

Climate change an existential dread”- a compendium study of climate change and its various effects

Prerna Sharma¹, Avnish Chauhan², Dr Amit Gupta³

¹Research scholar, Department of Environmental Science, Graphic Era Hill University,
Dehradun

²Associate Professor, Department of Environmental Science, Graphic Era Hill University,
Dehradun

³Dr Amit Gupta, Department of Life Sciences, Graphic Era Deemed to be University,
Dehradun

ABSTRACT

In spite of the fact that climate change has not shown mercy on any region of the world. Climate change is something which is more than global warming and has become one of the most challenging environmental issues the world facing nowadays. It is undoubtedly a biggest catastrophe that is hitting humankind very badly. Climate change has caused weather disruption which is as bad as pandemic disruption- occurred due to changes in land and sea temperatures. Wildfires, melting of glaciers and ice sheets, flash droughts, floods, heat waves and declining of biodiversity are some of the serious impacts discussed below. Emission of greenhouse gases has increased in which N₂O emissions are 300 times more deadly than CO₂ emissions, have grown. by humans up to 30 percent in between 1980-2016. Heat strokes caused due extreme high temperature causing vulnerability to mental illness in human beings. Freshwater biodiversity is declining due to climate change. Climate change is affecting lives of individuals', families and societies across the world.

Keywords: climate change, flash drought, biodiversity, global warming, global temperature rise, wildfires, human health, melting of glaciers.

INTRODUCTION

Last year was the most listed, most catastrophic and most defining year of our life time. Multiple crisis happened together has made the world more insecure. And upon all of those happening “climate change” is intensifying the distress. Global warming is aggravating the sustainability challenges as it might reduce the production in agriculture and will also result in some physical damages resulting from extreme weather events, floods, drought, sea – level rise etc. But in my view climate change is much more than global warming. The rise in average temperature of earth is a prime indicator of broader changes like drought, flooding, sea level rise, heat strokes, harmful impacts on food production and also infectious diseases.

Boundless discussions are happening throughout the world in all forms on the subject of global warming and climate change. Lot of incidents took place which shocked the nations like bush fires red hot extensive areas of Australia killed lot of population of both people and wildlife followed by destroying their homes. In January, Throngs of locusts has trenched upon the fields of Rajasthan and Gujarat, gulping crops and destroying farmer's livelihood. In May, super- cyclonic storm named Amphan hits the eastern sites of India and by ruining the lives and properties. Followed by it western side was also hit by another cyclone named Nisarga. And from then heavy rains, cyclonic activities and deep depressions in the oceans are seems to be noticed in the southern and eastern parts of India. According to the CSE's down to earth annual 2021, these all incidents took place due to climate change. The bush fires intensity was so high because of the increasing levels of heat, which dried the ground and turned into a powder keg.

“The most critical issue of our globalized world is what we did in response to covid-19 and what this mean from the next planetary emergency- climate change” (Sunita Narain, DTE). These weather disturbances are more bad than COVID-19 and caused by the increase temperature at land and sea which in turn adding the unpredictability of events globally.

Climate change and its various impacts

As a matter of fact, climate change describes how weather pattern changes over decades. It took place through human influences as well as naturally. Human's contribution towards climate change is there since the industrial revolution by emitting GHG's, pollutants, aerosols and changes in the land use patterns which leads to rise in global temperatures. The earth receives its energy through solar radiation. In atmosphere, various gases like water vapor, carbon dioxide, ozone, methane and nitrous oxide act like a glass shield of a greenhouse gases by trapping heat and warming the planet. These gases are known as greenhouse gases. The natural level of these gases has been increased in atmosphere due to human activities such as deforestation, fossil fuel burning, changing land use patterns etc. Due to this increasing level of greenhouse gases earth's surface and lower temperature are warming and leading to climate change.

We know that, GHG's plays a very major role in trapping the heat and maintaining earth's temperature for sustaining life. This whole phenomena is known as greenhouse effect and it is necessary to support lives on earth. And if this phenomenon will not take place our earth will become approximately 33°C cooler than it is today. In recent time, many anthropogenic activities have contributed to an increase in atmospheric GHG's in result of fossil fuel burning and deforestation. This rise in GHG's emission is the prime cause for global warming over the past decades. This global increase in temperature may have various impacts like storms, floods, forest fires, droughts, glaciers melting, rising sea level and declining in ice sheets.

Many changes has been observed since mid-1800, as global temperature increased up to 0.6 °C and impacted the entire world. For instance, during 20th century global mean sea level rose to 10-20 cm, Switzerland overall glaciers volume had decreased by two- thirds, about 40% of artic ice thickness decreased by late summer and early autumn.

Climate has a variable impacts on rainfall intensity. The increase in the frequency and severity is

being connected to climate change. “In fact, climate variability and changes are projected to play a significant role in the coming years” (Down To Earth, annual, 2021 pg.110). A lot of research studies have discovered that high intensity rainfall frequency will likely to increase due to the increase in surface temperatures caused due to climate change.” In India, surface temperature has mounted from 1.1°C to 1.4°C since 20th century” (DTE, annual 2021). Real-time data from the precise regions indicated rising levels of CO₂, methane, and nitrous oxide in 2020, according to the World Meteorological Organization's (WMO) tentative State of the Global Climate report. (Akshit Sangmolia, DTE annual 2021).

Global temperature rise

According to the nature report, the planet was warmer by 1.2°C from January to October in 2020. This was the second warmest year as per the historic data, and according to the EU's Copernicus climate change service, a non-profit organization 2020 has joined hottest year of record with 2016, as 2016 was the warmest year on record. August was the hottest month of 2020 with the average temperature of 19.8°C and December noted to be the coldest month of 2020 with average monthly temperature of 1.9°C.

As per The Emission Gap Report 2020, which is recently released by UNEP, states unambiguously that the human induced GHG's emission continue ceaseless. In 2019, the emission rate of GHG's reached to a new height of 59.1 gigatonnes of carbon dioxide (= GtCO₂ e) due to many factors including land use change. As a result, 2020 has recorded as the warmest year by causing lot of devastating activities like wildfires, droughts, floods and glacier melts. The global mean temperature may increase between 1.4°C to 5.8°C by 2100 reported by the intergovernmental panel on climate change (IPCC). “This unprecedented increase is expected to have severe impacts on the global hydrological system, ecosystem, sea level, crop production and related processes” (M Balasubramanian *et al.*, 2012). “The impact would be particularly severe in the tropical areas, which mainly consists of developing countries, including India” (Jayant *et al.*, 2006).

Forest fires

Forest cover about one third part of our earth surface and home to millions of terrestrial species. It is a valuable wealth to human beings and provides many ecosystem services for the well-being of the people such as watershed protection, water quality and its flow regulation, wildlife habitat and its diversity, recreational opportunities, aesthetic and spiritual fulfilment, raw material like wood, food and paper products, climate regulation, carbon storage and air quality maintenance. In past 8,000 years, about 45% of the forest area has been converted to meet the requirements of the human population. Forests are very vulnerable to climate change any change can cause a great impact on forests regulative and productive functions. High temperature may affect the rainfall patterns and can cause tremendous forest fires.

The science is linking forest fires occurring globally with the climate change. “Global warming and deforestation are fueling forest fires across the globe” (S.C. Gazdar, DTE). A climate scientist at the Lamont Doherty earth observatory at Columbia University, United States, Richard Seager, said that “Climate change by warming the atmosphere increases the ability of the atmosphere to extract moisture from the forest making it more flammable”. The wildfires that took place in 2019-2020 in

Australia killed over three billion animals which in result led 26 species closer to extinction. Wildfires are taking place in the most unexpected places due to climate change.

The peat bogs (it is a type of frozen wetland, where peat, deposits of dead plant material often mosses are accumulated.) in Siberia are on fire this year. “Peat bogs occupy only 3 percent of the earth’s surface, but they stored over 30 percent of organic carbon” says Dr. Michal Slowinski. He also added “when we heat the earth, bogs in high latitudes thaw and emit carbon in the form of carbon dioxide or methane”. In June, about nine million hectares of forest land is lost by Siberia due to forest fires. According to a study reported in Nature geoscience, the region of Siberia is drying up and becoming more arid which are exposing the moss, grass, dwarf shrubs to catch fires.

This is a situation to rethink as the permafrost soil contains about 1,600 billion tonnes of organic carbon which is twice the amount of carbon present in the atmosphere currently. Not only Siberia, India has also faced about 35,000 forest fires incident on an average in the past three years (2107-2019). According to government forest fire alert system, in 2020 also about 21,000 forest fires incident has been recorded. “Forest fires release carbon stored in vegetation and soil, and as the severity increases, they begin to damage deeper layers of soil, releasing centuries old legacy carbon” (DTE annual 2021, pg. no. 29) which results in net increase in carbon emission.

Heat accumulation and rising and warming of the oceans.

Ocean heating value, one of the most significant aspects of global warming even though seas and oceans store roughly 90% of the atmospheric heat, is a factor to be taken into account when discussing heat build-up. According to 15 distinct international datasets of Ocean heating value , the heating value of oceans in the measurement range of 0-2,000 m reached a peak in 2019 and is anticipated to continue in 2020 and the following years.” (Akshit Sangmolgia, DTE annual 2021, pg.no.337). In past decades many datasets agreed to the notably increase in OHC and in past 60 years heat accumulation has occurred at ocean depth of 700-2,000m. In 2020 high temperature were noted over ocean surfaces because of which 80 percent of the oceans have experienced at least one marine heat wave.

Since 1901, global mean sea level temperature has risen up by 1.7mm. The Indian Ocean has faced the sea levels rise non- uniformly per year at 1.06 to 1.75 mm till 2004 and about 3.3 mm in recent years. Since 1950s the monsoons has weakened due to rapid warming of the Indian Ocean along with changes in land uses and increased aerosols emissions. Sea surface warming temperature has reduced the oxygen concentration, marine phytoplankton and pH concentration in the tropical Indian Ocean and over the western Indian Ocean respectively. This decline in pH concentration could interfere with many critical processes like coral reef building and carbon sequestration alongside phytoplankton sedimentation. “The warming of the north Indian ocean has resulted in increasing fluctuations in the southwest monsoon winds and a three folds increase in extreme rainfall events across central India” (Avantika Goswami, DTE annual 2021, pg.no.352).

Flash Droughts

Flash droughts are creating havoc to the farmers for years, unlike normal drought that takes few months or years to develop, the onset of flash drought as the name itself suggesting sudden, it took

place suddenly. It takes place at the dry spell in the monsoon season and has a catastrophic impact on agriculture. Flash drought can develop within 10-15 days, said by Vimal Mishra, an associate professor at the department of civil engineering, IIT Gandhinagar. He also mentioned about flash drought in one of his paper titled “dominance of summer monsoon flash droughts in India” in journal *Environmental research letters* that the intensity of flash drought is because of high evapotranspiration due to extreme heats, wind and high solar radiation. Its duration depends on how long monsoon lasts, lesser the monsoon time period longer will be the flash drought duration.

Flash drought recovery is only depends on the intensity of rain fall. “Between the year 1951 to 2015, drought have become more frequent and have reached newer areas, mainly in the central parts of India and parts of Indo- Gangetic plains” (DTE annual 2021). For instance, Madhya Pradesh a state known for the largest soybean producer, has lost its 15 percent crop in this July due to month long dry period reported by the Indian Institute of soybean research, Indore. Similar situation took place in Odisha’s 30 districts with 40 percent rainfall deficiency reported and leads one of their farmer to commit suicide because of the fear of losing kharif crops. As per the food and agriculture policy analyst Devinder Sharma, “flash droughts severely impacts kharif crops and can affect the grain formation when crops have already been sown”. Approximately 234 of the 685 districts of India had suffered deficit rainfall by the month of July, 2020. Flash drought have become more frequent now and causing psychological stress to the farmers.

Heating of Himalayas and melting of the ice sheets

Between 2000 to the present, the Hindu Kush Himalayas have melted twice as fast as they occurred between 1975 and 2000. (DTE annual 2021, pg. no. 353). Outside of the poles, the Hindu Kush Himalayas, an 800 km long mountain range, contains the most substantial mass of snow and the biggest permafrost ice cover area. Its annual mean surface air temperatures increased by 0.1°C every decade between 1901 and 2014, which resulted in decreased snowfall, retreating glaciers, and more winter precipitation.

There are roughly 9,579 glaciers in the Himalayan cryosphere, each of which has about 75% of the world's frozen freshwater. Additionally, the annual snowfall determines how far the glaciers will retreat. Despite the fact that many scientists expect the area would become 2.6 to 4.6°C warmer by 2100. According to recent studies at current warming rate, in the coming decades the amount of snow melt and glacier melt water in major rivers like Ganges, Brahmaputra and Indus will increase. The probability of inundation will increase in the immediate future due to glacier melting. "In the long run, there is no substitute for the water provided by glaciers, which might lead to unprecedented water shortages. Thus, it is anticipated that as a consequence of climate change, floods and droughts will intensify. (M Balasubmanian *et al.* 2012).

The recorded temperatures in the Polar Regions activated the melting of ice sheets. In the Arctic Circle region, Verkhoyansk, Siberia, saw the highest temperature ever, which was 38°C in June. However, this was about 18°C higher than its normal temperature in that place for that particular year. Many wildfires are also taking place in parts of the Arctic region due to soaring temperatures.

Impact of climate change on water resources

Water isn't only insurgent to life, however it also acts as a fortress against the main threat to life in the present era, namely climate change. Whether as a result of the altering wind patterns brought on by a warming globe or the rise in catastrophic weather events, climate change has disrupted the water cycle. According to the United Nations' World Water Development Report 2018, there are currently 3.6 billion people living in places with water scarcity for at least one month a year, and by 2050, that figure is expected to increase to 5.7 billion. The Intergovernmental Panel on Climate Change's fifth assessment report and its 2018 special report on the effects of global warming of 1.5°C "have envisaged a terrifying scenario of the consequence of climate change on the water sector" (DTE, 16-31march, pg.no. 49). According to statistics, 7 percent of the world's population will experience a 20 percent reduction in water resources for every degree the temperature rises. The most significant source of water for the nation, "the monsoon," would undergo substantial shift as an outcome of climate change, finds a study by the Indian Institute of Tropical Meteorology (IITM) in Pune.

In extremely vulnerable nations like India, climate change has a significant influence on water, either directly or indirectly, which is creating substantial social and economic problems. Resources for water are becoming more depleted and damaged. Low levels of adaptive capacity, inappropriate water management, and widespread wetland degradation make it difficult for many poor people to live. "Impacts of climate change will directly affect water security, which will have an influence on food security." (DTE, 16-31march, pg.no. 52). In past few decades many of the Indian farmers committed suicide due to anxiety and mental health disorders caused by the disasters like floods and prolonged droughts. Floods intensity has increased, floods contaminate the quality of fresh water by increasing the risk of water borne diseases.

Impacts on biodiversity

Nowadays, predicting how climate change will affect biodiversity and trigger the extinction of species has emerged to be a top scientific interest. The diversity of life on earth is referred to as biodiversity. It is crucial to human existence because it offers the goods and services we need to survive. There are now a variety of factors preventing plants and animals from adapting to the current stage of global warming, many of which have been greatly exacerbated by humans, such as changes to landforms, watersheds, and coastlines. Pollutions, introduction of alien species, hunting or fishing has already reduce the resilience ecosystem. Estimated changes in climate, including land use changes and spread of exotic species has probably limited the migration capability of some species and consequently accelerated species loss.

The 1°C rise in the global mean temperatures has caused often and serious impacts on species by affecting their abundance, genetic compositions their behavior and survival. Species composition has already affected by climate change caused by human beings. Approximately 19% of species are listed as threatened species in the IUCN red list of threatened species.

In the wave of the climate change and recent biodiversity crisis, amphibians are considered as the most threatened species across the world. About 32.5 percent of different species of amphibians are threatened due to destruction of habitat and climate change. Many human activities such as GHGs

emissions, poaching and habitat modification bringing the planets wildlife population at the verge of danger. A report of IPBES, United nations mandated scientific body, says that approx. 1.3 million species are under dread of extinction because of poaching, deforestation, hunting, pollution, invasion of alien species and climate change. An article of Chandrima Debi, DTE 1-15 october 2020, reported that the fireflies in the Landour, Mussoorie has been disappeared in past two years. It seems like fireflies are also signaling the effects of climate change. Many of the reports has suggested that with the changes in conditions of the climate globally the distribution and ecological habitat of the fireflies are also changing.

The inhabitants and their habitat are suffering greatly as a result of the temperature rise. Many species, like the Adelie penguin in Antarctica, have had difficulties due to the melting of the ice. Some populations on the western peninsula have declined by 90 percent or more. Due to the extreme temperatures, certain insects, foxes, and alpine flora have moved northward or upward or to cooler regions. Numerous species are expanding, including plant pests, jellyfish, fleas, and mosquitoes. Millions of forest areas in the U.S. have been negatively impacted by an increase in the population of bark beetles, which feed on spruce and pine trees.

Climate change poses a hazard to marine mammals like walruses, polar bears, seals, and others that depend on sea ice for behaviors' like breeding and foraging. Polar bears habitat and existence are in danger due to shorter period of ice sea coverage which providing them less hunting time in Arctic. The rate of North Atlantic right whale is declining as their food i.e. plankton population is declining due to climate changes. Male turtle's offspring are reducing due to higher temperature.

Impacts on agriculture

About one third of global world's land surface is taken up by agricultural fields. About 20% of greenhouse gases are produced in agricultural fields and enter the environment. Through the release of gases including carbon dioxide, methane, and nitrous oxide, this industry contributes to global warming. Methane has a potential for 300 times more global warming than carbon dioxide and around 20 times that of nitrous oxide, with carbon dioxide coming in second. These gases are primarily released from sources such as rice fields, biomass burning, nitrogen fertilizers, etc. Additionally, this is one of the factors contributing to climate change.

And this increasing temperature and changed rainfall patterns are adversely affecting agriculture worldwide. Due to these climatic changes, crop productivity is expected to be altered and also changes in the patterns of the pests and diseases can be observed. Many staple crop growing land areas could undergo geographical shifts due to these climatic changes. However, reduction in water availability can also become a major impact for agriculture. Due to sea level rise acute shortage of land and salinization problem can also be observed. Production of yields of different crops can be affected due to changes in the soil moisture, temperature, precipitation and increase in the concentration of carbon dioxide.

With the increase in temperature losses of crops will increase due to weeds, pests and diseases. Massive rain can leach out useful nutrients from the soil by leaving the land less cultivable. Higher temperature can cause heat stress and drier soil which may reduce the yield of crops from tropics

and subtropics where crops are found already near their maximum tolerant towards heat. Plants growth can also get affected due to higher temperatures. It can also shorter the life cycles of many plants leads to shorter reproductive phase and results in low yield potential.

Perhaps there is a connection between agriculture and climate change. Unfavorable climate change has put the world's food security in danger. 2018 data from the World Food Programme (WFP) shows that population growth lowers crop yields per hectare. According to data from the Food and Agriculture Organization (FAO) from 2016, if GHG concentrations continue to rise and the climate changes by 2100, there will likely be a significant decline in the production of major cereal crops, including maize yields falling by 20–45 percent, wheat yields falling by 5–50 percent, and rice yields falling by 20–30 percent.

Due to the high pace of land degradation brought on by climate change, there has been considerable desertification and soil depletion of nutrients. Extreme drought conditions are becoming more common as a result of climate change, which lowers crop output by immobilizing nutrients and causes salt to build up in the soil, leaving it dry, unhealthy, and infertile. For example, the Kerala flood of 2018 wiped away the topmost layer of soil and nutrients, causing low productivity for several years in Kerala. Floods cause significant damage to soil.

Sea level rise has reduced the amount of farmland in coastal areas and salinization of the soil has stressed crops by reducing transpiration and photosynthesis, which ultimately leads in low food supply and security in such areas.

Impacts on livestock

These weather phenomena are particularly noticeable as a result of the rise in the global mean surface temperature. Many activities such as growth performance, meat and milk quality and yield, egg quality, yield, and weight, reproductive and metabolic rate, as well as their health status, are all influenced by this climate change. These climate changes are either directly or indirectly affecting the health and production of the livestock.

Extreme weather events have made it very difficult to predict illnesses connected to temperature, and changes in their metabolic processes present a huge challenge and put them at risk for developing unknown diseases. The effects of temperature on livestock's growth, reproduction, foraging behaviour, and health are significant. The process of foraging is negatively impacted by rising temperatures and CO₂. However, fluctuating precipitation and higher temperatures have an impact on animal health.

Changes in climate can have an impact on disease vector distributions, crop patterns, and animal husbandry practices. By limiting animal weight increase and reproduction methods, higher temperatures cause a drop in dairy production. Diseases brought on by climate change may also affect animals. There have been numerous cases of livestock and other animal diseases that are thought to be related to climate change. Since many diseases are thought to be spread by insects like flies and ticks, whose development is frequently greatly influenced by temperature.

In addition, climate change has an impact on several nematode growth stages, and sheep, goats, and cows are particularly susceptible to nematode infections. Heat stress, a significant consequence of climate change, causes numerous metabolic problems in livestock, including lameness and ketosis. Numerous studies have shown that heat stress or climatic change diminishes colostrum immunoglobulin's like IgG and IgA in dairy cows, which lowers calf immunity. This decreases the immunological response in poultry. In animals, heat stress also affects the development of the oocyst, the embryo, and the estrus cycle.

Impacts on deserts

Deserts are the most important indicator of climate change. Already due to climate extremes over the last 50 years deserts have warmed and dried more rapidly globally. Climate change has although impacted the desert species directly and indirectly by providing thermal and hydric stress and by reducing habitat and food resources respectively. Dry lands cover almost about 40% of the global land surface and are home to more than 2 billion people. Whereas deserts cover 15% of the world land surface with providing home to about 144 million people. Desertification has affected more than one sixth of the population of the world and this rapidly increase in desertification causing environmental degradation, unstable local political situations and economic losses.

In dry and semi-arid regions, climate change is expected to reduce water supplies and have a negative impact on water quality. Many cattle and the majority of the world's food crops are found in deserts, which also have tremendous biological significance. Climate change is more likely to affect dry places. The biodiversity of arid and semi-arid environments can be seriously impacted by even little changes in temperature and rainfall patterns. Due to numerous activities such as conversion to agricultural use, introduction of an alien species, pollution, and altered fire experiments, dry regions or deserts are already under stress.

Because deserts are meant to get hotter and drier, the rising temperatures could endanger creatures that are already at the upper limits of their heat tolerance. For instance, the climate change has a significant impact on the wealthy and sensitive Karoo, which is located in southern South Africa and southern Namibia and is the world's richest desert hotspot.

The biodiversity of the desert can be seriously impacted by changes in rainfall patterns brought on by climate change. As we have seen over the past few years, wildfire danger could rise as a result of climate change. With increased wildfire risk come opportunities for changing species composition and declining biodiversity.

Impacts on Inland water ecosystem

Inland water ecosystems are those ecosystem that can be of saline or fresh water within continental or island boundaries. These are believed to be one of the richest ecosystem and supports about 6% of the species globally. However, biodiversity of these ecosystem are important source of food, income and livelihood to the local people. Besides this maintenance of hydrological balance, retention of nutrients and sediments are some other important functions of inland water ecosystem. It provides home to various flora and fauna.

Although, these inland water ecosystems are negatively affected by climate change. Approximately 20% of the fish species or more than that have become extinct due to higher temperatures because these high temperature is increasing the normal water temperature and making it more difficult for fishes to tolerate that heat. Due to this these freshwater ecosystem are facing declination in biodiversity farther than the terrestrial ecosystem.

Changing rainfall patterns and melting of glaciers has resulted in flow regimes change of many rivers and lakes due to which fishes spawning and feeding habits are affecting very badly. Already due to human excess usage of water many of the lakes are decreased in size globally. On the other hand, this atmospheric warming is contributing to less rainfall and making these lakes drier because the inland water temperatures are strongly related with the dynamics of hydrological cycle. Many other responses of lakes and rivers are also noted because of the climate change such as warming of rivers, alteration in flow regimes, reduction in ice cover and greater frequencies of extreme events like droughts and floods.

Impacts on human health

Though, human beings contributed a large proportion towards climate change but these extreme climate events has not spared them they attacked back on human health in form of various harmful and unprecedented diseases. However, all living beings in nature have natural predators but human beings is supreme over all. The consumption of resources has increased during industrialisation results in releasing toxic substances into the environment with a negative effects at the local level (such as air pollution) and at global level (such as climate change). These development has come back to us in the form of new diseases, crimes, social and economic inequalities and various psychological disorders.

About 60% of the diseases occurs from animals globally known as zoonotic diseases and out of which 72% comes from wild animals. For instance, a virus, its characteristics is it changes in the new animals through a process called mutation through which new copies of these virus form. But changes like change in land use, deforestation, commercial cultivation which has somewhere caused climate change has altered the existing biodiversity, species number and population densities and creates a different conditions. These new conditions has created an opportunity for a virus to mutate and multiply. There can also be a possibility for rapid spread of corona virus globally in shorter period of time due to these climate fluctuations.

Urbanisation is increasing due to explosion of population and reducing the biodiversity and with this lifestyles are also changing. Somehow these changes are affecting our immune system and making it weaker. If the external environment will change it will directly affect our health. Many researches has reported that allergies which are causing asthma, skin diseases has increased due to decline in biodiversity and changes in climate.

Climate change is a serious threat to everyone and will eventually have a negative influence on their health. On the physical, emotional, and social well-being of people, climate change has a variety of effects. The frequency of extreme occurrences including droughts, floods, storms, and heat strokes has increased due to climate change, endangering human health and safety. The food, water, air, and

weather are all being affected by the effects of climate change, endangering human health.

Diseases like dengue, malaria which is spread by the insect vector i.e. mosquitoes which is totally dependent on rainfall according to many studies. We know that these vectors grows in stagnant water and heavy rainfall can washes away the breeding sites but with these changes in rainfall patterns or low intensity of rainfall can creates drought conditions and can increase breeding sites by causing river water to become stagnant. Vector borne diseases are more prone to higher temperature, higher temperature can reduce their breeding time and can also reduce their incubation period resulting in vectors to become more infectious very quickly.

Human's exposure to extreme heat can cause heat strokes, dehydration, cardiovascular diseases and neural disorders. Although these extreme heats are vulnerable to certain types of population such as outdoor workers, students, athletes and homeless people those spend most of their time outdoors. Warmer temperatures has increased the frequency of ground level ozone in the troposphere. People who are exposed to ground level ozone has a greater risk of premature deaths. Ground level ozone can damage lung tissues, reduce its functions and can aggravate asthma and other respiratory disorders. Any changes that takes place in the surrounding environment of human beings creates a disastrous effects on their mental well-being. Extreme heat can cause stress and other mental disability in humans. Children's, pregnant women, old age people are at higher risk of mental illness due to extreme heat.

Conclusion

In the bigger picture, climate change is amalgamating with wider issues such as global temperature rise, forest fires, flash droughts, floods, melting of ice sheets etc. Climate change is hitting the humankind very badly it is affecting the basic needs of humans like food, water etc. In coming decades, some people or communities may start relocating internally or to some other place to cope up with the circumstances. But is it worth wandering or will it be right that we think towards correcting it. There is a need to enact an appropriate legislation to deal with the greenhouse gas emission and address the climate change. Since, transportation sector contributes bigger proportion in emission of greenhouse gases. Henceforth, use of electric or ecofriendly transportation should be implemented. Stricter observation should have to done for the flash drought so the farmers can receive information. and we can save their lives with this. A state must take action towards those who are contributing directly or indirectly towards the surge of global warming. Government should have to aware farmers about the increasing global temperature and should provide them the best ideas to tackle the problem with calmness.

References

1. Al. Blooshi, Latifa. & Issa, Salem & Ksiksi, Taoufik., (2020). Assessing the Environmental Impact of Climate Change on Desert Ecosystems: A Review. 5. 27-52, 2020.
2. Ali, M. Z., Carlile, G., & Giasuddin, M. (2020). Impact of global climate change on livestock health: Bangladesh perspective. *Open Veterinary Journal*, 10(2), 178-188.
3. Alig, R. J., & Mercer, E. (2011). Effects of climate change on natural resources and communities: a compendium of briefing papers. *Gen. Tech. Rep. PNWGTR-837. Portland,*

OR: US Department of Agriculture, Forest Service, Pacific Northwest Research Station. 169 p, 837.

4. Arora, N. K. (2019). Impact of climate change on agriculture production and its sustainable solutions.
5. Aydinalp, C., & Cresser, M. S. (2008). The effects of global climate change on agriculture. *American-Eurasian Journal of Agricultural & Environmental Sciences*, 3(5), 672-676.
6. Backlund, P., Janetos, A., & Schimel, D. (2008). The effects of climate change on agriculture, land resources, water resources, and biodiversity in the United States. *Synthesis and Assessment Product 4.3. Washington, DC: US Environmental Protection Agency, Climate Change Science Program. 240 p.*
7. Badger, W., Benjaminsen, T., Brown, K., Svarstad, H., 2000. Advancing a political ecology of global environmental discourse.
8. Balasubramanian, M. & Birundha, V. D. (2012). Climate Change and Its Impact on India. *IUP Journal of Environmental Sciences*.
9. Barange, M., & Perry, R. I. (2009). Physical and ecological impacts of climate change relevant to marine and inland capture fisheries and aquaculture. *Climate change implications for fisheries and aquaculture*, 7.
10. Brath, B., Friesen, T., Guérard, Y., Jacques-Brissette, C., Lindman, C., Lockridge, K., ... & Walke, B. J. (2015). Climate change and resource sustainability: An overview for actuaries. *Canadian Institute of Actuaries, Canada*.
11. Debi, C. (2020), "Nature's Lanterns are Dimming, Known for their Bioluminescence, Firefly species were glowing indicators of changing seasons. Today, their population is declining as climate has their destroyed their habitats", *Down to Earth* 1-15 October, pg.no. 48-50.
12. Drolet, J. (2020), "First Victims, Climate Change Impacts Marginalised People Differently", *Down to Earth* 16-31 march, pg. no. 50-51.
13. Ezcurra, E. (2006). Global deserts outlook. UNEP/Earthprint.
14. Gazdar, S. C. (2020), "Fanning the Flames, Global Warming And Deforestation Are Fuelling Forest Fires Across The Globe," *Down to Earth* 1-15 November, pg. no. 27-29.
15. Gazdar, S. C. (2021), "Change To Recover, A Post Pandemic Green Recovery Plan With Ambitious National Targets Aimed At Net-Zero Emissions, Can Still Save The World", *State of India's Environment, A Down To Earth Annual*, pg. no. 348-350.
16. Ghate, K. (2021), "ecology and evolution of viruses, conserving ecology and biodiversity is necessary to curb the spread of epidemics that have been aided by globalisation", *State of India's environment, A Down to Earth Annual*, pg. no. 80-82.
17. Goswami, A. (2021), "The Meltdown, India's First National Climate Assessment Reveals a

Hotter, Drier and More Turbulent Future”, State of India’s Environment, *A Down To Earth Annual*, pg. no. 351-353.

18. Henry, B., Charmley, E., Eckard, R., Gaughan, J.B. and Hegarty, R., 2012. Livestock production in a changing climate: adaptation and mitigation research in Australia. *Crop Pasture Sci.* 63, 191– 202.

http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_appendix.pdf

http://www.wmo.int/pages/themes/climate/causes_of_climate_change.php

https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-agriculture-and-food-supply_.html

https://19january2017snapshot.epa.gov/climate-impacts/climate-impacts-human-health_.html

<https://blog.agrivi.com/post/climate-change-impacts-on-agriculture>

<https://scienceinpoland.pap.pl/en/news/news%2C78240%2Csiberian-peat-bogs-shadow-climate-change.html>

<https://scienceinpoland.pap.pl/en/news/news%2C86510%2C2020-was-extremely-warm-says-new-weather-report.html>

<https://www.cbd.int/doc/bioday/2007/ibd-2007-booklet-01-en.pdf>

<https://www.downtoearth.org.in/news/climate-change/climate-change-what-the-emissions-gap-report-2020-tells-us-74578>

https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap11_FINAL.pdf

https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_Chapter1_High_Res.pdf

<https://www.iucn.org/resources/issues-briefs/species-and-climate-change>

<https://www.nationalgeographic.com/environment/article/global-warming-effects>

<https://www.unep.org/emissions-gap-report-2020>

19. Iknayan, K. J., & Beissinger, S. R. (2018). Collapse of a desert bird community over the past century driven by climate change. *Proceedings of the National Academy of Sciences*, 115(34), 8597-8602.
20. Kapil, S. (2020),” Let’s not Pretend, Flash Drought parch large tracts of lands and ruin crops, but they do not feature in India’s Disaster Management Regime”, *Down To Earth* 1-15 October, pg. no. 20-22.
21. Kukreti, I. (2021), “Wildlife In Peril, Destruction of Habitats, Changing Climate and Trade in Animal Parts are Driving the Wild Biodiversity to the Brink”, State Of India’s Environment, *A Down To Earth Annual*, pg. No. 326-329.

22. Mahto, S. S., & Mishra, V. (2020). Dominance of summer monsoon flash droughts in India. *Environmental Research Letters*, 15(10), 104061.
23. Middleton, N., 2017. Desert dust hazards: A global review. *Aeolian Research* 24, 53–63.
24. Nair, K. S. (2020), "Ripple Marks, People with Lower Socio-Economic Status, Migrants and Refugees are Most Vulnerable to the Impact of Climate Change on Water", *down to earth* 16-31 march, pg. no. 52-53.
25. Narain S (2021), "A Year to Reiterate, Re-Imagine and Reinvent", State of India's Environment, *A Down to Earth Annual*, pg. no. 6-10.
26. Narain S (2021), "Wasted Time, While the Impacts of Climate Change become clearer, most countries do precious little to deliver on the promises they made five years ago during the landmark Paris Agreement", *Down To Earth* 1-15 January, pg. no. 48-50.
27. Nardone, A., Ronchi, B., Lacetera, N., Ranieri, M.S. and Bernabucci, U. 2010. Effects of climate change on animal production and sustainability of livestock systems. *Livest. Sci.* 130, 57–69
28. Nichi, M., Bols, P.E.J., Züge, R.M., Barnabe, V.H., Goovaerts, I.G.F., Barnabe, R.C. and Cortada, C.N.M. 2006. Seasonal variation in semen quality in *Bos indicus* and *Bos taurus* bulls raised under tropical conditions. *Theriogenology* 66, 822–828.
29. Palita, S. K. CLIMATE CHANGE AND ITS IMPACT ON BIODIVERSITY.
30. Regnier, J.A. and Kelley, K.W. 1981. Heat-and coldstress suppresses in vivo and in vitro cellular immune responses of chickens. *Am. J. Vet. Res.* 42, 294–299.
31. Sangmolia A (2021), "Unmitigated Loss, The Economic Global Shutdown Notwithstanding, 2020 is the Warmest Year on Record", State of India's Environment, *A Down To Earth Annual*, pg.no. 336-338.
32. Sathaye, J., Shukla, P. R., & Ravindranath, N. H. (2006). Climate change, sustainable development and India: Global and national concerns. *Current science*, 314-325.
33. Sawalhah, M.N., Holechek, J.L., Cibils, A.F., Geli, H.M. and Zaied, A. 2019. Rangeland livestock production in relation to climate and vegetation trends in New Mexico. *Angeland Ecol. Manag.* 72, 832–845.
34. Stewart, B.M., Block, J., Morelli, P., Navarette, A.E., Amstalden, M., Bonilla, L., Hansen, P.J. and Bilby, T.R. 2011. Efficacy of embryo transfer in lactating dairy cows during summer using fresh or vitrified embryos produced in vitro with sex-sorted semen. *J. Dairy Sci.* 94, 3437–3445
35. Venkateswarlu, B., & Shanker, A. K. (2009). Climate change and agriculture: adaptation and mitigation strategies. *Indian Journal of Agronomy*, 54(2), 226.
36. Wang, H., Zhou, S., Li, X., Liu, H., Chi, D., Xu, K., 2016. The influence of climate change and human activities on ecosystem service value. *Ecological Engineering* 87, 224–239.

37. Water, U. N. (2018). 2018 UN World Water Development Report, Nature-based Solutions for Water.
38. Wolfenson, D., Roth, Z. and Meidan R. 2000. Impaired reproduction in heat-stressed cattle: basic and applied aspects. *Anim. Reprod. Sci.* 60, 535–547.
39. Xu, D., Kang, X., Zhuang, D., Pan, J., 2010. Multi-scale quantitative assessment of the relative roles of climate change and human activities in desertification– a case study of the ordos plateau, china. *Journal of Arid Environments* 74, 498–507.