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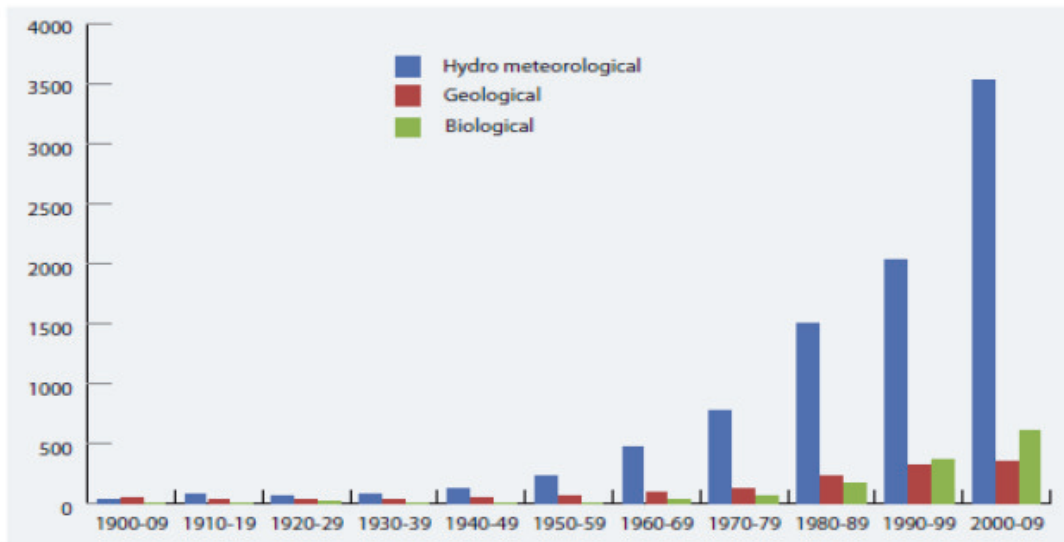
FUTURE CHALLENGES IN DISASTER MANAGEMENT

We are facing difficult times due to global warming and other factors. Some of the challenges that the governments and communities should prepare for are being discussed such that the disaster management managers specially police officers could appreciate the enormous task that they have on hand in future.

Frequency and intensity of disasters are increasing. At the same time response management is becoming increasingly difficult due to variety of reasons including population growth, climate change and democratisation of information, which makes incumbent upon us to bring about recommended changes in approach, policy, legislation etc. Moreover, the future is not all that promising too. Although major countries are making efforts to reduce carbon emission and mitigate the effects of global warming, the declarations have not been translated in real terms so far to have any significant impact.

6.1 INCREASING FREQUENCY AND INTENSITY OF DISASTERS IN RECENT TIMES

The graph below indicates the rapidly growing number of incidents in last decades. Number of reported disasters confirmed the global upward trend in natural hazard-related disasters, mainly driven by the increase in the number of hydro-meteorological disasters. In recent decades, the number of reported hydrological disasters has increased by 7.4% per year on average. Both hydro meteorological and geological disasters have shown steep upward trend. This naturally poses serious challenges for future disaster management.



Source: Disaster Management in India, Ministry of Home Affairs

Disaster events globally between 1900 and 2009

India is prone to disasters due to number of factors, both natural and human induced, including adverse geo-climatic conditions, topographic features, environmental degradation, population growth, urbanization, industrialization, flawed development practices, etc. As far as the geographic dimensions of the country are concerned, the five distinctive regions of the country i.e. Himalayan region, the alluvial plains, the hilly part of the peninsula, and the coastal zone have their own specific problems. While on one hand the Himalayan region is prone to disasters like earthquakes and landslides, the plain is affected by floods almost every year. The desert part of the country is affected

According to the World Bank, direct losses from natural disasters have been estimated to amount to up to 2 per cent of India's GDP and up to 12 per cent of central government revenues.

by droughts while the coastal zone is susceptible to cyclones and storms. If we analyse the layers of vulnerability statistically, out of 35 States and Union Territories in the country, 27 of them are disaster prone. Almost 58.6 per cent of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares (12 per cent of land) are prone to floods and river erosion; of the 7,516 km long coastline, close to 5,700 km, is prone to cyclones and tsunamis; 68 per cent of the cultivable area is vulnerable to drought.

On account of its multilayered vulnerability, the country too has witnessed an increase in the frequency and intensity of disasters in the past resulting in widespread devastation. The human and economic losses from disasters are enormously high in India as compared to other developing nations of the world.

This inference is drawn on the basis of disasters which have been reported. Many of the disasters, particularly in remote areas, go unreported because local administration lack the technical and human resources for community-level disaster monitoring and are not able to fully identify or map potential local hazards or develop the appropriate disaster management plans. Losses from low-intensity, but more extensive disaster events continue to affect housing, local infrastructure, and large numbers of people. These disasters at the local level are so frequent that many communities accept them as an integral part of their existence and, with varying degrees of success, learn to live with them.

6.2 IMPACT OF CLIMATE CHANGE – UNCERTAIN TIMES

There are three major ways in which global warming will make changes to regional climate: melting or forming ice, changing the hydrological cycle (of evaporation and precipitation) and changing currents in the oceans and air flows in the atmosphere. The coast can also be considered a region, and will suffer severe impacts from sea level rise.

The various effects of climate change pose risks that increase with global warming (i.e., increases in the Earth's global mean temperature). The effects of global warming are the ecological and social changes caused by the rise in global temperatures. Evidence of climate change includes the instrumental temperature record, rising sea levels, and decreased snow cover in the Northern Hemisphere. According to the Intergovernmental Panel on Climate Change (IPCC), most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in human greenhouse gas concentrations. Projections of future climate change suggest further global warming, sea level rise and an increase in the frequency of some extreme weather events.

Parties to the United Nations Framework Convention on Climate Change (UNFCCC) have agreed to implement policies designed to reduce their emissions of greenhouse gases to avoid dangerous climate change.

Thus the climatic changes happening due to global warming could have serious challenges for disaster management managers. Climate change is resulting in unusual happenings. Studies on climate change paint a very dismal picture of future world. We are witnessing erratic weather every year. The monsoon is showing extremist tendencies. The amount of water India gets has not changed, but who gets how much and when, is changing. Globally too we have witnessed frightening instances: floods that devastated Pakistan, Venezuela and Colombia in 2011, wildfires gripped Russia. 2011 was the hottest summer to date in Japan and China.

These events are a wake-up call. There could be worse impacts. Climate change has far-reaching implications for managing disaster risk in India, as the frequency and intensity of flash floods, landslides, droughts, cyclones, and storm surges are expected to increase in upcoming decades.

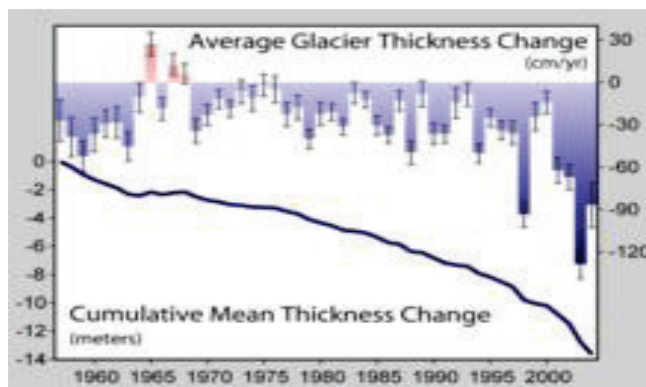
GOLABAL WARMING – CLIMATE CHANGE

UNUSUAL HAPPENINGS

- Extreme snow fall in Europe in winter of 2010 – 50/ 60 year record. Breakdown of communication. Airports closed for several days.
- European airports closed for days in 2011 and 2010 due to volcano eruption.
- Helsinki contrasting climate- 7 feet of snow and 37 temp in 2010.
- **Russia - 50 people died due to extreme heat (40 °c). Forest fires in Russia.**
- Repeated droughts, flood in unknown places (Haryana). Rains at wrong time & too much – Mumbai etc. Floods in Hardwar, Moradabad Rajasthan in 2012 are unusual.
- Yamuna river at 32 year high in 2010 and 2012 in Delhi
- Seoul 1256 mm rainfall since 1 Aug till 22 Sep 2010.
- Reports of deaths in US due to extreme heat in 2011.
- Extreme summer in US in 2012 – Many died
- **IS GLOBAL WARMING THE CULPRIT?**

As it is, impact is being felt in our life. We are witnessing untimely rains in unknown places, flooding in thitherto unknown areas eg Rajasthan. Another significant impact has been extreme hot weather in US, Europe, China & other countries which have reported deaths due to extreme heat and wild fires in places previously unknown areas.

- ✚ Several research studies have established that we are likely to face serious challenges in response in view of the alarming effects of global warming and climate change. Global warming will melt glaciers in Himalayan and Alpine ranges thereby flooding glacier fed rivers including Ganga, Brahmaputra, Kosi thereby causing not only floods along their course, including cities along sea, but also threaten the very existence of several islands. In the arena of climate change, the list of vulnerable nations is long, and growing. Tuvalu, Maldives, Kiribati, Vanuatu are looking for ways to evacuate their entire population because of salt water intrusion and rising sea levels. Sooner rather than later, island nations will have to seek refuge in other, higher lying countries. Their fate is a wake-up call to all of us.



✚ Alpine glaciers may shrink by about 75% by the turn of the century, a team of American and Canadian scientists has said in a research published in Nature Geosciences. But the melting of ice sheets in the Arctic regions of Canada and Russia, Alaska, northern Norway and Antarctica are likely to contribute most to the rise in global sea level of an estimated 12 cm by 2100 because of their large size, they said. “The surprising finding for me is that the 12 cm rise by 2100 is only from glacier melting. Our predictions probably present the lower bound (of sea level rise from ice melting),” Valentina Radic, geophysicist at the University of British Columbia, Vancouver, and one of the lead authors(published in Hindustan Times, Patna). As per some studies this will be followed by severe drought in Gangetic plain, the granary of India.



✚ **Arctic sea ice could vanish within 10 years as it is melting much faster than previously believed, thanks to global warming, warn scientists, claiming that the process is 50% faster than the current estimates. Preliminary results from the European Space Agency's CryoSat-2 probe indicate that 900 cubic kilometres of summer sea ice has disappeared from the Arctic Ocean over the past year. (Guardian London)**

✚ **Rising Sea Level threatens coastal areas**

"It is estimated that sea level rise by 3.5 to 34.6 inches between 1990 and 2100 would result in saline coastal groundwater, endangering wetlands and inundating valuable land and coastal communities. The most vulnerable stretches along the western Indian coast are Khambhat and Kutch in Gujarat, Mumbai and parts of the Konkan coast and south Kerala," says *India's Second National Communication to the United Nations Framework Convention on Climate Change* – was prepared by multi disciplinary teams and other stakeholders comprising more than 220 scientists belonging to over 120 institutions. Kerala's tranquil stretches of emerald green backwaters and Mumbai are among several locales on the western and eastern coasts facing threat from the rising sea level due to climate change. Deltas of the Ganga, Krishna, Godavari, Cauvery and Mahanadi on the east coast may also be threatened along with irrigated land and adjoining settlements.

- Some studies show that unless we act now, most Himalayan glaciers likely to melt by 2030.
- 1/3 population living along sea. Climate change may raise sea levels followed by flooding & even disappearance of some islands –Vanuatu, Mauritius.
- There will be a sharp rise in water levels of glacier-fed rivers. Coastal cities, including Mumbai, may be compelled to build dykes.
- Increased frequency and intensity of floods. Vulnerability of people in coastal, arid and semi-arid zones of the country.
- Decreased snow cover, drying of rivers in gangetic plain Ganges and Brahmaputra. Adverse affect on agriculture – draught.
- Less rain meant less hydroelectric power.

✚ Climate change will make monsoons unpredictable. As a result, rain-fed wheat cultivation in South Asia will suffer in a big way. Total cereal production will go down. The crop yield per hectare will be hit badly, causing food insecurity and loss of livelihood. The rising levels of the sea in the coastal areas will damage nursery areas for fisheries, causing coastal erosion and flooding. The Arctic regions, Sub-Saharan Africa, small islands and Asian mega deltas, including the Ganga and Brahmaputra, will be affected most. (rediff.com)

✚ **Global warming- 90% of land area faces heat wave**

Earth’s northern hemisphere, which comprises of 90% of the planet’s land, is likely to experience an extreme summer heat wave compared to a base period from 1951 to 1980, NASA scientists have warned. Researchers analyzed mean summer temperatures since 1951 and showed that the odds have increased in recent decades for what they define as “hot” (orange), “very hot” (red) and “extremely hot” (brown) summers. The study shows how the area experiencing “extremely hot” summers grows from nearly nonexistent during the base period to cover 12% of land in the northern hemisphere by 2011. Heat waves in Texas in 2011 fall into the new ‘extremely hot’ category. The statistics show that the recent bouts of extremely warm year, could be due summers, including the intense heat wave afflicting the United States Midwest this to global warming, James Hansen of Nasa’s Goddard Institute for Space Studies (GISS) has claimed. *“This summer people are seeing extreme heat and agricultural impacts,” Hansen said. (PTI)*



- ✦ Northern parts of the country and the Himalayan region will be the worst hit by climate change in India and warming will be greater over land than sea, according to a latest report. The research, conducted by Boston-based University of Massachusetts and Bangalore-based Ashoka Trust for Research in Ecology and Environment (ATREE) points that the average mean temperature during a 25-year period (1982-2006) in the Himalayas has increased by 1.50 degree Celsius."In the 2020s, the projected warming is of the order of 0.5-1.5 degree Celsius , by the 2050s, 3 degree celsius and by the 2080s, around 4 degree Celsius.
- ✦ Warmer ocean temperatures due to global warming may also increase the severity of droughts. The Indian Ocean and the western Pacific were exceptionally warm between 1998 and 2002, in part because of the overall warming trend in the world's oceans. In the same period, unusually persistent atmospheric flow patterns resulted in below normal precipitation, high temperatures, and drought conditions across wide swaths of North America, southern Europe, and southern and central Asia. A number of researchers have used climate models to examine the underlying causes of the recent drought. **In short, there is mounting evidence that global warming contributed to the vast extent and severity of the recent drought.**

6.3 POPULATION PRESSURE

In addition to global warming, rapid population growth particularly in urban areas of developing nations is posing serious problems for disaster management. This phenomenon results in construction of apartments, buildings that do not follow safety laws e.g. building bye laws. The unplanned growth of urban areas makes response much more difficult. Unsafe building practices in rapidly growing urban settlements constitute one of India's greatest challenges for disaster management. A major earthquake in any of India's densely and heavily populated cities in seismic zones would be catastrophic in terms of fatalities.

- **14/19 megacities in respect of population growth are in developing countries.**
- **It is expected that 3/5 population would be living in urban areas by 2025. Disaster response in urban setting is much more difficult.**

6.4 DEMOCRATISATION OF INFORMATION

Now a day, flow of information from site of incident/disaster is extremely fast. As such response has to be not only timely but adequate and appropriate too. This would require preparedness of highest order where no response agencies can afford to make mistakes.

- ✓ **Democratisation of information. Mobile phones many with camera increasing @ 15 million per month. Media about 200 news channels today.**
- ✓ **Reporters reach site as early as responder. Visual Instant coverage of the event. Information to public available in real time.**
- ✓ **Forces quick decision making,**
- ✓ **Leaves no chance for making mistakes,**
- ✓ **Forces accountability. Government has to act or seen to act.**

In view of above governments do realize that disaster response must have exclusive mandate. After all armed forces main function is defence of the country. Therefore the emphasis is now on creation of separate and exclusive response forces i.e NDRF, SDRF and capacity building of state police forces and auxiliary agencies such as CD, Home guards etc. The deployment of outside forces has a cost in terms of time lag which may be critical at many times. But the state police especially at the police station level being closest to society reach the site at the earliest point of time. More importantly people

too perceive policemen as their support in distress. Hence there is urgent need to strength the police station along side creation of specialized forces.