

# Climate Change Phenomena: Is Human in Danger?

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**ABSTRACT:** Climate change is emerging as one of the most controversial environmental issues of the twenty-first century. Environmental changes as a result of climate change are likely to be accelerated; climate extremes and disasters will occur more frequently than expected. Climate change is already beginning to transform life worldwide including Malaysia. This adverse change poses serious risks and disruption to the functioning of a community or a society causes widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. For that reason, concern for the global climate change gained strongly international attention and action worldwide.

**Keywords:** Climate change, warming trends, human activity, climate extremes, disasters

## Introduction

Climate change is a change in the statistical distribution of weather over periods of time that ranges from decades to millions of years. Climate change becomes one of the most controversial environmental issues of the twenty-first century. Some scientists blame the warming of earth as a result of accumulated carbon dioxide and other heat-trapping gases being poured into atmosphere emitted by power plants, vehicles, furnaces and other fossil fuel-burning industrial and residential sources. Many scientists have also warned that environmental changes following the climate change are likely to be accelerated and climate extremes and disasters will occur more frequently. New records on extreme conditions and observations of these adverse phenomena around the world are consistent with scientist's claim pertaining to climate change. For examples, in 2006 more than 17 million people in Djibouti, Ethiopia, Kenya and Somalia faced serious food shortages due to the consecutive years of droughts; in 2004, heavy rains and floods in India, Nepal and Bangladesh have caused 1800 deaths and millions stranded. In 2003, about 35000 deaths were caused by extreme heat in France, Italy, Netherlands, Portugal, Spain and the UK.

In 1998 the failure of the monsoon rains contributed to one of the worst fire out-breaks ever recorded in

Indonesia with thick smokes traveled to thousands of miles and affected millions of people. In early 2009, horrible bushfires in the United States were reported; Drought and flood in Australia in early 2009, and many more are concrete manifestations of climate extremes (Haliza 2010). The United Nation's network of climate scientists – the Intergovernmental Panel on Climate Change (IPCC) has long predicted that rising global temperature would produce more frequent and intense heat waves and more intense rainfalls. In 2007, IPCC has predicted that these trends (more frequent and more intense extreme weather events) have already been observed since 1950 due to global warming.

There is strong evidence that extreme weather events – such as hurricanes, floods, droughts and heat waves – are increasing (and becoming more severe and frequent) because of climate change. According to the United Nations Environment Programme (UNEP), the economic costs of extreme weather events are growing rapidly. Since 1960, the number of global weather disasters has increase as many as four folds, real economic losses as much as seven folds. Real losses are estimated from US\$ 3.9 billion per year in the 1950's to a staggering US\$40 billion per year in the 1990s. The cumulative number of people affected by disasters rose to 2 billion in the 1990s, up from 740 million in the 1970s. Rising sea levels, melting glaciers, massive flooding, decline of agricultural yields, an increase in risk of species extinction and biodiversity loss - these are the immediate impacts if humans failed to stop climate change (<http://www.greenpeace.org/seasia/en/asia-energy-revolution/climate-change>).

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## Causes of Climate Change

There are many factors identified to cause and influence climate change. These factors could be global, national and localized factors. Global warming and open burning (haze) are some of the good examples of global factor that are trans-border in nature. On the other hand, industrialization, clearing of land for agriculture, and encroachment of fragile ecosystems are some examples of national and localized causal factors (Haliza 2008).

Human activities are the main factors directly contribute to accelerated climate change as stated by IPCC "*....there is new and stronger evidence that the observed warming over the last 50 years is attributable to human activities*". The main greenhouse gas from human activity is carbon-dioxide, which is released mainly as a result of combustion of fossil fuels and in the conversion of forests to other uses. Excess carbon dioxide increases "greenhouse effect" on our planet by trapping heat in the atmosphere and causing global temperature increment. Atmospheric concentrations of carbon dioxide have increased by 31% since 1750 with current global concentrations averaged about 370 ppmv (part per million by volume). The records since 1950s show that atmospheric carbon dioxide has been increasing at about 0.5% per year (Albritton and Meira 2001). This creates catastrophic impacts on the planet's ecosystems hits hardly on the developing countries. Apart from carbon dioxide, methane from agriculture and waste dumps and some industrial processes (Frank et al. 2009) is also an example of greenhouse gases. The atmospheric concentration of methane has increased 151% since 1750. Measurements between the early 1980s and 2000 showed a 10% increase in atmospheric methane to 1850 ppb (parts per billion) (Albritton and Meira 2001). Nitrous oxide and ozone are other greenhouse gases. Nitrous oxide is emitted by both natural and anthropogenic sources, and can be removed from the atmosphere by chemical reactions. The atmospheric concentration of nitrous oxide has increased steadily since the Industrial Revolution and is now about 16% larger than in 1750. Ozone is not emitted directly but formed from photochemical processes involving both natural and anthropogenic species. Based on limited observations, global tropospheric ozone has increased about 35% since preindustrial times (Albritton and Meira 2001).

## Catastrophes Everywhere?

Climate change is more than just a warming trend. According to the IPCC's Third Assessment Report, increasing temperatures will lead to changes in many aspects of weather including wind patterns, the amount and type of precipitation, and the increase

frequency of severe weather. Such climate change could have far-reaching and with unpredictable environmental, social and economic consequences.

Worldwide temperature shows that January-June was the hottest first half of a year in 150 years of global climate record keeping. 17 nations have recorded all-time-high temperature in 2010, more than in any other year with a few catastrophes due to climate change and global warming being recorded worldwide in 2010. The 2007 IPCC report predicted a doubling of disastrous droughts in Russia this century and cited studies foreseeing catastrophic fires during dry years. The report predicted that Russia would suffer large crop losses and this is observed in the hottest summer ever recorded with Moscow temperatures topping 38°C for the first time in 2010. The drought has also sparked hundreds of wild-fires in forest and dried peat bogs, blanketing Russia with toxic smog leading to Russia capital's death rate reaching 700 people a day at one point. As a result of the drought also, wheat harvest is reduced by more than one-third.

Climate change leads to increasing frequency and intensity of floods especially in Asia where floods are the most frequent and devastating type of disaster (Dutta and Herath 2004). The average of 10 flood events recorded annually in the 1970s hit 30 in the 1990s but reaching 50 events per year in early 2000s. More frequent floods have decreased crop productivity when the planted area reduced. As consequences, it reduced of harvesting outcome and implied severe damage to agricultural and other infrastructure (Frank et al. 2009).

The 2007 IPCC report predicted rains to grow heavier for 40 years over north Pakistan and predicted greater flooding this century in south Asia's monsoon region. In 2010, the heaviest monsoon rains on record was 300 mm in one 36-hour period have sent rivers rampaging over huge swaths of countryside at Pakistan. The disaster has left 14 million Pakistanis homeless and killed 1,500: - the worst natural disaster in nation history of Pakistan.

The IPCC reported in 2007 that rains had increased in north-west China by 33% since 1961 and floods nationwide had increased seven folds since the 1950s, and more frequent flooding is predicted to hit this region. In 2010, China witnessed its worst floods in decades especially in province of Gansu with floods and landslides in early August 2010 killing at least 1,117 people and left more than 600 missing, feared swept away or buried beneath mud and debris.

Iowa State in US was soaked by its wettest 36-month period in 127 years record-keeping. Flooding occurred as a result from three days of raining; forced hundreds evacuated and claimed one victim.

The international climate panel predicted that precipitation will increase throughout the nation in this century except for the Southwest.

Another example of climate change was observed in early August 2010 when researchers spotted a 260 sq km chunk of ice calved off from the great Petermann Glacier in Greenland's far north-west. It was the most massive ice island to break away in the Arctic in a half-century of observation. The huge iceberg appeared just five months after an international scientific team published a report regarding ice loss in the Greenland ice sheet being expanded up to its north-west coast from the south. Satellite data also show the ocean area covered by ice in July 2010 was the second-lowest ever recorded for July. The melting of land ice into the oceans is causing about 60% of the accelerating rise in sea levels worldwide with thermal expansion from warming waters causing the rest. The World Meteorological Organisation (WMO) Climate Research Programme predicted that seas are rising by 3.4 mm per decade, about twice the 20<sup>th</sup> century's average. Projected future impacts of climate change in the region are staggering. A 40 cm sea level rise by 2080 could displace as many as 55 million people in South Asia, and 21 million people in Southeast Asia (IPCC 2001). A World Bank study (Dasgupta et al. 2007) on the impacts of sea level rise shows that a 1 metre sea level rise could displace 60 million people in many of the 84 coastal developing countries. In Vietnam alone, 11 per cent of the population will be affected.

Agriculture is projected to be heavily affected by extreme weather events related to climate change. Global wheat markets reeling from Russia droughts, thousands of cattle killed by heat in Kansas, United States and countless crop acres wiped out by floods in Pakistan are glimpses of what can be expected as the world struggles to battle climate change. Furthermore, climate change could reduce grain production in the G20 countries by up to 8.7% by 2020 if no significant action is taken to adapt the extreme weather and high temperatures. In India and other countries that rely more on rice, a real concern is that high temperatures will lead to severe yield losses (The Star 24 August 2010).

Together with higher average temperatures and more extremes spikes in temperature during heatwaves, these changes are likely to have strong adverse impacts on settlements, economic activity and health. Many low-lying areas will be exposed to flooding, and freshwater will become scarcer in other places. The suitability of land for agriculture will change, depending on the changes in rainfall and temperature and this could affect food security (Frank et al. 2009). For example, the droughts in Indonesia in 1994 and 1997 were considered the worst of the twentieth century and have led to a significant fall in national

rice production. Productivity declined on almost 500 million hectares of agricultural land, and harvest failed on 150 million hectares in late nineties (Sutardi 2006).

Climate change also poses serious risks to human health. According to the World Health Organization, 150,000 people are dying annually as a result of climate change. Note that higher temperatures bring about greater heat stress but also extend the spread of infectious and vector-borne diseases like malaria and dengue fever. As the world warms, malaria and dengue transmitting mosquitoes can survive at higher altitudes as well as having more watery areas in which to breed. The incubation periods of the vector-transmittable diseases are becoming shorter with higher temperature, and mutation of the viruses may occur. The 1997-1998 *El Nino* was a good example of the impacts of a warming world on humans. Malaria has spread to high elevations, and for the first time, it was detected at altitudes above 2,000 metres in the highlands of Irian Jaya (Epstein et al. 1998). At the same time, dengue fever spreading faster and killing more people than in the past.

Malaysia is projected to be hotter with a temperature rise of up to 1.5°C by 2050. More rainfall extremes, i.e intense rainfall in the wet period and a lack of rainfall in the dry period are expected. Our sea level is also expected to rise from 15 to 95 centimeters over a hundred-year period, threatening the increasing urban population in our coastal areas. In fact, the rapidly changing weather patterns and climate variability in the region and in the country evidenced by recent major flood events in December 2006 and January 2007 (Haliza 2008) which badly affected the southern states of Peninsular Malaysia with lost of RM80 milion. Recently, the same casualties occurred in the same region of Peninsular Malaysia affected 54,637 victims and isolated those areas such as Segamat, Johor for not being transposed during the period.

### **Global Efforts on Climate Change**

Concerning of the atmosphere and global climate over the next 20 years has gained international attention and action as part of efforts to implement the 1972 decisions. In 1979, the UNEP Governing Council requested Earth Watch programme to monitor and evaluate the long-range transport of air pollutants, and the first international instrument on climate—the Convention on Long-Range Transboundary Air Pollution—was then adopted. UNEP took it to another level in 1980, when its Governing Council expressed concern at the damage to the ozone layer and recommended measures to limit the production and use of chlorofluorocarbons F-11 and F-12. This has led to the negotiation and

adoption in 1985 of the Vienna Convention for the Protection of the Ozone Layer and the conclusion of a Protocol to the 1979 Transboundary Air Pollution Convention, which aimed at reducing sulphur emissions by 30%. The phenomena of acid rain in Europe and North America, has also resulted in various programmes by UNEP and WMO for keeping it in check.

Efforts to raise awareness of the effects of climate changes were further advanced at the second World Climate Conference (29 October to 7 November 1990). In its Ministerial Declaration, the Conference stated that climate change was a global problem of unique character for which a global response was required, and therefore negotiations to begin on a framework convention without further delay was started.

International action on the environment, including climate change, had urged the United Nations to organize Conference on Environment and Development (UNCED) held in 1992 in Rio de Janeiro, Brazil. As a first global political response to the threat of climate change, UNCED agreed upon the United Nations Framework Convention on Climate Change (UNFCCC). The Earth Summit, as it is also known, set a new framework for seeking international agreements to protect the integrity of the global environment in its Rio Declaration and Agenda 21, which reflected a global consensus on development and environmental cooperation.

Chapter 9 of Agenda 21 dealt with the protection of the atmosphere, establishing the link between science, sustainable development, energy development and consumption, transportation, industrial development, stratospheric ozone depletion and trans-boundary atmospheric pollution. The most significant event during the Conference was the opening for signature of the United Nations Framework Convention on Climate Change (UNFCCC). 158 States had signed it at the end of 1992. As the most important international action thus far on climate change, the Convention was to stabilize atmospheric concentrations of "greenhouse gases" at a level that would prevent dangerous anthropogenic interference with the climate system. It entered into force in 1994, and in March 1995, the first Conference of the Parties to the Convention adopted the Berlin Mandate, launching talks on a protocol or other legal instrument containing stronger commitments for developed countries and those in transition. The cornerstone of the climate change action was, therefore, the adoption in Japan in December 1997 of the Kyoto Protocol to the UNFCCC, the most influential climate change action so far taken. It aimed to reduce the industrialized countries' overall emissions of carbon dioxide and other greenhouse gases by at least 5% below the 1990 levels in the

commitment period of 2008 to 2012. The Protocol, which opened for signature in March 1998, came into force on 16 February 2005 - seven years after it was negotiated by over 160 nations.

At the same time, the IPCC has produced a series of comprehensive Assessment Reports on the state of understanding of the causes of climate change, its potential impacts and options for response strategies. IPCC suggests that in order to prevent a 2°C rise (i.e. the widely accepted threshold for unacceptable and unpredictable change), global emissions growth would need to peak by 2015 and then decline fairly sharply to reach the 50% cut required by 2050.

## **Conclusion**

Climate change has already begun to transform life worldwide including Malaysia as evident by the adverse phenomena. Seasons are gradually shifting, temperatures are climbing and sea levels are rising. Climate change does not happen by default but is a man-made problem. It is undeniable that very bit of coal, every litre of oil or gas that humans burn are adding to the load of green house gases in the atmosphere that engulf the planet like an ever thicker blanket, trapping heat, smothering people and the nature (Haliza 2008).

A disaster is a serious disruption to the functioning of a community or a society causes widespread human, material, economic or environmental losses which exceed the ability of the affected community or society to cope using its own resources. Around the world, stresses on the climate system are already inducing disaster on Earth's and human. Climatic conditions affect human well-being both directly, through the physical effects of climatic extremes, and indirectly, through influences on the levels of pollution in the air, on the agricultural, marine and freshwater systems that provide food and water, and on the vectors and pathogens that cause infectious diseases.

Since it is widely accepted that humans are influencing global climate, decision makers are now focusing on the type and timing of actions to limit the rate of change. Attention is shifting to the balance between the possible impacts of climate change, and the economics costs, technological advances and societal adaptations that are necessary for mitigation. Furthermore, such top-down approaches should be widely supplemented by adaptation at the community and individual levels. These would include local environmental management, urban design, public education, neighbourhood alert and assistance scheme, and individual behavioural changes.

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