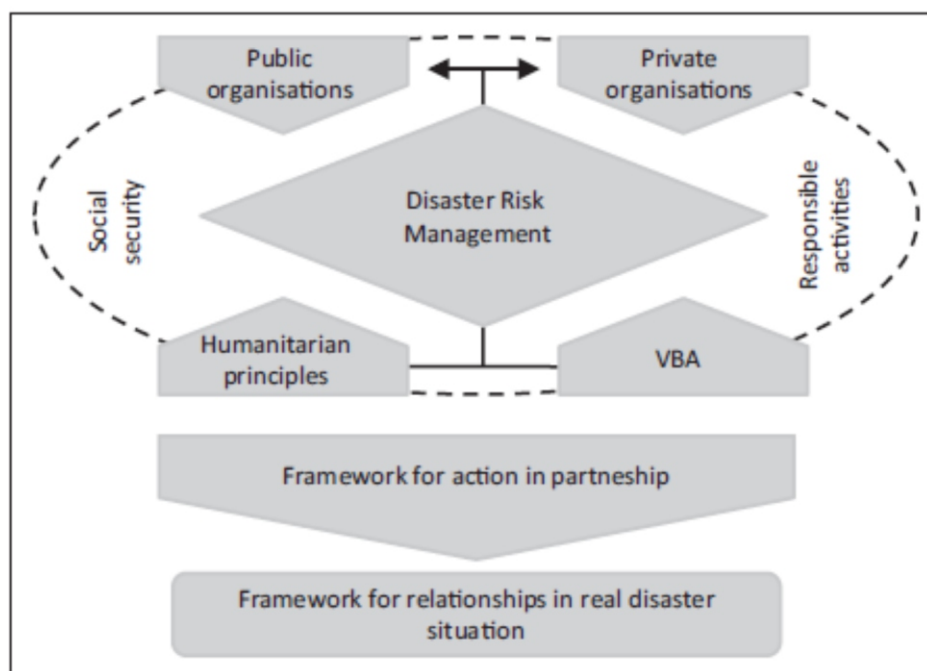
Disaster management is plagued with issues of implementation, poor governance and management deficiencies (Van der Berg, 2015). Uninsured risks, lack of purchasing power and lack of awareness about insurance covers are issues in India that lead to losses from natural disasters (Atmanand, 2003). Interconnected global economies lead to higher costs when supply chains break down. So, there is a need for impact reduction measures like coastal defenses, improved building codes, land-use zoning and planning and early warning systems (Baur & Parker, 2015).

Business Continuity Planning (BCP) allows companies to learn what to prioritize among critical operations, processes and materials to take effective disaster counter measures according to the level of risk and importance and to achieve an effective disaster response. (See Figure 5)

### **Disaster management in developing and developed countries**

Developing economies are more vulnerable to climate change due to limited levels of disaster resilience, lower coverage through insurance markets and less fiscal flexibility. Population living in low lying coastal areas, greater reliance on agriculture for GDP growth and lesser capacity for adaptation are all characteristics of developing economies that are more vulnerable to disasters (Wolfram et al, 2016).

Private sector is less attracted to actively participate in disaster management in developing nations (Khan & Rahman, 2007) (Ahrens & Rudolph, 2006). In addition, the financial markets are not well developed. In developing countries, private insurers share only 9% of the total property losses due to natural disasters. In contrast to this, New Zealand and France, 75% and 100% of property is covered by private insurance respectively (Sawada & Zen, 2014). PPP in disaster management has resulted in new programs for loss prevention in US and France (Auzzir et al, 2014).



**Figure 3:** Disaster Risk Management

Source: Eyerkauffer, Lima & Goncalves, 2016, 'Public and Private partnership in disaster risk management', Jamba: Journal of Disaster Risk Studies 8(1), a277.

### Disaster management in India

Working group Report on Disaster management for 12th 5 year plan was tabled by the Planning Commission on 31/10/2011. Existing institutional structure on disaster management needed streamlining to avoid multiplicity of structures. The Government has realised that there are innovative means for application of science and technology in disaster risk reduction. The policy framework needs to encourage PPP in disaster management and plan for capacity building at center, state and district levels.

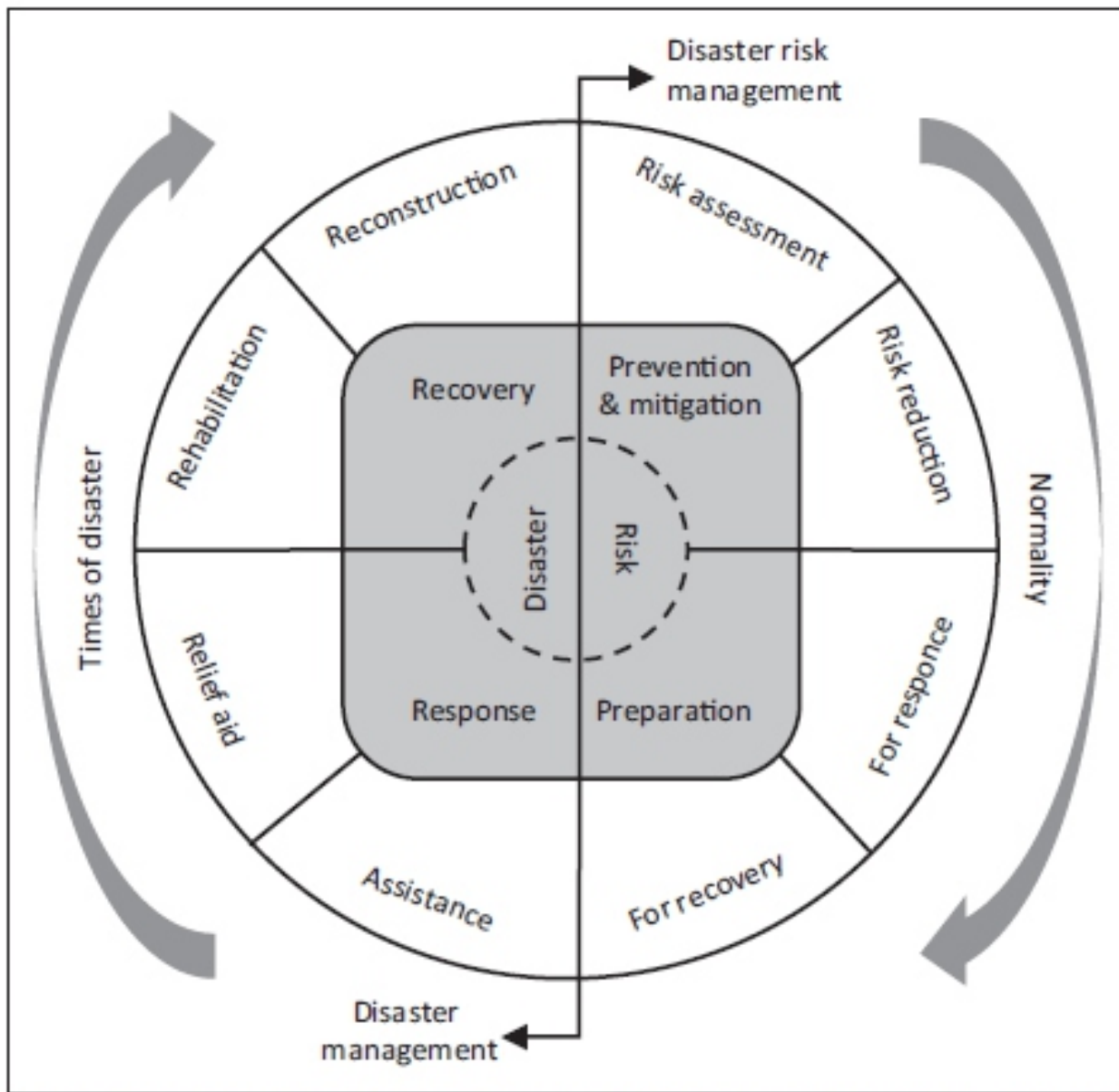
British risk assessors Maple Croft have rated India as high risk in terms of exposures to natural disasters along with Mexico, Philippines, Turkey, Indonesia, Italy and Canada. A World Bank study says that one dollar spent on prevention is more valuable than 10 times dollar spent on relief. The Japan earthquake and tsunami of 2011, New Zealand earthquake 2011, Haiti earthquake 2010, Chile earthquake of 2010 and Hurricane Katrina of 2005 are grim reminders of the ravages that natural disasters can cause.

Disaster management has to be an integral part of the development agenda. The vision of NDMA – National Disaster management Authority is to build a safer and disaster resilient India by developing a holistic, proactive, multi disaster and technology driven strategy for disaster management through collective efforts of all stake holders. Community level initiatives for disaster preparedness by involving people at the grass roots – for those who are vulnerable so that they are better prepared

### Jugaad Innovation and Disaster Management

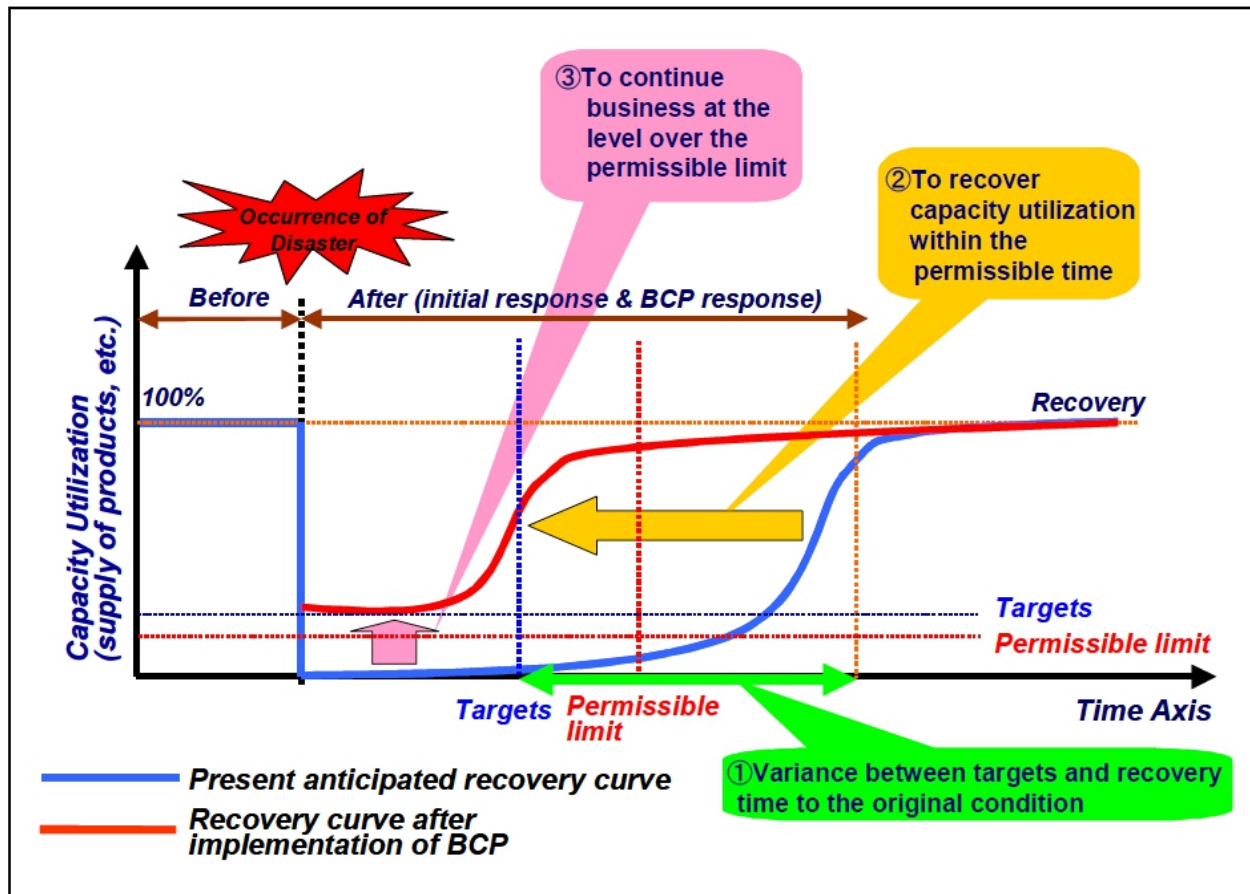
Jugaad is an innovative fix; an improvised solution born from ingenuity and cleverness. Scarcity can lead to opportunity

(Rajdou, Prabhu & Ahuja, 2012). A villager called Prajapati devised the innovative Mitticool refrigerator that does not use electricity but uses only clay and is biodegradable. Mansukh Prajapati got this idea when he saw a news item in the aftermath of the 2001 earthquake in Gujarat. The news item reported that a poor man's refrigerator (meaning a clay pot that is used to store water in villages) was broken. This triggered the creative potential in Mansukh Prajapati and thus was born the Mitticool refrigerator. Thus, if a disaster event has triggered creative potential in a community member, then it is possible to encourage local communities to use jugaad innovation for driving solutions to problems in the pre-disaster planning phase.



Source: Adapted from Ferreira, S.H.G., 2012, *Capacidade dos municípios no desenvolvimento da gestão do risco de desastres por meio dos seus órgãos de proteção e defesa civil: Estudo aplicado aos municípios da Região Metropolitana de Belo Horizonte que declararam situação de emergência no período chuvoso de 2011–2012, Monografia (Especialização em Segurança Pública), Academia de Polícia Militar e Fundação João Pinheiro, Belo Horizonte*

**Figure 4:** Stages in disaster management process



**Figure 5 :** Targets of Business Continuity

Source: <http://www.bousai.go.jp/kyoiku/kigyou/minkan/pdf/guideline01e.pdf>

**Resilience**

The United Nations International Strategy for Disaster Reduction (UN/ISDR) defines resilience as - The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.

Resilience is defined as societal adaptation led by expectation of disaster events and their consequences (Davies, 2015) and as the ability to manage change and recover from impacts without compromising long term prospects. Integration of risk reduction with recovery efforts is essential for resilience (2).

**Table 1:** Disaster Management in different nations (Quero, 2012).

<b>Country</b>	<b>Disaster management efforts</b>
Indonesia	Form a partnership between national disaster management office and local governments.
Philippines	Promotion of academic research in disaster management. Efforts to encourage small and medium scale businesses in disaster management. National and local governments, media, private sector, NGOs, volunteer groups, academia and foreign funding agencies are all involved in disaster management. Clarity on “who is in charge” during emergencies to avoid turf wars during a crisis. College students involved in educating local communities about need for disaster preparedness. Encourage private sector to update their business continuity plans.
Japan	In 1961 Disaster counter measures basic act was enacted with three major characteristics (1): Central Disaster Management Council chaired by PM and Ministers of Governments as well as heads of semi-public organizations like public broadcasting, Bank of Japan, Japanese Red Cross, Telecommunication company as well as representatives of academia. This council is responsible for overall policy for disaster risk management. Roles & responsibilities of National and Municipal Governments, community organizations and citizens regarding disaster risk reduction were defined and the different layers of Government had to make master plans for disaster risk reduction. Utility companies had to prepare sectoral disaster management plans. Involvement of electricity, gas and telecom companies as well as major transportation companies in disaster risk reduction Increased awareness of business continuity among the business community Low interest loans by Development bank of Japan to organisations interested in improving their disaster preparedness levels. Disaster management standards Awards for PPP in disaster reduction and business continuity
South Africa	Municipal disaster management centers where the start-up costs are funded by national government through a grant. Municipal disaster management centers (MDMCs) promote disaster management, capacity building, training and education in their communities (Van der Berg, 2015). Advisory forums act as effective conduit between government, civil society actors, disaster management experts and NGOs. Not only is the disaster risk management updated and reviewed periodically, emergency procedures are also documented. Research to reduce the vulnerability of disaster-prone areas is encouraged.

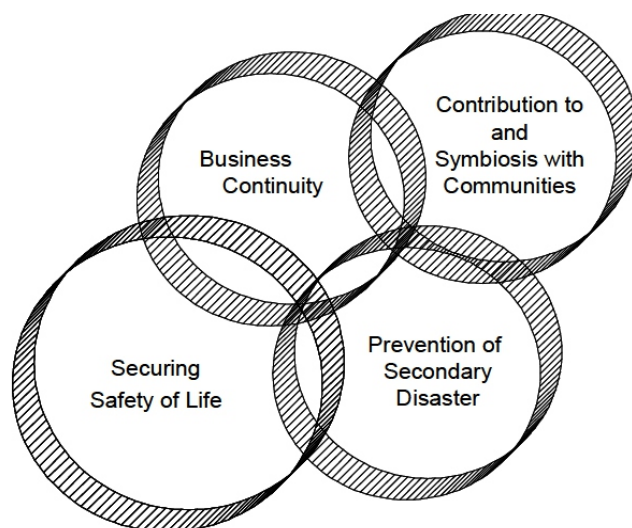
### **Role of private sector in disaster management**

Changes in frequency of disasters and intensity of disasters have changed. From 2000 to 2014, the number of US disaster declarations has increased dramatically – 65 major declarations per year on average and a total of 1907 declarations in all. The private sector contribution to disaster recovery financing occurs in two forms – for profit businesses that can minimize disruptions in payroll and private non-profits like philanthropies and charities. Often it is found that presidential declaration of an emergency or announcement of a major disaster spurs public sector to finance disaster recovery. Public utilities provide support to other organisations that are involved in disaster recovery by arranging for replacement of damaged facilities, removal of debris, repair of roads and bridges, controlling water facilities and facilitating emergency protective measures.

There are other efforts like temporary housing, arranging for evacuation that is done by public sector agencies to assist individuals in disaster recovery efforts. (Chandra et al, 2016).

Disaster cycle involves pre-planning, response and recovery. Recovery may happen both in short term and long term. When disaster impacts are severe, local communities tend to reach out to central and local government machinery. Private sector role is crucial at this juncture as it can bring in flexibility while distributing aid to local communities. As recovery phase begins, households need to access medical and disability benefits and often these needs can exceed what is available through a health insurance cover. The private sector has often addressed these shortfalls by arranging for medical relief camps and mobile health care vans. The involvement of private sector in planning and early response can help long term recovery (Chandra et al, 2016).

Business continuity plans also need to have customer centric focus so that economic and social resilience after a disaster is quicker. Private sector commitment to disaster risk reduction can steer public demand toward materials, systems and technological solutions (Chandra et al, 2016).



**Figure 6:** Targets of Business Continuity

Source: [www.adrc.asia/publications/psdrr/pdf/PPP-Finalized.pdf](http://www.adrc.asia/publications/psdrr/pdf/PPP-Finalized.pdf)

The different ways in which private sector can aid disaster management are:

1. Build local capacity as part of pre-disaster planning.
2. Focus on improving resilience of vulnerable communities.
3. Set standards and quality assurance criteria for safer structures in urban areas
4. Facilitate formulation of business processes and support risk assessments
5. Include employees and their family members in creating awareness about disaster management.
6. Speedy restoration of critical infrastructure and completion of the recovery jobs as per specifications laid by the Government.

Lack of information precipitates the need for more systematic engagement of state emergency centers to share information with the private sector. Rather than asking what is actually needed, private sector can report about what they can offer as disaster aid (White & Lang, 2012).

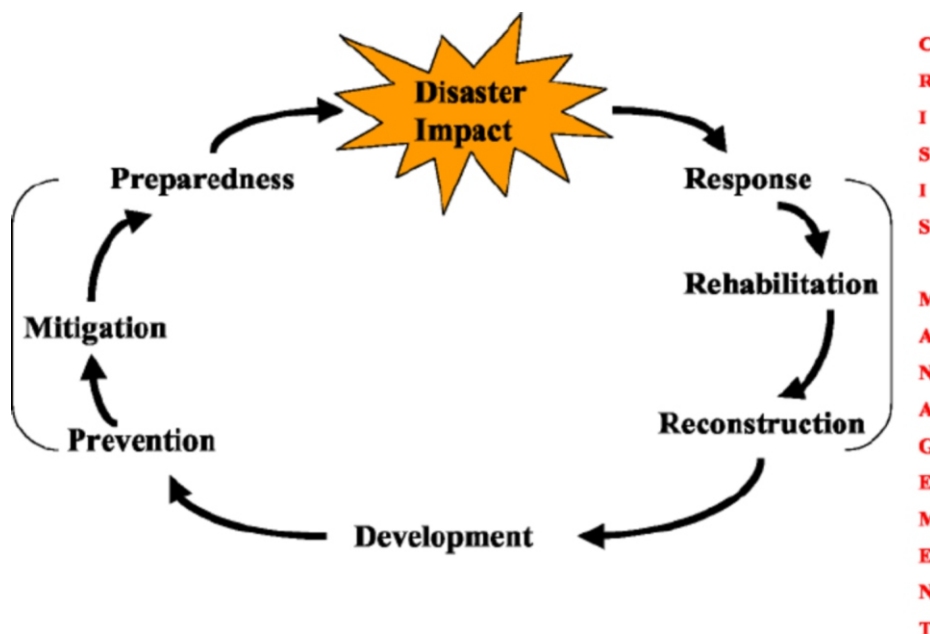
Security guards, drivers and lift operators could be trained in rescue and first aid with training support provided by manufacturers of specialized equipment or providers of services. For instance, in a post-earthquake reconstruction scenario, engineers working in Government, academic institutions or retired engineers could be helpful in designing appropriate structures for buildings to be reconstructed.



Private sector and NGOs have a track record of efficient disbursement of funds in the aftermath of a disaster (Chandra et al, 2016).

**Table 2:**

<b>Name of organization (Private sector)</b>	<b>Support to disaster management</b>
IBM	Smarter cities challenge grants in Japan after the 2011 earthquake and tsunami; open source database for tracking people and resources to aid community monitoring of recovery.
Office Depot	Educate small businesses about emergency preparedness
Shell Oil	Support for disaster victims in need of fuel
Walmart	Use of information in website to promote preparedness among employees and posting tips for specific areas and shelter or information about disasters.
Airbnb	Partner with Portland and San Francisco to pre-identify hosts for displaced people and services; provide alerts during a disaster via web and mobile technology.
Citigroup	Pre crisis preparation; providing programs for the unbanked – those without formal bank accounts ; providing them immediate support in the form of prepaid benefit cards to facilitate economic recovery after a disaster.



**Figure 7:** Disaster management cycle – a theoretical approach

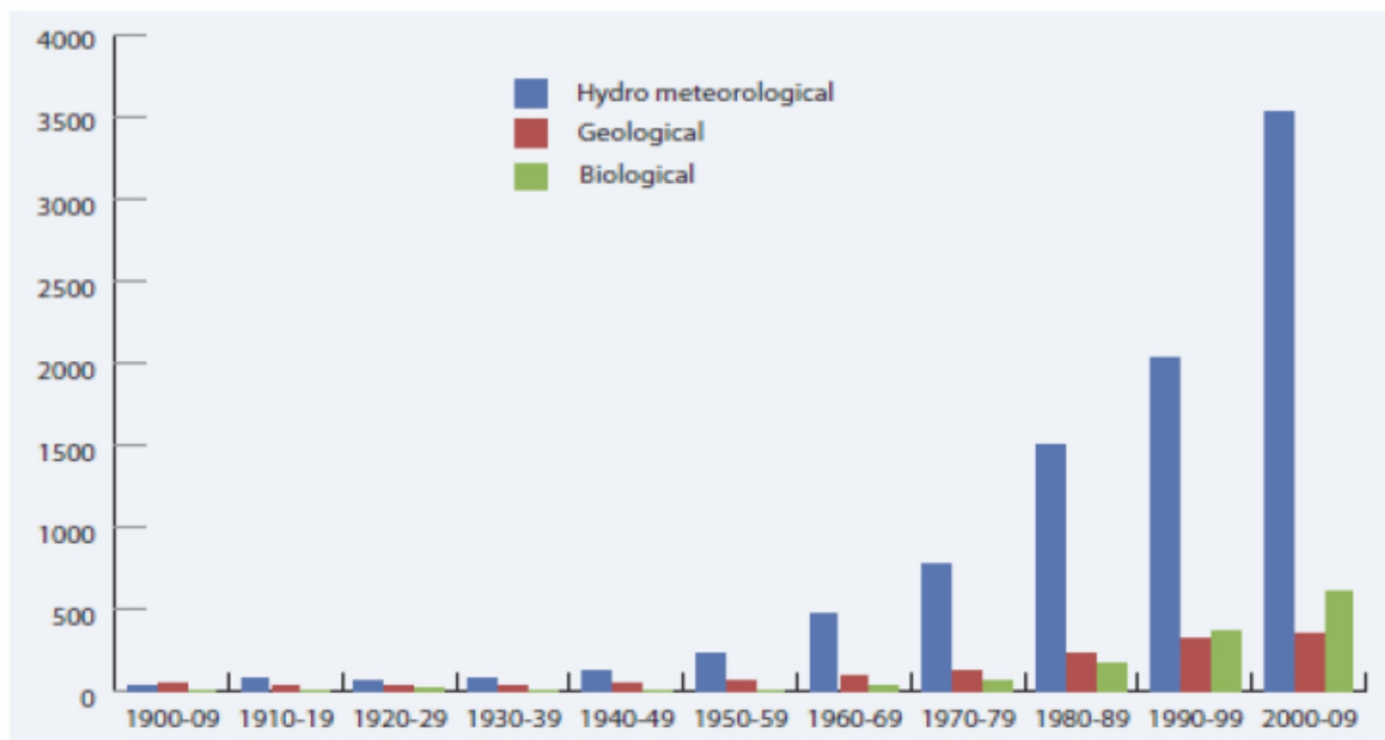
Source: Laura, Khan & Khan (2008) : Management & Marketing 6(1): 43-50

**Challenges during disaster relief**

- Incomplete information on spending by different sectors
- Lack of expertise in identifying specific areas for private sector contribution
- Absence of data to assess the impact of contributions / investments in effective recovery
- Is the right kind of relief reaching the right people?
- Lack of availability of relevant information

- Difficulty tracking the flow and timing of funds
- Risk of potential overlap of emergencies in disaster-prone areas.

The growing instances of naturally occurring disasters across the globe are really alarming. Let us look at the statistics. This is the reason why the challenges need to be addressed.



Source: Disaster Management in India, Ministry of Home Affairs

**Figure 8:** Disaster events globally between 1900 and 2009

India too has been the victim of successive disasters occurring within short time spans leading to massive devastation. Look at figures 9, 10 & 11.

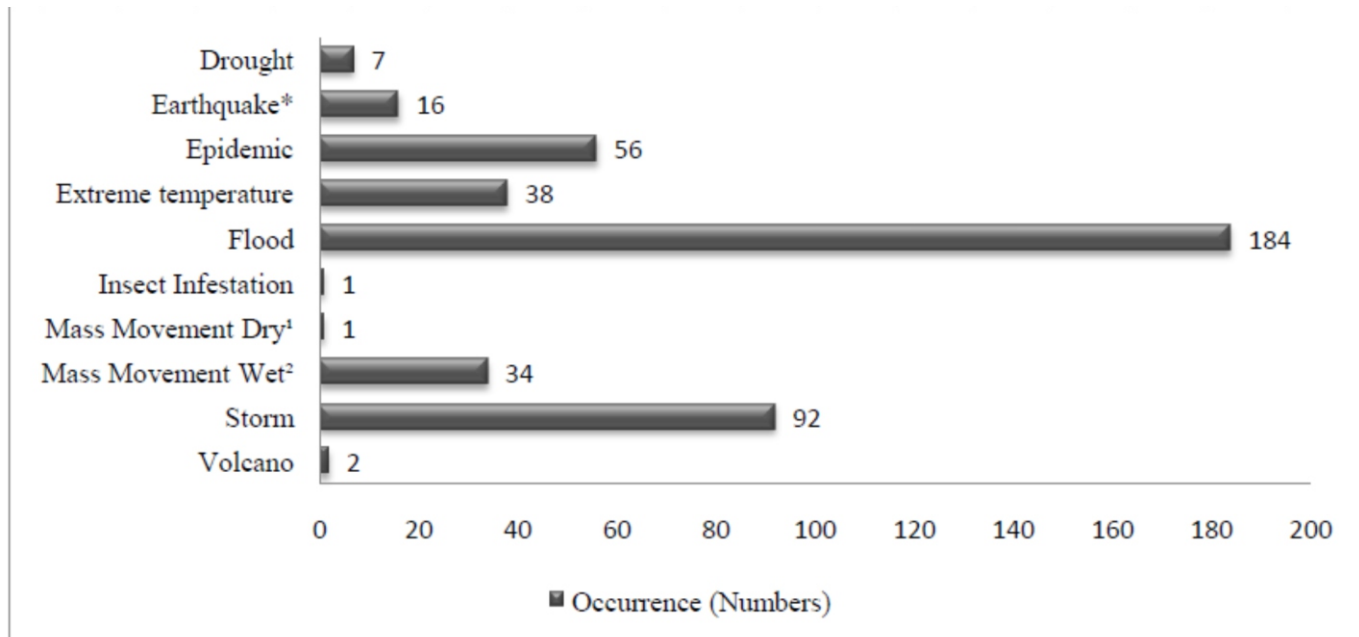
Disasters can stunt economic growth and figures 12 & 13 highlight this fact. Insurance can ensure a lesser impact of disasters on GDP growth. Figure 13 shows how uninsured losses are more in developing countries in comparison to high income countries.

### PPP in disaster management

The concept of PPP originated in the West in US and later in Europe. PPPs enable reduction in risk (Lassa, 2013). PPP is defined as a relationship established (by virtue of a contractual agreement) between the public sector and private sector (Van der Berg, 2015). A public private partnership (PPP) is a joint venture operated concertedly through government and private initiatives that provides a sustainable framework for sustainable development in communities and states. Both stakeholders share knowledge, technology, capital and goods. (Miller & Rivera, 2010)

PPP is a contract between a public sector authority and a private party in which the private party provides a public service or project and assumes substantial, financial, technical and operational risks in the project (Abou-Bakr, 2012).

The World Bank institute defines a public-private partnership as a long term contract between a private party and government agency for providing a public asset or service in which the private party bears significant risk and management responsibility. Public private partnerships can combine the strengths of private actors such as innovation, technical knowledge and skills, managerial efficiency and entrepreneurial spirit, and the role of public actors, including social responsibility, social justice, public accountability and local knowledge to create an enabling environment for delivering high quality health infrastructure and services. However PPP failures are also not uncommon.



**Figure 9:** Natural Disaster Occurrence Reported during 1980-2010 in India

Under the Hyogo framework for action, promoting public-private partnerships is an important strategy for implementing risk mitigation and risk financing in high risk countries. Promoting dialogue and co-operation among scientific communities and practitioners working on disaster risk reduction is essential (Hyogo framework for action 2005-2015). (Miller & Rivera, 2010)

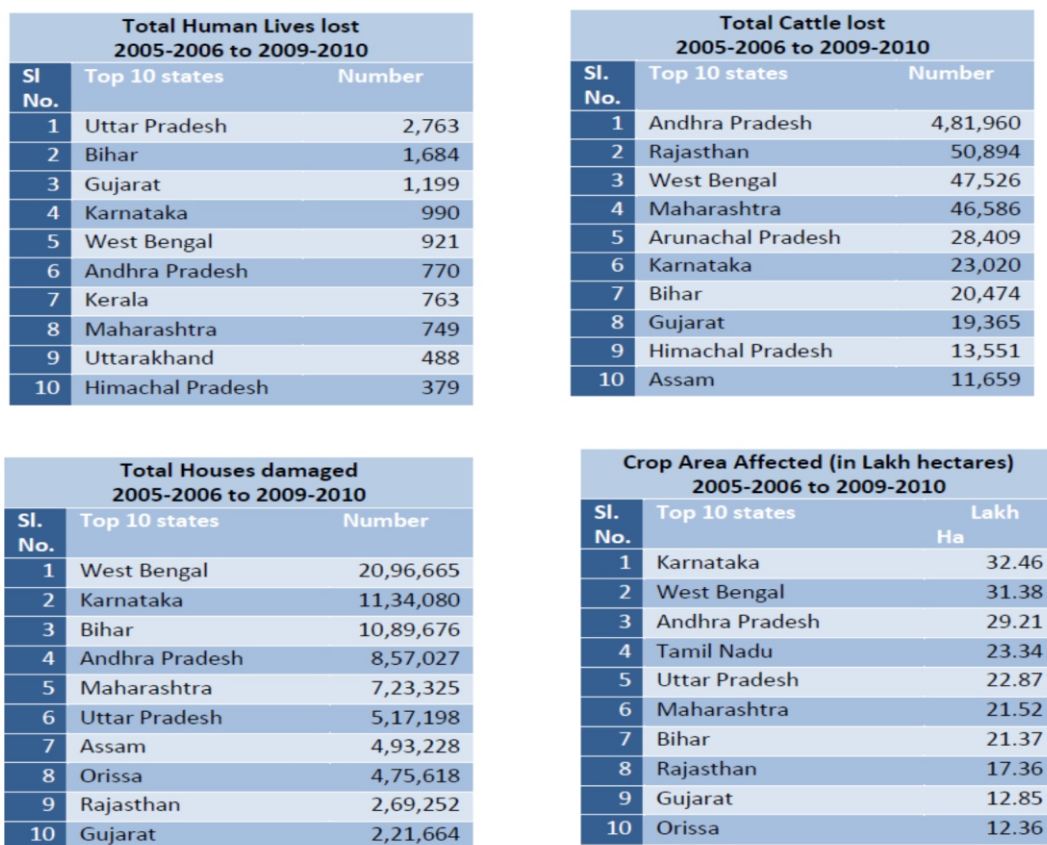
Three phases in disaster management cycle:

- a) Pre disaster phase in order to reduce disaster risks by adopting preparedness and mitigation measures.
- b) Immediate aftermath phase aiming at response and rescue.
- c) Recovery phase focusing on long term recovery and reconstruction.

Year	Live Lost human (in No.)	Cattle Lost (in No.)	Houses damaged (in No.)	Cropped areas affected (in Lakh hectares)
2001-02	834	21,269	3,46,878	18.72
2002-03	898	3,729	4,62,700	21.00
2003-04	1,992	25,393	6,82,209	31.98
2004-05	1,995	12,389	16,03,300	32.53
2005-06	2,698	1,10,997	21,20,012	35.52
2006-07	2,402	4,55,619	19,34,680	70.87
2007-08	3,764	1,19,218	35,27,041	85.13
2008-09	3,405	53,833	16,46,905	35.56
2009-10	1,677	1,28,452	13,59,726	47.13
2010-11	2,310	48,778	13,38,619	46.25

Source: Ministry of Home Affairs (MHA)

**Figure 10:** Year wise damage caused due to floods, cyclonic storms, landslides etc during last ten years in India



**Figure 11:** State-wise damage due to cyclonic storms/ flash floods/ landslides (2005-2010)

Pre-disaster framework agreements that link potential participants in disaster prone areas in advance are essential. Formal post disaster arrangements have to be mobilized faster, to efficiently organize diverse potential participants (Zou et al, 2015).

Post disaster reconstruction can generate employment, investment and growth, vulnerability reduction and sustainable development subject to adherence to appropriate policies and guidelines. Typical PPP approaches may not work in disaster scenarios demanding rapid responses and involving people- those affected as well as those who help (Zou et al, 2015).

The media can play a very important role in disseminating information and obtaining quick feedbacks as also can the general community with the rapid development of new media such as Facebook and Twitter. Such networks provide essential tools to get the right message across and communicate rapidly between major stakeholders (Zou et al, 2015).

Framework for disaster oriented PPP has 7 critical factors

1. Crisis
2. Leadership
3. Organizational structure
4. Information sharing
5. Shared benefits
6. Trust
7. Adaptability or sustainability

The US Federal Emergency Management Agency (FEMA) has identified the following 8 benefits of public-private partnerships for disaster resilience: (Reference 2)

- Timely information on disaster risks to facilitate sound decisions related to planning, operations, customer and employee safety. Real time situation updates through twitter feeds and video/photo submissions.Improved decision making through timely and relevant information and appropriate risk assessment and mitigation strategies by government and private sector.

- Increase in availability and efficient use of resources.
- Improved communication for better resilience, preparedness and recovery efforts.
- Involvement of public and private sector in all stages of the emergency management cycle through regular meetings and virtual networks.
- Increased mutual understanding between public and private sector to appreciate each other's limitations.
- Relationship building to support disaster response and recovery.
- Collaboration, coordination and communication between government and private sector partners to increase capacity and support local communities to manage disasters.

International disaster management arena comprises 3 types of PPP categories:

- Awareness and advocacy partnerships
- Disaster preparedness partnerships
- Social investment partnerships

#### **Awareness and advocacy**

This involves sharing knowledge, managing risks, reducing the impact of future disasters and fostering resilience in communities. Annual disaster drills for employees and employers of local authorities are conducted along with disaster management camps for school students. Fire departments, disaster management volunteer groups and individuals from the local community are involved in educating participating citizens in household preparedness.

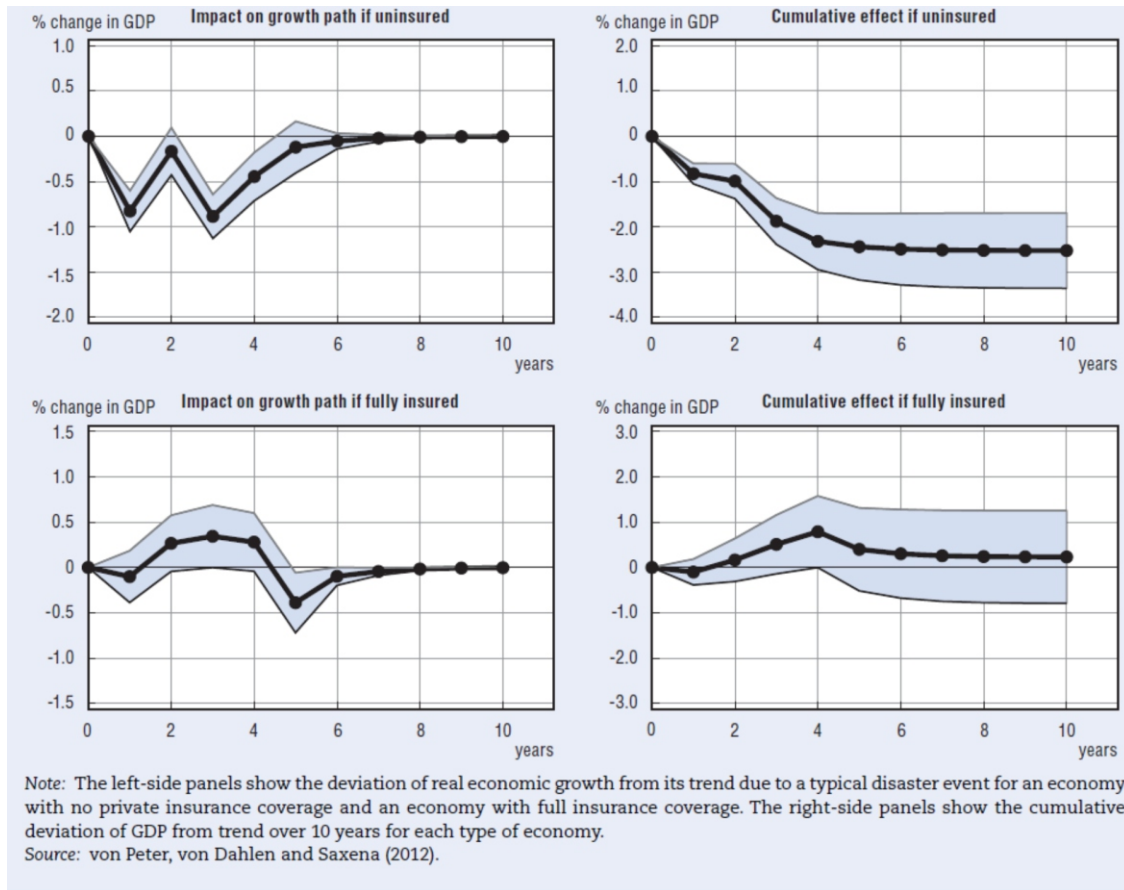
#### **Disaster Preparedness**

This involves improving the readiness of local authorities and communities. Stockpiling of equipment and supplies, coordination and stand by equipments, information management, personnel training and development of contingency or disaster management plans become essential.

#### **Social investments**

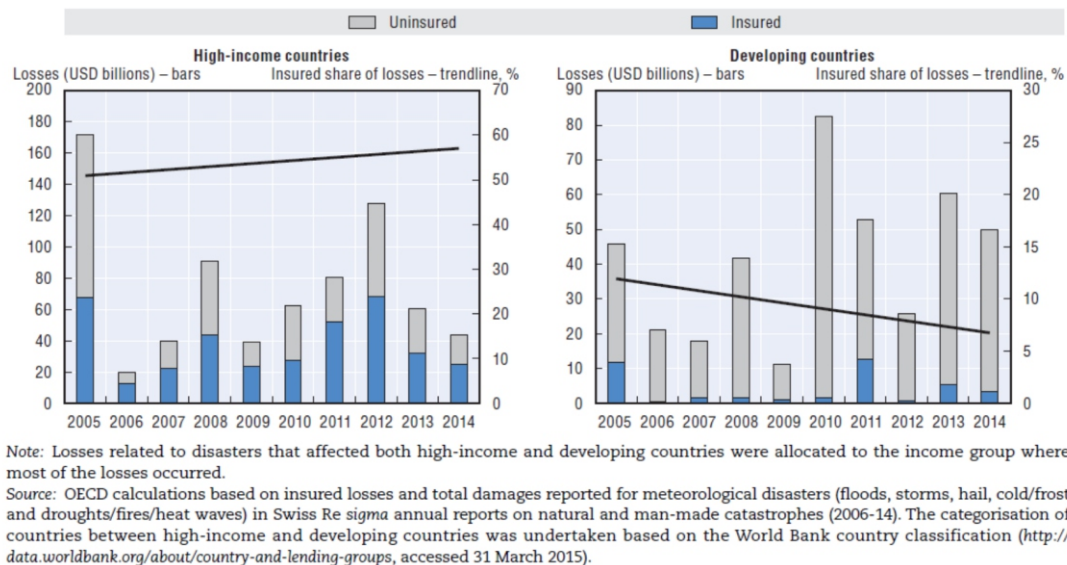
Private sector provides communities with financial support, volunteers or expertise and product donations to improve living conditions of those in disaster stricken areas or to repair critical infrastructure damaged by disaster. Such PPPs are often established by MNCs as philanthropy or as part of corporate social responsibility efforts. (Van der Berg, 2015)

Disaster management needs collaboration and co-operation among a diverse set of actors and regulatory support. Leveraging government, community and industry needs to have a grip on vulnerabilities is essential for a PPP in disaster management (Abou-Bakr, 2012) (Miller & Rivera, 2010). An integrated approach involving government, civil society organisations and private sector can aid mobilization of human and non human resources to support prevention and response to disasters (Lassa, 2013) (Chen et al, 2013). The government must set targets and define standards for PPP (Johannessen et al, 2013). Local governments can set up a disaster reserve fund using the taxes collected.



**Figure 12 :** Von Peter, G., Von Dahlen, S., & Saxena, S. C. (2012). Unmitigated disasters? New evidence on the macroeconomic cost of natural catastrophes.

PPP can supplement financial capacity of local governments and frame operational procedures for hazards to improve capacity and provide training through improved co-ordination (Lassa, 2013). PPPs can help smaller communities and support federal disbursement processes. They encourage multi stakeholder participation to improve planning and resilience. PPPs can drive innovation and use of technology to expedite disaster recovery. (Van der Berg, 2015) (Chandra et al, 2016) (Busch & Givens, 2013).



**Figure 14:** Phases of a typical disaster cycle Chandra, A., Moen, S., & Sellers, C. (2016). What Role Does the Private Sector Have in Supporting Disaster Recovery, and What Challenges Does It Face in Doing So?

Challenges in PPP in disaster management (Buwa, 2012) include delays in the reimbursement process dealing with relief partners, constant change of government personnel dealing with relief process, absence of a disaster relief official on the sites of distress and unsubsidized expenses incurred by the relief partners.

Germany implemented a project called 'Get Airports ready for disaster' as a successful example of private-public sector partnership (Ha, 2015). New model like public-private community partnership (PPCP) model wherein both the government and private players work together for social welfare eliminating the focus of private players on profit is also emerging (Abou-Bakr,2012).

Existing PPP models are skewed towards disaster response and recovery. So, risk reduction and resilience building also must be encouraged along with improvement in trust. Post Hurricane Sandy in 2012, businesses donated funds for relief but stayed away from getting involved in long term recovery. PPP can bring in flexibility in disaster relief leading to demonstration of accountabilities by private sector before, during and after disasters.

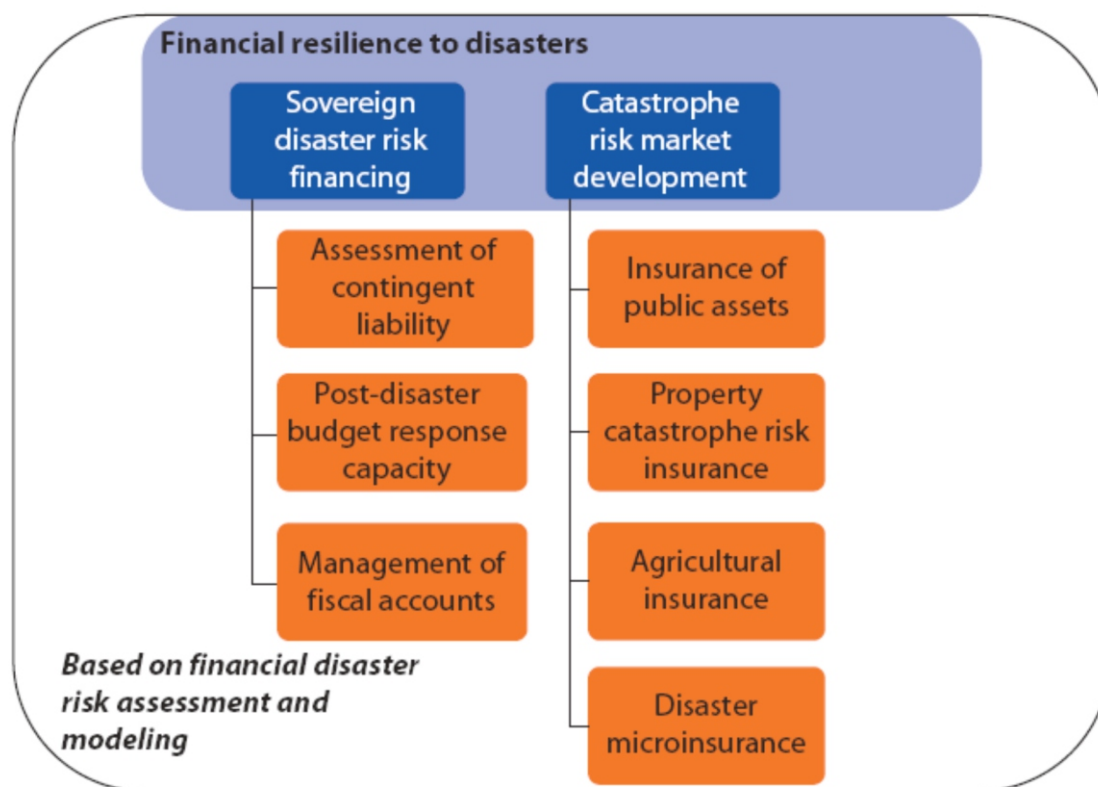


**Figure 13:** Insured and uninsured losses in high income countries and developing countries

**Table: 3** Successful examples of PPP across the globe

<b>Disaster Event/ Country</b>	<b>Private sector involvement</b>
Hurricane Katrina in 2005, USA	Walmart provided disaster victims with staples like food, water, toilet paper and fuel. (Van der Berg, 2015) Walt Disney company’s use of character actors in shelters for survivors (Abou-Bakr,2012).
9/11 terrorist attacks, USA	Federal Express
Piracy off the coast of Africa	Maersk’s efforts to combat piracy
India	Partnership between an ambulance service company in Mumbai (Ziqitza Healthcare Limited) and local government (Rakesh & Sriparna, 2014). The service company saw this as an opportunity to expand their social mission.
Tornado, Moore, Oklahoma, USA (20 May 2013)	Partnerships between government entities and businesses played a significant role in the recovery efforts. (Abou-Bakr, 2012). The Ford Motor Company donated \$ 400000 to local charities including the American Red Cross which worked closely with first responders to help survivors. The Home depot gathered 300 employees in Dallas, Texas including plumbers and general contractors and took them by bus to Moore to assist in recovery operations. (Abou-Bakr, 2012). Numerous cell phone towers were destroyed in the Moore area. The wireless phone company Sprint provided cell phones to local first responders and set up mobile cell phone towers on trucks to boost service coverage. (Abou-Bakr, 2012).
Blumenau (Santa Catarina state), 2008, Brazil	Federal Express partnered with the local government for identification of appropriate logistics solutions Fonseca et al. (2012).
	One of the successful PPP has been that of Thomas Nationwide Transport (TNT), an express delivery company that partnered with humanitarian agency World Food Programme. Barriers were overcome and solutions were arrived at by clear definition of roles and responsibilities (Tomasini & Van Wassenhove 2009).
PPP in disaster management in Bangladesh (Baur & Parker, 2015).	Bangladesh is a country prone to floods. People rely on government aid, NGOs, microfinance institutions to support them. The Bangladesh government along with international agencies and local partners has now built structural solutions to counter the losses caused by floods. The government has found protection for residents of the river basin against catastrophic floods like raising river embankments, constructing flood protection shelters and food and medical stores. Ex-post financing of disasters puts enormous burden on government and delays disaster relief. The flood index insurance project was launched by donor organizations in close collaboration with the private sector. This pilot covered 1660 families from 14 villages and uses model-generated flood data for payout calculation.
Indonesia	Mercy Corps received financial grants from OFDA-USAID and Boeing Corporation for a project (2008-2010) to facilitate coordination among local communities, local governments and private sector actors so they





**Figure 15:** Disaster Risk-Financing and Insurance (DRFI) Framework, World Bank 2012

### Disaster Insurance

People hesitate to take insurance cover due to lack of awareness about the need for insurance, cost of premiums and lack of trust in insurers (Lashley & Warner, 2015). On an average only 30-40% of disaster risks are insured. Recovery and rehabilitation efforts gobble up government funds and the onus falls on the exchequer. Disasters also set the clock back on development gains achieved by economies over the years. Insurance plays an important role in mitigating the macroeconomic costs arising from major natural catastrophes (Baur & Parker, 2015). Between 2005 and 2014, insurance covered approximately 51% of all losses in high income countries but less than 10% losses in developing countries. (Wolfram et al, 2016). In Europe only 30% of disaster risks are actually insured against. A key challenge to the viability of disaster insurance has been the establishment of a sufficiently large pool of policyholders with independently distributed probabilities of loss. In many countries, insurance for disaster risks is an optional add-on to other policies which has led to limited take up and significant under insurance of these risks even where the extra premium for disaster insurance coverage is affordable. (Wolfram et al, 2016). Lack of awareness about available insurance covers among the population is a huge handicap (Thomas & Leichenko, 2011). High underwriting costs of disaster insurance in developing countries coupled with lack of cost effective means of distributing insurance products has led to poor uptake of disaster insurance. Micro insurance schemes in many countries have been unable to demonstrate commercial viability and scalability is an issue. Access to reinsurance coverage at an affordable premium is essential for long term viability of micro insurance. In addition, developing suitable distribution channels is a must.

Insurance spreads losses among people and across time and reduces the catastrophic impact of disasters. Appropriate pricing of risks can motivate risk reducing behavior of insured (Lashley & Warner, 2015). While insurance can support adaptation and risk resilience for extreme weather, it is not appropriate for foreseeable, widespread, slower onset climate induced impacts. Even for weather related events, insurance cannot be a stand-alone measure to address frequent hazards such as flooding. Resilience building and prevention of loss and damage may be more cost effective ways to address these types of risks (Lashley & Warner, 2015).

Switzerland and Romania have made disaster insurance mandatory. Countries like Belgium, France and UK have made disaster coverage as a mandatory extension to property insurance policies. In Germany insurance companies, consumer organisations and state governments have increased awareness about disaster risks, the need for financial protection and the risk of depending on government compensation which may not be forthcoming for property for which insurance is available. (Wolfram et al, 2016). In Australia, insurers must provide flood insurance cover – this action was taken following the 2010-11 Queensland floods. In the US, a number of publicly backed insurance pools have been established to cover wind and storm damage in hurricane prone states in the South East. (Wolfram et al, 2016).

A number of disaster insurance schemes involve public-private partnerships that establish specific thresholds for the coverage of risks by the private and public sectors. Example – the Japanese Earthquake Reinsurance Co. Limited retrocedes (re-reinsures) 50% of mid-level exposures back to the private sector and adjusts the level of retrocession periodically based on changes in market capacity. (Wolfram et al, 2016). Countries with underdeveloped insurance markets and limited penetration of property insurance need to promote insurance coverage for property risks.

World Bank and Global environment facility have established Europa Re in South East Europe to encourage development of local catastrophe insurance markets. Europa Re provides a comprehensive market development package that includes reinsurance capacity, insurance market infrastructure services and technology solutions such as access to a sophisticated web-based production platform that supports automated pricing, underwriting and claims management. The platform was launched in 2014 (Wolfram et al, 2016)

### **Design of disaster insurance covers**

Risk based premiums for insurance coverage and premium discounts for effective risk reduction measures can provide incentives for reducing risks by offsetting the costs of risk reduction measures with lower future premiums for insurance coverage. Risk reduction measures implemented by policyholders such as elevating a building to protect against flood or installing storm shutters to protect against wind damage can reduce losses from disasters.

### **Alternative Risk Transfer (ART) Mechanisms; An introduction**

The field of ART grew out of a series of insurance capacity crisis in the 1970s through the 1990s that led purchasers of traditional reinsurance coverage to seek better ways of protection. ART also includes captives and risk retention groups.

A survey of 1059 low income persons in agriculture and tourism in Belize, Grenada, Jamaica & St Lucia pointed to a new need to balance risk reduction and risk transfer. During a disaster, people used their savings or borrowed money or sought government assistance or simply did nothing. There is a need for alternative financial risk management approaches like weather-related micro insurance (Lashley & Warner, 2015).

Alternative Risk transfer mechanisms have been necessitated due to increasing severity of losses due to catastrophic events and hardening of reinsurance markets (See Figure 16). ART is a mechanism to finance traditional risks (covered by insurance) as well as nontraditional risks. ART optimizes risk transfer by combining insurance and capital market instruments. It draws from experience in insurance, risk modelling, capital market, investment banking, taxation, law and actuarial profession. ART involves drawing capital from banks, capital markets, insurers and shareholders. It presents an opportunity for arbitrage between the price and products available in these markets. Vertical integration in banking, insurance and capital markets is driving the growth of ART mechanisms. ART deals may involve high transaction costs but they provide wider cover than conventional insurance programs (4). Development of ART mechanisms need a favorable regulatory and accounting regime to cater to large insurers and corporate. Some corporates have launched captive companies that can insure property, liability and catastrophic risks of parent companies. US, Japan, Singapore have embraced ART mechanisms (4)

The participants in ART market are

- Reinsurers, life insurance companies, bankers, capital market investors.
- Insurers, insurance brokers and investment bankers.

## Securitization

Here income generating asset can be turned into a capital. In case of insurance, premium income is used as a basis for securitisation which allows insurers to write more business. This enables transfer of risk to capital market with respect to low frequency, high severity perils like hurricane, earthquake and other natural perils.

Insurers have to float a special purpose vehicle to approach capital markets. The insurer enters into a reinsurance contract with the SPV which issues equity and liability backed bonds to the capital market. Most securitisation deals have been with respect to catastrophic risks.

### Benefits of ART mechanisms (4)

1. Higher reward risk returns for investors.
2. Increased underwriting capacity and capital for insurers.
3. Broader choice of coverage and earning stability for corporate.
4. Growth in financial markets.
5. Protection from catastrophic risks.
6. Better management of disasters.

### Challenges in implementing risk transfer mechanisms

1. Absence of an enabling environment
2. Low insurance penetration in developing countries
3. Poor insurance coverage in some rural areas
4. Coverage only for some perils
5. Lack of policy framework for developing diversified risk transfer mechanisms
6. Risk transfer products not targeted for poor and vulnerable
7. Illiquidity – investors do not understand the catastrophic component of event risk securities as they feel these are outside their control.
8. Computer based modelling, relying on certain assumptions related to weather losses may not lead to a precise scientific application due to lack of statistical evidence. So, the higher rate of return is not compensation enough especially as they lack standards to compare these products in the non-insurance context to independently verify price.
9. Insurance premium contributions are tax deductible. Most ART tools are not. These are regulatory and accounting related conventions that inhibit the growth of the alternative market.
10. Traditional reinsurance qualifies for accounting treatment and has a positive bearing on financial and solvency ratios. But ART tools will not qualify for the same.

### What is required for ART? (4)

- Partnership between Government and insurance sector.
- Effective regulatory framework.
- Prudent accounting standards ( sound capital, solvency requirements)
- Ease of access to financial services
- Government support in the form of efficient tax structure
- Infrastructural facility like proper telecommunication facility is important for transparency and efficiency in dealings.
- India needs to develop the necessary risk management expertise and work towards improving the clarity in accounting and regulatory guidelines.

Solvency regulation, accountancy practices and tax laws have to be aligned to spur the growth of ART instruments. Insurance is a highly leveraged activity as the aggregate exposure is several hundred times the capital of the insurer. This calls for underwriting expertise and ability to predict and manage exposure aggregation of large number of similar and dissimilar risks. This can be a significant entry barrier for non-insurers.

Catastrophe bonds are essentially insurance linked investments that transfer part of the risk exposure directly to investors in the financial markets. Catastrophe bonds can enable a country, a reinsurance company or any other organisation to access funds from investors if a severe disaster produces large scale damage. Government pays premium to SPV / independent company whose only purpose is to finance the disaster costs of the cost. SPV will raise capital to support its insurance policy by issuing a bond to investors. The investors' funds provided in exchange for the bond notes constitute the initial principal of the bond and will be placed in safe investments.

Suppose an event is triggered (disaster occurs), as defined by the specifications of the issued bond, interest on the bond or principal or both is forgiven and these funds are released to the Government to help cover claims from the event. Premiums collected from Government will be used to provide the investors with a high enough interest rate to compensate for a possible loss of their principal should a disaster occur. No disaster – payment of interest and principal of the cat bond (at maturity). If disaster strikes, investors lose their investment.

Investors in catastrophe bonds and sidecars are generally not reinsurance companies and so they provide an additional source of capital. By transferring risk to capital markets, alternative reinsurance and capital market instruments reduces insurance companies' need to hold capital and increase their capacity to write new business. An increase in use of alternative reinsurance and capital market instruments for catastrophe risks could make premiums for disaster insurance coverage affordable. (Wolfram et al, 2016).

Demand for catastrophe bonds may be impeded by illiquidity and less familiarity among investors with this asset class.

Some important steps that can be taken are: (Wolfram et al, 2016).

1. Cross country collaborations for disaster risk insurance cover.
2. Disaster insurance cover must be affordable and include large pool of disaster risks
3. Multi country risk pooling
4. Enhance reinsurance capacity by accessing international reinsurance markets
5. Collection of data for risk pricing

Besides insurance and micro insurance, risk transfer mechanisms include risk pooling and insurance-linked securities. Risk pooling allows regional aggregation of risks so that individual risk holders can spread their risks geographically. Catastrophe bonds help sharing risks with capital markets. These are issued by a government or an insurer and payments are triggered when a specified event occurs. Weather insurance typically takes the form of a parametric (or index-based) transaction, where payment is made if a chosen weather-index, such as 5-day rainfall amounts, exceeds some threshold. This leads to lesser administrative costs and moral hazard and transparent risk solutions. [Source: Munich Climate Insurance Initiative (MCII).Adapted from <http://unfccc.int/resource/docs/2009/smsn/ngo/163.pdf>]

The DRFI (disaster risk-financing and insurance) framework of World Bank classifies risk financing mechanisms as

1. Sovereign disaster risk financing – this involves assessment of the government's contingent liabilities associated with natural hazards and financial strategies to increase their capacity in the aftermath of a disaster.
  2. Catastrophe risk market development – this increases the transfer of public and private risks to insurance sector.
- After the devastating Marmara earthquake in Turkey, World Bank supported the development of the Turkish Cat Insurance Pool. Asian Development Bank selected pilot cities to develop risk transfer products for the Asia Pacific region.

### **Ex ante risk financing- a wide range of insurance solutions**

Individuals, businesses and governments must have resources needed to manage the economic consequences of disasters. Such arrangements are called as ex-ante arrangements which mean that funds will be used by Governments to prevent the affected areas from suffering societal and economic collapse. Risk transfer through insurance and alternative risk transfer mechanisms are viable options for dealing with low probability and high severity events (Baur & Parker, 2015).

A variety of innovative public-private risk transfer partnerships have been implemented over the past few years and these can act as models for many other countries yet to embark on ex-ante risk financing strategies (Baur & Parker, 2015).

Alternative Risk Transfer Mechanisms: Lessons from Mexico & Uruguay (Baur & Parker, 2015).

As early as the 1990s, the Mexican government identified disaster risk reduction as a national priority and created a fund for natural disasters. It introduced a catastrophe bond in 2009 renewing it in 2012 to transfer earthquake and hurricane risks to capital markets. The three components of Mexico's financial strategy are:

- Risk retention vehicle that allows budgeting for the costs produced by the most frequent types of disasters.
- Reinsurance program to take care of severe deviations after a disaster.
- Parametric triggered layer of cover to provide immediate funds in case of a major and severe disaster.

Uruguay relies largely on rainfall for its hydroelectric plants to produce enough electricity. A drought in 2012 resulted in a deficit as Uruguay had to buy electricity on the international spot market. The country has now entered into a weather risk transaction. Rainfall data and oil prices are used for settlement. The government gets compensated for the combined risk of drought conditions and increase in the price of energy (Baur & Parker, 2015).

### **Sovereign Risk Transfer (Baur & Parker, 2015)**

A number of countries have now come together to build a sovereign risk pool to jointly transfer the risk to the international re/insurance and capital markets. The Caribbean Catastrophe Risk Insurance Pool is one such arrangement involving 16 Caribbean governments. Pay outs are quick. Strength of earthquakes, wind speeds or rainfall are used to estimate losses and determine payout levels. This is a classic case of proactive management of risks initiated by governments.

The Pacific catastrophe risk insurance pool includes Cook Islands, Marshall Islands, Samoa, Solomon Islands, Tonga and Vanuatu. The pool offers protection against earthquake, tsunami and tropical cyclone risks. This pool was launched in 2013 and provides a mechanism for transferring catastrophic risk and provision of emergency funds for disaster relief efforts. Tonga was the first country to benefit from such a payout.

The African Risk Pool was launched in May 2014. It enables government to move from post disaster aid to pre-disaster risk management. Senegal, Mauretania, Niger, Kenya and Mozambique are among the first five countries which have joined this African Risk Capacity insurance program. This is an example of ex-ante risk transfer mechanisms.

Sovereign risk transfers are based on parametric or index insurance. A model is used to calculate the payout of the insurance policy. The model closely mirrors the actual damage on the ground and ensures rapid payment. For example, the payout can be triggered by a measure such as the strength of an earthquake or air pressure experienced during a hurricane. The speed at which payouts can be made is a big bonus (Baur & Parker, 2015).

The Turkish Catastrophe Insurance Pool is one of the most successful specialized earthquake insurance pools in the world, providing risk-based disaster insurance for homeowners. With close to 7 million policies sold, it has become one of the largest catastrophe insurance pools in the world. It also serves as a model for many countries in terms of a successful public-private partnership (Baur & Parker, 2015).

Disaster prone areas like Caribbean are witnessing the gradual shift from disaster reconstruction assistance to funding for mitigation of risks as a tool for sustainable development. The next stage is application of risk transfer mechanisms to address the financial risk of exposure to catastrophic events that need funding beyond what can be controlled solely through mitigation and physical measures.

Risk pooling structures and alternative catastrophe coverage mechanisms (long-maturity risk financing facilities, weather-indexed contracts and capital market instruments) can achieve better risk protection and financing terms by improving insurance coverage.

**How can acceptability of alternative risk transfer mechanisms be improved?**

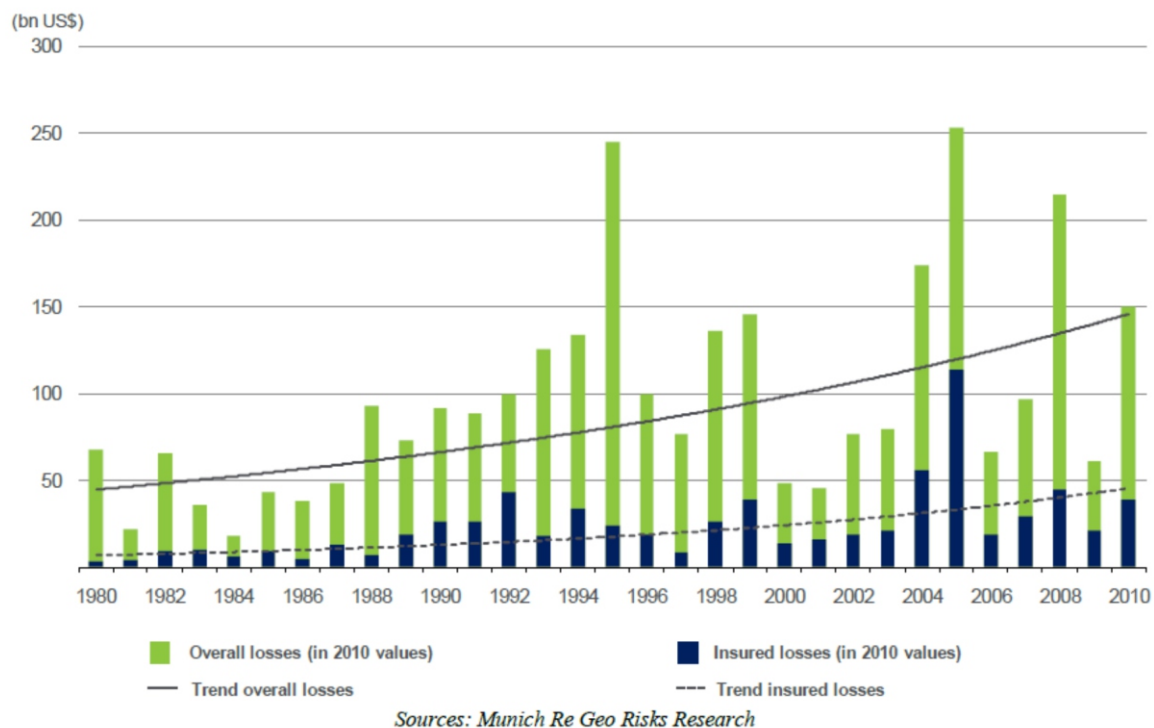
Financial preparedness is the hallmark of sovereign disaster risk management as this enables funding of disaster response, recovery and reconstruction. Risk pricing by insurers incentivizes prevention measures. What is needed is an integrated country risk management approach (Baur & Parker, 2015). Risk management strategy needs to include financial risk transfer. Integrated approach involves analysis of risk landscape and needs a high degree of coordination among public and private entities. The appointment of Chief Risk Officer (CRO) has been recommended by OECD. The CRO monitors the risk landscape and co-ordinates actions to minimize the impact of disasters.

Transferring catastrophic risk must therefore be a key element in the financial strategy of every disaster-prone country or region to enable and sustain growth. Financial education and training for disaster management specialists is important: equally public finance specialists need to be more aware of disaster risks and exposures. What is needed is a more joined-up effort between finance and disaster management disciplines.

Small Caribbean islands have been challenged by post catastrophe recovery and problems of financial illiquidity. Multifarious natural hazards cause socio economic dislocation and lead to heavy losses disrupting government operations. Catastrophe insurance schemes are still not popular as there are reservations regarding their efficacy (Joyette et al, 2015).

Following serious floods in late 1981, the French government established a single compensation scheme for those who are victims of natural disasters called Cat Nat. This is an example of public private partnership for natural hazards that are considered uninsurable. It combines private insurance and state-guaranteed public reinsurance by the national treasury. French Government, public and private reinsurers and insurers form the triad (Platis & Josan, 2010).

Analysis of risks and benefits of different forms of engagement (contractual relationships, one-off relationships and CSR partnerships) is inadequately addressed in literature (de Oliveira et al, 2016).



**Figure 16:** Cost of Natural Catastrophes worldwide 1980-2010

### FUTURE RESEARCH AREAS

- Which areas of disaster management can benefit from private sector contribution?
- How can PPP be made more effective?
- To what extent must private sector formalize its role or responsibility in disaster preparedness?
- How can private sector funding data be captured adequately?
- How can quality of private sector involvement in disaster risk reduction be assessed?
- What are the procedures for establishing PPPs?

### SUGGESTIONS & RECOMMENDATIONS

International disaster events have highlighted the need for better planning, preparedness and effective governance. 70% of fatalities caused by natural disasters occur in the Asia Pacific region. Collaborative partnerships across all levels of government, the non- government sector, business and individuals will lead to better disaster management (3). India can set up early warning systems, conduct risk assessments for all hazards and regions, increase public awareness about disasters and enforce building bye laws. Manufacturing sector must meet safety and legal requirements; they must have a business continuity plan and conduct regular mock drills and hazard assessments.

Community based/ mutual insurance model in India and involvement of village panchayats in creating disaster awareness among rural communities are other measures. A SAARC kind of institution can be set up to promote global and regional advocacy in disaster management.

Community education can be promoted by involvement of rural women folk and volunteers. For example, one in 20 people in Australia are trained emergency management volunteers. The general insurance association in Thailand provides employee volunteers from insurance companies who encourage communities to embrace insurance and use one million Baht fund to fund relief activities. Micro insurance is being provided extending fire insurance of houses to include earthquakes and floods (3). Insurers can collaborate with construction companies to ensure that the buildings are earthquake resilient and assist in calculating potential damage and loss estimations before the onset of a disaster as well as the costs of proposed structural mitigation measures.

Development of knowledge bank on disaster management, risk management, BCP, Risk auditing and offsite emergency plans needs to be on the anvil. Coastal sirens, simulations, wireless web based dissemination and radio technologies need development. The emergence of a central information system including all risks may be made available on the public domain (3).

Sustainable economic development needs a proper understanding of disasters. A disaster insurance system that functions well can allow quick pay-outs so that restoration work can be carried out with agility as otherwise the onus falls on the government. Well designed insurance policies can deter deviant behaviors. Risk based pricing can motivate businesses and individuals to reduce their exposure to risk. Risk modeling and scaling up of insurance pilot projects in developing nations can yield good insights.

Private organisations must build social capital through humanitarian activities and improve their brand equity (Tomasini & Van Wassenhove, 2009). Business efforts in disaster relief and recovery can lead to social capital between businesses and communities. Social capital enables understanding the social fabric at the heart of the community psychology agenda (Saegert et al, 2017). Social capital is the ability of an individual to obtain benefits through membership in social networks (Portes, 1998). Social capital refers to resources embedded in social networks assessed and used by actors for actions including goodwill. (Avery & Swafford, 2009) (Yasin & Gomes, 2010) (Adler & Kwon, 2002).

The public sector can raise awareness, structure control and enable creation of facilities. The private sector can infuse the partnership with their competence, agility, professionalism, operational resources and financial resources. The synergy between both partners will eventually lead to an integrated and comprehensive disaster management plan (Auzzir et al, 2014).

## CONCLUSION

Increasing frequency of natural disasters accompanied by increase in the intensity of each disaster has made nations across the globe realize the importance of public private participation in disaster management. The involvement of private sector in disaster management has been marginal in developing countries and more pronounced in developed countries. Yet there is a crying need to increase private sector participation in disaster management to enhance disaster response and recovery efforts.

The Government has to steer efforts to involve private sector in the disaster planning stage. Disaster planning and risk mitigation are equally important as response and recovery efforts. Compared to disaster recovery efforts, the involvement of the private sector is more skewed towards disaster response and relief. This situation needs correction.

Having said this, we need to bear in mind that public-private participation in projects has not always been successful. In Peru, following the Pisco earthquake, lack of integration between public and private sector during pre and post disaster situation led to severe financial losses as coordination was poor.

In India, projects that were implemented using the PPP route have often dragged on endlessly leading to time overruns and cost overruns. Bureaucratic hurdles have often subsumed PPP projects. One shouldn't expect anything great from PPP in disaster management. Rather it is imperative to provide a framework and mechanism by which the coalition between public and private sector in disaster management can be productive and result-oriented. The trick is to keep things simple, clarify roles and responsibilities and accountabilities at the beginning itself and establish an ongoing monitoring and review process to check if things are under control.

In the Mumbai monsoon floods of 2005, the Mumbai dabbawalas – the food delivery men of Mumbai – pitched in to support government's efforts. This is a clear indication that community involvement in disaster planning, response and recovery is essential. When floods ravaged Chennai in late 2015, help poured in from unexpected quarters. Citizen groups volunteered to support victims of the disaster. Taxi aggregator service provider like Ola arranged for boats to ferry victims. This is again clear evidence that business community can engage with local communities in relief efforts. The catch is how to cascade this momentum to pre-disaster planning and post-disaster recovery efforts.

There are research issues that have emerged from this study that need attention and may prove interesting for all stakeholders who are involved in disaster management. It is up to academia to provide the answers to support the government's efforts. The Government of India is promoting “Make in India” to encourage entrepreneurship in a big way. There is also added thrust on digitalization. This is the right time to encourage start ups to look at designing and implementing projects that can help in pre-disaster planning and risk mitigation/ reduction. To ensure greater involvement of private sector, the government needs to amend the Corporate Social Responsibility (CSR) guidelines to include disaster management efforts by the business community. Global institutions often sponsor projects for community development but these projects must be designed, planned and executed keeping in mind the needs of the community. A cover story in the Hindu (Sunday, April 9, 2017) reported how the villages in and around the Cauvery delta are facing the adverse consequences of shrimp farming. More than 2000 acres of agricultural land in Thalainayiru block stand to be salinated because of shrimp farms. The Asian development bank, under the aegis of the Central and State governments, announced an ambitious plan to build regulators on the three rivers that enter the sea in the block. The Rs. 1650 crore project is called as the climate adjustment project. The readjustment will reportedly have no impact on small farmers and their pockets of land. The proposed regulator is being built at a spot where it will not control the sea water inversion completely. The community was not consulted by the Public Works Department regarding the design. Such contentious issues can be challenging to deal with. So, community involvement in disaster management projects is important to derive greater buy-in from them. Disaster insurance uptake is inadequate in most countries – developing countries in particular. Awareness about insurance cover and affordability of the disaster insurance are two issues that



need to be addressed with alacrity. Of the losses resulting from a disaster, only 40% are insured and this figure can be much lower in underdeveloped and developing nations. Despite capacity provided by reinsurance, the truth is that there is only so much disaster insurance can provide if one considers the debilitating impact of disasters and the magnitude of the financial duress that results from the disaster. Huge losses and claims in a post-disaster situation lead to enormous burden on the state as expectations from the public can become unmanageable in such a situation. Governance becomes a challenge too. There is a need to create a disaster relief fund with contributions from the insurance and reinsurance sector in India and this fund can be managed by GIC Re on behalf of the government.

Alternative risk transfer mechanisms can provide effective solutions to address problems of financial recovery and availability of funds in a post disaster scenario. With the risk being transferred to capital markets, these risk transfer mechanisms can alleviate the burden of the state. But they are associated with challenges too which can become burdensome in the absence of policy framework and regulatory intervention. If these challenges are overcome, then the alternative risk transfer mechanisms (along with disaster insurance) can supplement the disaster relief efforts.

Seldom can all aspects of disaster management be addressed in one go and neither is there a magic wand to wish away the problems. A concerted effort by the government to act as an aggregator of all the different sub-elements/ task forces that need to work together to manage disasters well is essential. The management of disaster can be a complex affair considering the involvement of so many stakeholders. The Government will need support from public works authorities, public sector, private sector, non-profit organizations, civil society organisations and multi lateral institutions like World Bank. If volunteering has been successful in Australia, so can it be in India. Adopting a strategic mindset will go a long way in managing disasters effectively.

We may have little control on the occurrence of natural disasters; however early warning systems, predictive analytics and weather forecast modeling can prepare us for managing disasters. Disaster planning will help mitigate risks to reduce the impact of financial crises after a disaster. The public-private participation in disaster management will play an important role in this transition from a reactive to a proactive approach. As always, in troubled times, the old adage "Prevention is better than cure" stands tall.

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