

Adverse Impacts of Changing Climatic Conditions on the Environment due to increasing Pollution

Piyush Gupta

Assistant Professor, Department of Chemistry, SRM University, NCR Campus, Modinagar, India

Email: piyushg.1977@gmail.com

Manuscript details:	ABSTRACT
<p>Received: 27.07.2015 Revised: 20.10.2015 Accepted: 26.11.2015 Published : 30.12.2015</p> <p>Editor: Dr. Arvind Chavhan</p> <p>Cite this article as: Gupta Piyush (2015) Adverse Impacts of Changing Climatic Conditions on the Environment due to increasing Pollution. <i>Int. J. of Life Sciences</i>, 3(4): 403-408</p> <p>Copyright: © 2015 Author(s), This is an open access article under the terms of the Creative Commons Attribution- Non-Commercial - No Derivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.</p>	<p>This paper deals with the different perceptions about global environmental crisis due to the over burden of pollution. Environmental problems are not as bad as they are made out to be. The earth is a self-evolving and self-regulating living system and it will survive (Gaia Theory). The common issues associated with the earth's environment are Environmental pollution, Water scarcity, Contamination of food, Waste management, Global Climate Change, Land degradation, Desertification (80% of forests are destroyed), Acid Rain, Ozone Layer Depletion, Soil Erosion, Loss of Biodiversity and Mass extinction (Most species are endangered and 50% may go extinct by 2025) etc.</p> <p>Keywords: Environment, Climatic change, Pollution, Global Warming, Pollutants, Waste, Health</p> <p>INTRODUCTION</p> <p>Weather and climate play a significant role in people's health. Changes in climate affect the average weather conditions that we are accustomed to. Warmer average temperatures will likely lead to hotter days and more frequent and longer heat waves. This could increase the number of heat-related illnesses and deaths. Increases in the frequency or severity of extreme weather events such as storms could increase the risk of dangerous flooding, high winds, and other direct threats to people and property. Warmer temperatures could increase the concentrations of unhealthy air and water pollutants. Changes in temperature, precipitation patterns and extreme events could enhance the spread of some diseases (USGCRP, 2009). Deforestation, landslides, soil erosion, floods, droughts, illegal constructions, more exploitation, mountaineering, garbage, heavy movement, resource depletion, volcanic eruptions and melting of glaciers are leading to utmost</p>

severe challenges that we can face while surviving on the earth (Mckibben, 2010). Most of the world cities lack adequate water and sanitation. 80 countries of the world suffer from serious water shortages, one fourth of the population have no access to safe drinking water, half of the population lacks sanitation facilities. In India there is no drinking water in more than 60,000 villages. The per capita availability of freshwater is declining globally. Contaminated water remains the greatest single environmental cause of human sickness and death. Diarrhoea kills one million children per year 45 million affected by bad water per year.

The decline of quantity and quality of surface and groundwater is impacting aquatic ecosystems and their functionality. By 2025, approx 1.8 billion people will be living in countries or regions with absolute water scarcity, and two-thirds of the people in the world may face water stress. Aquatic ecosystems continue to be heavily exploited, putting at risk sustainability of food supplies and biodiversity. Global marine and freshwater fish catches show large-scale declines, caused mostly by persistent overfishing. There will be no fish to catch, by 2050. The average population density in coastal areas is now twice as high as the global average. More than 100 million people live in areas no more than one metre above mean sea-level. 21 of the world's 33 mega-cities are located in coastal areas, with most of them in developing countries. the loss of key ecosystems such as wetlands, mangroves and coral reefs. Sea level rise due to climate change, are increasing the risk of flooding and reducing coastal protection from storms, tsunamis and erosion. Increase in urban population from 732 million in 1950 to 3.2 billion in 2006. Half the world population lives in cities (from 2008). Asia and Africa to double their urban populations to roughly 3.4 billion by 2030 (Hunter and Cohen, 2011).

Eight of the world's 10 most populous cities sit on earthquake faults. 6 out of 10 are vulnerable to storm surges. Urban air pollution kills an

estimated 800,000 people each year, roughly half of them in China. More than 50 countries have lost between 90 and 100 % of their forests. Tropical forests are being cleared at the rate of one hectare every second. In whole world 24% mammals, 12% birds, 25% reptiles, 30% fish are threatened or endangered. 100-1000 times faster than natural process of extinction. In India more than 10% flora and fauna are threatened, many on verge of extinction.

IMPACTS FROM HEAT WAVES

Heat waves can lead to heat stroke and dehydration, and are the most common cause of weather-related deaths. Excessive heat is more likely to impact populations in northern latitudes where people are less prepared to cope with excessive temperatures. Young children, older adults, people with medical conditions, and the poor are more vulnerable than others to heat-related illness. The "urban heat island" refers to the fact that the local temperature in urban areas is a few degrees higher than the surrounding area. Climate change will likely lead to more frequent, more severe, and longer heat waves in the summer (see 100-degree-days figure), as well as less severe cold spells in the winter. A recent assessment of the science suggests that increases in heat-related deaths due to climate change would outweigh decreases in deaths from cold-snaps (USGCRP, 2009). Urban areas are typically warmer than their rural surroundings. This climate change would increase the demand for electricity in the summer to run air conditioning, which in turn would increase air pollution and greenhouse gas emissions from power plants. Heat waves are also often accompanied by periods of stagnant air, leading to increase in air pollution and the associated health effects.

IMPACTS FROM REDUCED AIR QUALITY

At least one billion people in the world breathe unhealthy air. More than 2 million people globally die prematurely every year due to outdoor and indoor air pollution. Although air pollution has

decreased in some countries across the world, but some unwanted emissions are increasing. Indoor air pollution due to the improper burning of solid biomass fuels imposes an enormous health burden. Indian cities are the most polluted in the world. Despite significant improvements in air quality since the 1970s, as of today millions of people lived in counties that did not meet national air quality standards (EPA, 2010).

Increases in Ozone

Ground-level ozone is formed when certain air pollutants, such as carbon monoxide, oxides of nitrogen (also called NO_x), and volatile organic compounds, are exposed to each other in sunlight. Ground-level ozone is one of the pollutants in smog. If emissions of air pollutants remain fixed at today's levels until 2050, warming from climate change alone could increase the number of Red Ozone Alert Days (when the air is unhealthy for everyone) by 60-70% (CCSP, 2008). Scientists project that warmer temperatures from climate change will increase the frequency of days with unhealthy levels of ground-level ozone, a harmful air pollutant, and a component in smog. Smog decreases visibility and can be harmful to human health. Ground-level ozone can damage lung tissue and can reduce lung function and inflame airways. This can increase respiratory symptoms and aggravate asthma or other lung diseases. It is especially harmful to children, older adults, outdoor workers, and those with asthma and other chronic lung diseases (NRC, 2010). Ozone exposure also has been associated with increased susceptibility to respiratory infections, medication use, doctor visits, and emergency department visits and hospital admissions for individuals with lung disease. Some studies suggest that ozone may increase the risk of premature mortality, and possibly even the development of asthma (EPA, 2006).

Changes in Fine Particulate Matter

Sources of fine particle pollution include power plants, gasoline and diesel engines, wood combustion, high-temperature industrial processes such as smelters and steel mills, and

forest fires. Due to the variety of sources and components of fine particulate matter, scientists do not yet know whether climate change will increase or decrease particulate matter concentrations across the world (EPA, 2009). A lot of particulate matter is cleaned from the air by rainfall, so increases in precipitation could have a beneficial effect. At the same time, other climate-related changes in stagnant air episodes, wind patterns, emissions from vegetation and the chemistry of atmospheric pollutants will likely affect particulate matter levels. Climate change will also affect particulates through changes in wildfires, which are expected to become more frequent and intense in a warmer climate (NRC, 2010).

Particulate matter is the term for a category of extremely small particles and liquid droplets suspended in the atmosphere. Fine particles include particles smaller than 2.5 micrometers (about one ten-thousandth of an inch). These particles may be emitted directly or formed in the atmosphere from chemical reactions of gases such as sulfur dioxide, nitrogen dioxide, and volatile organic compounds. Inhaling fine particles can lead to a broad range of adverse health effects, including premature mortality, aggravation of cardiovascular and respiratory disease, development of chronic lung disease, exacerbation of asthma, and decreased lung function growth in children (EPA, 2009).

Changes in Allergens

Climate change may affect allergies and respiratory health. The spring pollen season is already occurring earlier in the world due to climate change. The length of the season may also have increased. In addition, climate change may facilitate the spread of ragweed, an invasive plant with very allergenic pollen. Tests on ragweed show that increasing carbon dioxide concentrations and temperatures would increase the amount and timing of ragweed pollen production (Confalonieri et al., 2007). A recent interim assessment finds that:

- Climate change may increase surface-level ozone concentrations in areas where pollution levels are already high.
- Management of air quality would be more difficult.
- Policy makers should consider the potential impacts of climate change on air quality when making air quality management decisions.

Ozone Hole

The "hole" in the stratospheric ozone layer over the Antarctic is now the largest ever. Due to decreased emissions of ozone depleting substances and assuming full Montreal Protocol compliance, the ozone layer is expected to recover, but not until 2060 (or even later).

Global Warming

Earth's surface is continuously warming up due to Global warming. The Himalayan glaciers are receding in India. The Arctic is melting. Antarctic ice shelves are breaking off. Clouds are bursting. The weather is becoming unpredictable. This global warming is leading to floods, earthquakes, land sliding volcanic eruptions, etc. The frequency of these natural disasters and the number of people affected are increasing. Sea level rise is threatening the existence of small islands (Lawson, 2008; Weart, 2003 and Bell and Strieber, 1999).

Interconnected Things

Increasing population, urbanisation, unscientific developmental activities, food prices, increasing disparities, marginalisation of the poor, farmers in distress, increasing militarisation, terrorism, large scale corruption, frauds, financial crisis, economic ups and downs are another factors which should be controlled (Miller Jr. , 2008).

Natural Disasters

Nepal earthquake also known as the Gorkha earthquake killed more than 8,800 people and injured more than 23,000 in April 2015. It was the worst natural disaster to strike Nepal since the 1934 Nepal-Bihar earthquake. In June 2013, a multi-day cloudburst centered on the North

Indian state of Uttarakhand caused devastating floods and landslides becoming the country's worst natural disaster since the 2004 tsunami. From 14 to 17 June 2013, the Indian state of Uttarakhand and adjoining areas received heavy rainfall, which was about 375% more than the benchmark rainfall during a normal monsoon. This caused the melting of Chorabari Glacier at the height of 3800 metres, and eruption of the Mandakini River which led to heavy floods near Gobindghat, Kedar Dome, Rudraprayag district, Uttarakhand, Himachal Pradesh and Western Nepal, and acute rainfall in other nearby regions of Delhi, Haryana, Uttar Pradesh and some parts of Tibet. In Cyclone Sidr, B'desh, 3000 were dead and 500,000 homes were gone. In Cyclone Nargis, Myanmar, 8000 were dead, Worst drought in China, drying rivers, Quake in China, 70,000 were dead and 4.8 million became homeless. California wildfires, 2000 sq. km, 500,000 evacuated. Arctic ice lowest since 1970, Northwest Passage open, Greenland ice melt maximum since 50 years, global glacier melt doubled. Amazon deforestation is increasing. An Ocean dead zone doubles every decade. SE Asia Ocean running out of fish, threat to livelihood of people. China emits 14% more than US. Russian tanker spill 2000 tons near Black Sea. China birth defects 40% up since 2001, due to pollution.

IMPACTS FROM EXTREME WEATHER EVENTS

The frequency and intensity of extreme precipitation events is projected to increase in some locations, as is the severity (wind speeds and rain) of tropical storms. These extreme weather events could cause injuries and, in some cases, death. As with heat waves, the people most at risk include young children, older adults, people with medical conditions, and the poor. Extreme events can also indirectly threaten human health in a following number of ways:

- Reduce the availability of fresh food and water.
- Interrupt communication, utility, and health care services.
- Contribute to carbon monoxide poisoning from portable electric generators used during and after storms.

- Increase stomach and intestinal illness among evacuees.
- Contribute to mental health impacts such as depression and post-traumatic stress disorder (PTSD) (USGCRP, 2009).

IMPACTS FROM CLIMATE-SENSITIVE DISEASES

Changes in climate may enhance the spread of some diseases. Disease-causing agents, called pathogens, can be transmitted through food, water, and animals such as deer, birds, mice, and insects (USGCRP, 2009). Climate change could affect all of these transmitters.

Food-borne Diseases

Higher air temperatures can increase cases of salmonella and other bacteria-related food poisoning because bacteria grow more rapidly in warm environments. These diseases can cause gastrointestinal distress and, in severe cases, death. Flooding and heavy rainfall can cause overflows from sewage treatment plants into fresh water sources. Overflows could contaminate certain food crops with pathogen-containing faeces.

Water-borne Diseases

Heavy rainfall or flooding can increase water-borne parasites such as *Cryptosporidium* and *Giardia* that are sometimes found in drinking water. These parasites can cause gastrointestinal distress and in severe cases, death. Heavy rainfall events cause stormwater runoff that may contaminate water bodies used for recreation (such as lakes and beaches) with other bacteria. The most common illness contracted from contamination at beaches is gastroenteritis, an inflammation of the stomach and the intestines that can cause symptoms such as vomiting, headaches, and fever. Other minor illnesses include ear, eye, nose, and throat infections.

Animal-borne Diseases

Mosquitoes favor warm, wet climates and can spread diseases such as West Nile virus. The geographic range of ticks that carry Lyme disease

is limited by temperature. As air temperatures rise, the range of these ticks is likely to continue to expand northward. Typical symptoms of Lyme disease include fever, headache, fatigue, and a characteristic skin rash. The spread of climate-sensitive diseases will depend on both climatic and non-climatic factors. Many developed countries have public health infrastructure and programs to monitor, manage, and prevent the spread of many diseases. The risks for climate-sensitive diseases can be much higher in poorer countries that have less capacity to prevent and treat illness than developed countries.

OTHER HEALTH LINKAGES

Other linkages exist between climate change and human health. For example, changes in temperature and precipitation, as well as droughts and floods, will likely affect agricultural yields and production. In some regions of the world, these impacts may compromise food security and threaten human health through malnutrition, the spread of infectious diseases, and food poisoning. The worst of these effects are projected to occur in developing countries, among vulnerable populations. Although the impacts of climate change have the potential to affect human around the world, there is a lot we can do to prepare for and adapt to these changes (Confalonieri et al., 2007).

CONCLUSION

The impacts of climate change on health will depend on many factors. These factors include the effectiveness of a community's public health and safety systems to address or prepare for the risk and the behavior, age, gender, and economic status of individuals affected. Impacts will likely vary by region, the sensitivity of populations, the extent and length of exposure to climate change impacts, and society's ability to adapt to change. In addition, the impacts of climate change on public health around the globe could have important consequences (Joseph, 2006; UNEP 2005).

Many of the expected health effects are likely to fall mostly on the poor, the very old, the very young, the disabled, and the uninsured. Climate change will likely result in regional differences in impacts, due not only to a regional pattern of changes in climate but also to regional variations in the distribution of sensitive populations and the ability of communities to adapt to climate changes. Adaptation should begin now, starting with public health infrastructure. Individuals, communities, and government agencies can take steps to moderate the impacts of climate change on human health.

Organizations and governments around the globe are taking up the issue in arms. The simplest global phenomenon is called the Environmental Impact Assessment (EIA). Environmental impact assessment is a planning tool and a formal process that is now generally regarded as an integral component of sound assessment and decision making which will determine the potential environmental, social and health effects of a proposed development. The EIA is thus one of the forerunning tools to study, identify and improve on past, present and future environment hazards.

REFERENCES

- Bell Art and Strieber Whitley (1999) *The Coming Global Superstorm*.
- CCSP (2008) *Analyses of the effects of global change on human health and welfare and human systems*. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. Gamble JL, Ebi KL, Sussman FG and Wilbanks TJ. U.S. Environmental Protection Agency, Washington, DC, USA.
- Confalonieri U, Menne B, Akhtar R, Ebi KL, Hauengue M, Kovats RS, Revich B and Woodward A (2007) Human health. In: *Climate Change: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Parry M, Canziani OF, Palutikof JP, van der Linden PJ and Hanson CE (eds.), Cambridge University Press, Cambridge, United Kingdom.
- EPA (2006) *Air Quality Criteria for Ozone and Related Photochemical Oxidants*. U.S. Environmental Protection Agency, Washington, DC, USA.
- EPA (2009) *Assessment of the Impacts of Global Change on Regional U.S. Air Quality: A Synthesis of Climate Change Impacts on Ground-Level Ozone (An Interim Report of the U.S. EPA Global Change Research Program)*. U.S. Environmental Protection Agency, Washington, DC, USA.
- EPA (2009) *Integrated Science Assessment for Particulate Matter: Final Report*. U.S. Environmental Protection Agency, Washington, DC, USA.
- EPA (2010) *Our Nation's Air: Status and Trends Through 2008*. U.S. Environmental Protection Agency. EPA-454/R-09-002.
- Hunter Lovins L and Cohen Boyd (2011) *Climate Capitalism: Capitalism in the Age of Climate Change*.
- Joseph Benny (2006) *Environmental Studies*, Tata McGraw-Hill Publishing Company Limited.
- Lawson Nigel (2008) *An Appeal to Reason: A Cool Look at Global Warming*.
- Mckibben Bill (2010) *Eaarth: Making a Life on a Tough New Planet*.
- Meadows Donella, Meadows Dennis and Randers Jorgen. *Beyond the Limits*, 1992.
- Miller Jr. GT (2008) *Environmental Science*, 11th Edition, Cengage Learning India Pvt. Ltd.
- NRC (2010) *Adapting to the Impacts of Climate Change*. National Research Council. The National Academies Press, Washington, DC, USA.
- NRC (2010) *Advancing the Science of Climate Change*. National Research Council. The National Academies Press, Washington, DC, USA, 2010.
- United Nations Environment Programme UNEP (2005) *Atlas of Our Changing Environment*.
- USGCRP (2009) *Global Climate Change Impacts in the United States*. Karl TR, Melillo JM and Peterson TC (eds.). United States Global Change Research Program. Cambridge University Press, New York, NY, USA, 2009.
- Weart Spencer R (2003) *The Discovery of Global Warming*.