Greenhouse Effect and Global Warming

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“The planet’s climate has constantly been changing over geological time, with significant fluctuations of global average temperatures.” (“Climate Change - Amnesty International”). However, this current period of global warming is occurring more rapidly than any past events. “It has become clear that humanity has caused most of the last century’s warming by releasing heat-trapping gases—commonly referred to as greenhouse gases—to power our modern lives.” (“Climate Change - Amnesty International”) [1] . We are doing this through burning fossil fuels, agricultural activities and other activities that drive climate change. Greenhouse gases are at the highest levels they have ever been at over the last 800,000 years. There is an overwhelming scientific consensus that global warming is mostly because of human activities. The Earth receives energy from the Sun in the form of infrared and ultraviolet radiation. When this energy enters through the Ozone layer, it is reflected by the Earth’s surface. The greenhouse gases such as carbon dioxide, Methane, and Nitrous Oxide released by human activities trap the radiant heat and cause the overall temperature of the Earth’s surface to rise. Thus, in turn, causing global warming.

The most common factors of greenhouse gas emissions are, deforestation, degradation of soils, clearing for agriculture, biomass burning, usage of fertilizers, burning of fossil fuels and emissions of F-gases which include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) [2]. The main source of carbon footprint in the world is electricity generation as 73% of CO2 is produced by burning coal,13% from burning gas and the remaining 14% comes from renewable sources such as Wind, Hydroelectric power and Solar. Plants and trees play a key role by regulating the levels of Carbon Dioxide by absorbing it and producing Oxygen. Because of the growing population and increase in need of land, trees are cut down for farming, and infrastructure development which in turn affects the levels of CO_2 in our surroundings. Other than this, manufacturing of goods and industrial activities also cause a large chunk of global emissions. Energy is produced in making of steel, iron, plastic, synthetics, cement and heavy metals. Energy from coal and other fossil fuels is used to run factories, and some plastics

and chemicals are also made by using them. Overall, Industries and factories are one of the largest contributors in producing the carbon footprint. With all these sources, the effects of climate change have been devastating. Earth's temperature has risen to 0.75 degree Celsius, and it still is increasing. In the last 16 years we have experienced 14 of the hottest years. Because of the boost in industrial development, the paradigm shift came in the 21st century when the temperature further increased 2 to 4 degrees. This poses a tremendous threat to the lives, property and livelihoods of people. Millions more people could experience coastal flooding each year [5]. Some kinds of food productivity will decrease in low latitudes and rise in mid to high latitudes. Ecosystems are changing. Growing numbers of people in the poorest countries will suffer from malnutrition and from diarrheal, cardio‐respiratory and infectious diseases. "Globally, up to 30 percent of species will be at increasing risk of extinction." ("Climate change Fact and Figures.pdf - Climate change facts...") [2]. The level of $C0_2$ before the industrial revolution was 280 ppm (parts per million), which increased to 380 ppm [5]. This drastic change of 100 ppm has proven to be catastrophic already, with sea levels rising between 20 to 90 cm (about the length of a baseball bat), causing heavy floods in various parts of the world including Pakistan and western Africa.

The increasing temperature has caused wildfires in various parts of Australia, which have caused damage to vegetation, wildlife, and the local communities living in the region. The Ice levels in the polar regions are decreasing at an alarming rate. Natural Disasters such as Hurricanes and sea storms are ready to hit the shorelines at any moment. As the level of greenhouse gases increases, oceans absorb some of these gases which leads to the acidification of waters. Since the early 1700s the acidity of waters rocketed to 25 percent. If the current ocean acidification rate continues to be the same, then coral reefs would become rare in the regions where they are common. In 2016 and 2017, portions of the Great Barrier Reef of Australia were hit with Bleaching, a phenomenon in which coral ejects their symbiotic algae [2]. Bleaching is a sign of stress from too-warm waters, unbalanced pH, or pollution; coral can recover from bleaching, but back-to-back episodes make recovery less likely. ("What are the effects of global warming? | Live Science") [2].

It is expected that global warming will significantly and extensively affect the Earth's ecosystems. As a result of rising temperatures, many plants and animal species are already expanding their range northward or upward in elevation, according to an assessment made by the National Academy of Sciences. In addition, migrating insects and birds are increasingly arriving in their summer eating and nesting areas days or weeks earlier than they did in the 20th century, according to the EPA (Environmental Protection Agency). As many disease-causing organisms that were previously restricted to tropical and subtropical regions increase their range due to warming, previously disease-resistant plant and animal species will go extinct. Ecosystems and other living things will continue to be significantly affected by climate change, albeit not all of them will be affected equally. Due to its rapid warming (at least twice as fast as the world average) and the significant contribution of melting glaciers and land ice to global sea level rise, the Arctic is one of the ecosystems most vulnerable to the effects of climate change. Climate change is causing certain living things to adapt; some plants are flowering sooner, and some animals may widen their geographic range. But because of stressed ecosystems brought on by rising temperatures and shifting precipitation patterns, these changes are occurring too quickly for many other plants and animals.

The single greatest hazard to human health is climate change. Air pollution, sickness, harsh weather, forced relocation, stress on mental health, increasing hunger and inadequate nutrition in areas where people cannot grow or get enough food are only a few of the health effects of climate change [6]. 13 million individuals every year are killed by environmental conditions. Extreme weather events increase fatalities and make it challenging for health care systems to keep up with the growing number of diseases caused by changing weather patterns.

Another Impact of the greenhouse effect on our environment is the pollution that it has caused. Air pollution has increased drastically in various regions and Smog is a running example of it. Smog is produced when the greenhouse gases condense in the air during winters causing thick colorless smoke to take over an area. Mixed up with dangerous chemicals and acids such as Carbon Monoxide, Sulphur oxide,

volatile organic compounds and ammonia gas, these chemicals are extremely acidic and cause harmful diseases such as Lung cancer, emphysema and other respiratory diseases. People are forced to stay at home because of the unsuitable conditions of the air. They are forced to wear masks when leaving homes and Air purifiers become necessary inside their homes. In the areas affected by Smog, people have complained of irritation in eyes and on their skin.

Another effect of climate change on our environment is natural disasters. Africa alone witnessed 1697 recorded disasters, which took lives of 731,791 people and an economic loss of 5 billion dollars. In Asia 3467 disasters were recorded with 975623 lives lost and nearly 7 trillion dollars' worth of economic loss [8]. The recent flooding in the southern and north-western part of Pakistan took the lives of nearly 1500 people with over a million left homeless.

Climate and weather have an impact on our food supply. Although farmers and researchers might be able to develop new agricultural technologies or adapt some existing ones, other changes will be challenging to handle. The issues faced by the farmers and ranchers that supply the food for our tables include rising temperatures, drought and water stress, illnesses, and harsh weather. Health problems associated with heat, such as exhaustion, heatstroke, and heart attacks, can affect human farm laborers. Animals can suffer from heat stress and rising temperatures.

Acid rain is also one of the effects of increasing greenhouse gas emissions. The deposit of acidic precipitation that falls to the ground from the atmosphere is known as acid rain. It arises from the discharge of pollutants into the atmosphere from sources including motor vehicle exhaust and coal-fired power plants. The Environmental Protection Agency (EPA) claims that the chemical reaction between Sulfur dioxide (SO2), nitrogen oxides (NOx), and particulate matter (extremely small particles) in the presence of oxygen and water results in acid rain. Acid rain, also known as airborne sulfuric and nitric acids, is the result of this process. A hundred miles or more from its source, acid rain can travel great distances thanks to the wind. In the Midwest, coal-fired power stations are to blame for the acid rain that harms the Adirondacks.

As a result of climate change, water is becoming scarcer in more places. In already water-stressed areas, global warming makes water shortages worse. It also increases the danger of ecological droughts, which make ecosystems more vulnerable, and agricultural droughts that harm crops. In addition to causing deadly dust and sandstorms, droughts have the power to transport billions of tons of sand across continents. As deserts spread, there is less space for agriculture. The threat of regularly not having enough water affects a lot of people nowadays [7].

Now the question comes how we can stop or limit the increasing effects of climate change and make our planet a better place to live in. Becoming more energy efficient is a great way to prevent pollution. It causes the power plants to expend less energy which can lead to the production of greenhouse gases. This means that you should do what you can to cut down on energy usage in your household. "Make sure to turn off lights and unplug devices that you are not using anymore when you are done with them." Replace your light bulbs with energy-efficient light bulbs to help you save electricity too [2] ("6 Things You Can Do To Prevent Climate Change - ACCIONA"). We can also minimize our carbon footprint by limiting the activities involving the emission of Carbon Dioxide or other greenhouse gases. Every year, a lot of greenhouse gases are released by manufacturing facilities. In the making of products that we frequently use, it is inescapable. Recycling expenditures, however, would be a more environmentally sound option. Recycling reduces waste and doesn't release greenhouse gases into the atmosphere, making it both economical and environmentally friendly. Don't forget to bring your old paper, glass, plastic, and electronics to your neighborhood recycling facility. The experts will transport these objects to a recycling facility where they will be converted back into other recyclable products. We can also carry out public drives such as Go Green and Tree plantation to increase awareness among people of taking care of their surroundings.

Overall, the causes and effects of Climate Change are not hidden from anyone. Knowingly, we have all such practices which are harmful for our environment, it's just a matter of time that all these effects will lead to something more catastrophic. All these harmful repercussions are growing from time to time. If we don't take a

step now, then I fear that it will be too late for us to make this planet a better place to live in.

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