

## **Understanding the impact of Climate Change – a need of the hour**

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The mankind world over especially the scientific community is wondering as well as trying to correlate the occurrence and severity of Extreme Weather Events with Global Warming. The studies and research are aimed at establishing a direct link not only on the severity but also the frequency of such catastrophic events. It does become little complicated as the climate also exhibits trends of natural variability at various scales of Time and Space.

Broadly, the Extreme Weather Events that are being studied about are heat waves, frosts, flooding, droughts, storms, etc. A number of socio – economic factors such as human dwelling, technical and technological advancements, encroachment of forests, etc disturb the elements which compensate and could save the Extreme Weather Events from bringing a disaster. These factors too often may complicate placing an Extreme Weather Event as an occurrence out of natural variability or Global Warming.



Global Warming is likely to push the temperatures above the record set in 1998, while 2007 was the seventh warmest year globally, the 12 warmest years since 1850 occurred during 1995-2008. It has already been established that, the ever rising temperatures are nothing but unwanted contribution of human industrial activities. The CO<sub>2</sub> being released today is 30 % higher than prior to the start of the Industrial Revolution. There is seemingly no stopping for the global average temperature from rising as the mankind still has to depend heavily on fossil fuels for energy needs. The burning of fossil fuel is leading to discharge and increase in the concentration of CO<sub>2</sub>. In 2005, the CO<sub>2</sub> concentration was 379 ppm (parts per million) higher than ever. The people all over the world not only started feeling extended warmer periods but also recorded temperatures much more than ever in the past. However, what is certainly hidden and not really on mind is the severe consequences of this warming especially the increased frequency and severity of Extreme Weather Events.

Melting of polar ice caps and land - based glaciers is the first and the foremost direct consequence of Global Warming. The polar ice cap is melting at the rate of 1 % per year. The Arctic ice thickness has decreased 40 % since the 1960s. This melting polar ice cap, melting land or mountain – based glaciers which also include our Great Himalayas, contribute in raising the water level of oceans and rivers. Glaciers across Himalayas in fact are melting at an alarming rate and may disappear altogether within another 30 to 40 years. Observations summarized indicate that global sea level had already increased to 20cm during the 20th century. This rate was roughly ten times greater than the average rate of rise over the past 2000 years. It is estimated that if the warming continues in the same rate, the global sea level would rise by almost 0.1 metre by middle of the present century. The next in the series would be the loss of low lying areas, coastal lands, islands like Maldives and Lakshadweep. While, all the above predictions and submerging of coastal lands, islands and low lying lands may appear to be worry for future, India has reportedly already lost 31 sq km of the Sagar Islands in the Sunderbans, a world heritage site, as well as four other smaller islands, rendering a large number of families homeless. If the trend continues unchecked, another 15 % of the hospitable land will be under sea by 2020, displacing 30,000 families. By 2020, the disaster area will not be limited to far flung low lying areas like the Sunderbans, it will be much closer to us. Mumbai, Goa, Kochi, Chennai, Vizag, Puri, Kolkata, in fact all along the country's 7,600 km coastline where around 20 % of the population live cannot escape from its clutches. On one hand, Global Warming is not only causing increased evaporation of water from drier parts of the region but also resulting in severe droughts and increased frequency and severity of heat waves in these regions. On the other hand, the increased evaporation over wetlands and oceans are causing increased concentration of moisture in atmosphere over the regions. The amount of water vapour that air can hold increases rapidly with temperature. This large energy would give rise to formation of huge masses of convective Thunder Clouds over wetter regions and genesis of severe cyclonic storms over oceans

### **Extreme Weather Events witnessed in the recent past**

In 2003, the pre – monsoon heat wave hit India much earlier than usual and caused peak temperatures between 45 and 49°C taking a toll of around 1500 people and numerous cattle lives. Australia's



various regions were also hit by the longest drought recorded in history devastating crop yield and sparking forest fires. In the same year, Switzerland recorded its hottest June in the last 250 years while France experienced record breaking heat wave between 2 and 15 August 2003. All the French regions were affected by this heat wave resulting in around 15,000 deaths. Southern parts of France experienced 5 to 7<sup>o</sup> C warmer temperatures than the normal. The year 2003 also saw more than 550 tornadoes in the US in the month of May, a record far higher than previous monthly peak of 399 in June 1992. Many parts of China and East Asia also witnessed severe flooding resulting in thousands of deaths.

The Pre-Monsoon rainfall of 2004 was exceptionally high in the states of Kerala, Tamil Nadu and the Union territory of Lakshadweep. It was 79%, 145% and 278% above normal in Kerala, Tamil Nadu and Lakshadweep respectively. Though rainfall for the months of March and April were deficient (below 20%), it shot up in May; that too during the first few days. Rainfall was heavy during 1<sup>st</sup> to 10<sup>th</sup> May in these regions. The impact was noticed first in Tamil Nadu and then in Kerala and Lakshadweep..

Kerala rainfall during the week ending 12<sup>th</sup> May was 606% above normal, while it was 3106% above normal for Lakshadweep. In a single day, Aminidivi (Lakshadweep) recorded 117 cm of rainfall which is the unbroken record till date in India and eighth highest in the world. More than half of the rainfall was received during 1730 hrs of 5<sup>th</sup> to 0830 hrs of 6<sup>th</sup> May.

About 600 people were shifted to relief camps. 20 boats had sunk off kavarati – the capital island and 30 boats had sunk in and around the lagoon in Kadmat island alone. 9 persons were reported dead and 17 persons missing. Many houses were damaged fully or partly due to strong sea erosion in many Kerala coasts. Total loss was estimated to be over 30 Crores.

In the year 2004, while hurricanes which hit Florida and Alabama brought catastrophic damages to Southeast United States, hurricanes Katrina, Rita and Wilma of 2005 appeared to be the most severe of cyclonic storms ever witnessed, Katrina's devastating blow to New Orleans catching USA totally unaware. The unforgettable Mumbai deluge of 26 July 2005 recording 95cm of rain on 26 and 27 July 2005 was another extreme weather event claiming more than 1000 lives and property worth 1,700 crores. In a similar way, Barmer in Rajasthan was deluged with 75cm of rainfall in August 2006: five times the district's average annual rainfall and subsequent flooding submerging houses in the district up to 15 feet. In 2006 itself, on the other hand Monsoon - friendly Assam was reeling under draught with devastated Kharif crop.

### **Visible Climate Changes**

The United Arab Emirates on 31 December 2004 woke up to see the desert country's first ever snow when they found the mountains in the Ras Al Khaimah blanketed with ice. For the previous three days, the country had been experiencing above average rains and unusual cold spell . The temperatures dropped to as low as minus 5<sup>o</sup>C.



Grass has established in Antarctica for the first time, showing the continent is warming. Scientists have reported that broad areas of grass are now forming turf where there were once ice-sheets and glaciers. Turfs have previously grown on patches of Antarctica in summer, but the scientists have now observed bigger areas surviving winter and spreading in the summer months. Many species of wildlife including penguins, seals, cold-water fish, giant sea spiders, etc are at serious risk from such rapid changes. Measurements over the past three decades show that Antarctica is among the fastest - warming places on the earth, with winter temperatures already 5°C higher than in seventies. Climate change in Antarctica is a warning of the global catastrophic changes that will follow. In Jan 2007 itself temperatures across northern India soared as high as 35°C. Much of the Gangetic plain has been already transformed into one vast dust bowl.

First Hurricane ever recorded in South Atlantic battered Southern Brazil Coast indicating the climate change is likely to produce shifting of storm tracks and even some areas rarely or never visited by hurricanes may become vulnerable to such severe storms.

Deforestation coupled with erratic and decreased precipitation levels are depleting the forest cover seriously endangering the wildlife. Upto 50 % of total bio-diversity of India is at risk due to climate change. The country's grasslands too are declining rapidly.

Warmer Ocean temperatures are leading to bleaching and destroying vast traces of India's coral reefs. Ocean acidification would lead to shell dissolution, severely impacting marine life and fisheries. The rich Mangroves of India are already getting wiped out due to rising sea levels.

Even migratory birds as well as fishes and whales are suffering from Global Warming. A warmer climate is disrupting the biological clock of migratory species including Bats, Dolphins, Antelopes and Turtles. These are the most visible warning signs or indicators signaling the dramatic changes in our Eco-systems caused in part by Climate change. Many creatures are mistiming their migrations or failing to bother as changes between seasons become less clear.

Climate change has important health-related consequences. These consequences including the emergence and re-emergence of infectious diseases, heat stress, and respiratory illness demonstrates how global climate change interacts with the complex and rapidly changing socio-political environment and consequently determine the security of individuals, communities and the society. Effects are observed in both chronic and acute disease spanning both developing and industrialized countries.

The changing frequency of extreme climatic events has direct effect on human mortality and morbidity, such as respiratory disease and cardiovascular disease. In addition , epidemiologic studies already showed that people with some prevalent disease in industrialized countries, such as asthma, chronic bronchitis, allergy problem and heart condition suffered more from the impact of climate mediated air pollution. Global warming with an accompanying rise in floods and drought is fueling the spread of epidemics in areas unprepared for the disease. Mosquitoes, ticks, mice and other disease carriers are surviving warmer



winters and expanding their range, bringing health treats with them. Because of global warming, the dengue viruses have evolved to risk the relatively colder climate of Asia causing a potential disaster in the form of an outbreak of dengue fever.

## **Conclusion**

The climate scientists may seem to be divided that whether Extreme Weather Events and their increased frequency / severity is manifestation of climate changing out of natural variability or due to Global warming. However, there is definitely a trend being observed all over the world of increasing cases of droughts, severe than ever heat waves in drier regions, increased precipitation over wetter regions and more intense than ever cyclonic storms forming over oceans that hit the continents bringing about unprecedented disasters. The scientific community in big manner has undertaken numerous studies and research trying to establish a cause and effect relationship between the Global Warming and occurrence and severity of the Extreme Weather Events. Although, the results will definitely come sooner than later, a complete change in the Global Climate is seemingly concerning every soul on the planet. In addition, the ongoing Global Warming is definitely making it difficult day by day for bio-diversity, marine eco-system, wild life and last but not the least, human beings to survive through the present into the future.



“I would freely admit that on [global warming] we have crossed the boundary from news reporting to advocacy.”

- ***Charles Alexander***, *Time Magazine Science Editor*