

# Topic: Global Warming: Causes and Solutions

## Outline:

### ① Introduction:

Global warming has brought humanity closer to a continuous onslaught of extreme heatwaves, floods, <sup>and</sup> droughts due to the <sup>excessive</sup> use of fossil fuels, depletion of Ozone layer, population explosion and massive deforestation; hence, global community needs to take a concerted effort towards using renewable energy, increasing global forest cover and promoting sustainable transport to thwart the looming threat of human extinction.

### ② The Arrival of Global warming on Global Landscape

- i) Agricultural Revolution.
- ii) Industrial Revolution

### ③ Causes behind Global Warming

- i) Green house gas effect
- ii) Depletion of ozone layer
- iii) Population explosion
- iv) Rapid Urbanization
- v) Rapid Industrialisation
- vi) Weapons of Mass Destruction (WMDs)
- vii) Eruption of wild wild fires
- viii) Volcanic Eruption

### ④ Impacts of Global warming on Humans and Environment:

- i) Threat to life
- ii) Melting of glaciers
- iii) Rising global sea levels

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iv) Migration and displacement

v) Rising intensity and frequency of disasters

vi) Low agricultural yield

vii) Political instability conflicts

viii) Economic degradation

### ⑤ Mitigation and Adaptation Measures

i) Transitions towards renewable energy resources

ii) Promotion of sustainable transport

iii) Discouraging deforestation

iv) Environmental education and awareness

v) Mending culturally ill mindset

vi) Decarbonization of sectors

vii) International cooperation

### ⑥ Conclusion

The planet earth is the only planet where life exists. It is full of natural resources in the form of mighty mountains, gushing water reservoirs, and lush green forest covers. However, despite these bounties, it is becoming hard to live a certain life due to uncertain weather patterns. Unfortunately, our myopic and self-centred actions, leading to the phenomena of global warming, have turned this peaceful planet into a living torment. Global warming has become a global threat, by bringing humanity closer to a continuous onslaught of extreme heatwaves, floods, and droughts, due to the excessive use of non-renewable energy resources, depletion of ozone layer, population explosion and massive deforestation; hence, global community needs to take a concerted effort towards using renewable energy, increasing global forest cover and promoting sustainable transport to thwart the looming threat of human extinction.

In order to explore the causes of global warming, it is incumbent to find the historical roots of global warming on global landscape. By going back, some 10,000 years ago people started changing their living patterns. They turned from nomadic, hunter-gatherer <sup>lifestyle</sup> to a settled <sup>and agricultural based</sup> life-style. They started growing fields and kept animals with them. Historians call that time period 'Agricultural Revolution'. People started clearing lands, which paved way for today's deforestation; and similarly, practices like raising livestock, which can lead to methane emissions, a potent green house gas. Over time, as human populations grew and

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agricultural practices evolved, these activities began to have cumulative effects on the environment and the climate.

It is important to note that while Agricultural Revolution played a role in shaping human societies and land use practices, the more significant impact on ~~modern~~ global warming comes from the Industrial Revolution and the subsequent use of fossil fuels. Industrial Revolution got birth in the late 18th century and continued into the 19th century. The first Industrial Revolution started in Britain, and was marked by the advancements in manufacturing processes, mechanization, and the growth of factories. Key developments in that period included the invention of steam engine, improvements in textile production, and the expansion of transportation networks through the construction of canals and railways. Industrial Revolution revolutionized the socio-economic patterns of life.

However, it also impacted the environment in the form of using coal and fossil fuels for energy production and transportation. This usage led to the release of greenhouse gases,  $\text{CO}_2$ ,  $\text{NO}_x$ ,  $\text{CFCL}$ , which ultimately paved way for the long-term global warming and climate change.

There is not, indeed, an iota of doubt that global warming has led to a perplexed situation. This dilemma, in return, warrants an investigation into some of the major causes of the global warming.

The first major cause of global warming is green house gas effect. Green house effect is a

thermal process in which heat gets trapped in the troposphere, first layer of atmosphere, under the action of green house gases. These are such gases which have the ability to absorb, trap and scatter the heat. According to Intergovernmental Panel on Climate Change (IPCC), 61 per cent  $\text{CO}_2$ , 15 <sup>percent</sup>  $\text{CH}_4$ , and 11 per cent CFCs, and 4 per cent  $\text{N}_2\text{O}$  are some of the gases trapped inside the atmosphere. These gases, resultantly, never allow the heat to escape. Thus, the average temperature of the atmosphere gets on increasing leading to global warming.

Secondly, ozone layer,  $\text{O}_3$ , plays significant role in protecting the harmful UV radiations of sun. However, due to industrialization releasing gases into the atmosphere, burning of solid-wastes, and other human activities are unfortunately diminishing this vital layer. Resultantly, this has led to ozone hole, which fails in stopping sun's ultra violet radiations. Apart from impact on humans, animals and agriculture, these radiations also increase the global temperature. As per IPCC, about  $1.2^\circ\text{C}$  of temperature has increased from 1850 to 2022. According to ~~content~~ prediction, with a current pace the temperature may rise from  $1.4^\circ\text{C}$  to  $5.8^\circ\text{C}$  till 2100. <sup>with</sup> In this, probable increment <sup>in temperature</sup> & depletion of Ozone layer will ~~adding~~ fuel to the fire.

With the advancement in science and technology, and research in the field of medicine and diseases offered lowered death rates and enhanced expectancy ratio as compared to past.

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Thus, the world is experiencing huge population bulge. Moreover, it is also a fact that the world has limited resources, and growing population compels governments to go for unsustainable means to ensure sufficient food supply to their respective polities. In some of these endeavours use of fossil fuels in the factories, for production and manufacturing, release harmful gases and heat into the atmosphere. ~~As~~ These gases in turn increase the global temperature. According to Pakistan Bureau of Statistics, the population growth rate of the country was 2.55 percent in the census 2023, ~~for~~ which resulted in a new figure of population from 221 million to 241 million people. By generalizing this fact, this means world's population is constantly increasing, compelling more production and manufacturing; hence increment in global warming.

Similarly, the world has ~~be~~ transformed largely in its way of living, since the on-set of Industrial Revolution. Today, ~~one~~ ~~with~~ while looking around can't deny the presence of colossal buildings, paved roads, underpasses and flyovers. Undoubtedly, these all are bounties, making our lives easy and ~~live~~ liveable. On the other hand, such infrastructures also calls for more transportation, more vehicles running on the roads, and incremental gases ~~for~~ get stuck in the mighty buildings. Furthermore, it also permits clearing lands for ~~made~~ the establishment of modern structures, leaving little to no-room for forestation and plantation. Thus, people lose an opportunity of temperate climate and clean air for

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inhalation. According to World Meteorological Department (WMD), there is around 40,000 billion tonnes of carbon dioxide stuck in the atmosphere. Thanks to urbanization paving path to unsustainable means contributing to global warming.

Rapid urbanization leads to rapid industrialization. Gone are the days when people used to experience serene environment far from the hustle and bustle of roaring traffic. If one goes to industrialized nations like US, UK, and China one would feel lost in a matrix of multiple roads and never-ending industrial hubs. According to World Bank 2022 report, China<sup>and</sup> US are the largest contributor to the level of carbon dioxide in the atmosphere. China is the largest manufacturing country in the world, and the largest importer of fossil fuels. This competition for economic hegemony is happening at the cost of staggering rate of global warming. As mentioned earlier, the temperature may rise to dangerous level of  $5.81^{\circ}\text{C}$  <sup>by 2100</sup> IPCC reports. Therefore, industrialization is happening at the cost of global warming.

Furthermore, ~~the~~ weapons of Mass Destruction (WMDs) are also one of the causes in warming the global atmosphere. Starting from mining for the Uranium, one of the major ingredients used in WMDs manufacturing, until the manufacturing of missiles and rockets every step releases equipment and machinery. These tools are undoubtedly releasing heat into the atmosphere. The story does not end here, when such weapons are used either in the training arenas

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or battlefields, they release thousands of tonnes of heat into the atmosphere. According to UN research agency report, US is the largest exporter of weapons, while Russia and France comes second and third respectively. Again, these weapons are not found naturally but they are made. Unfortunately, making leaps manifold in the education, the world has failed to acknowledge multidimensional causes of WMDs. Apart from taking lives, these weapons are risking the future lives by acting as a helping-hand in global warming.

Another cause of global warming is wildfires engulfing the <sup>global</sup> forest cover. The wildfire occurs either through human causes or naturally. When people go for picnic to jungle, or for some other purpose they possibly leave fire put-on which may lead to the whole forest catches fire. On the other hand, another common reason, nowadays, is the dangerous heatwaves. Climate patterns have been too unfortunate in the recent years, when some parts of a country experiences temperatures touching  $50^{\circ}\text{C}$ , while other parts are covered by cold weather. No one, but us, are responsible for unexpected weather patterns. According to AlJazeera news, the Hawaii's, island of Maui has been devastated by the horrendous wildfires, forcing thousands to flee, and killing dozens of people. Similarly, according to CNN news, the <sup>recorded</sup> hottest month of July 2023 has been considered the hottest in the past 120,000 years. Eruption of wildfire has become too common. This eruption not only it is diminishing the green cover but also is increasing the average temperature of the globe.

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The last major cause of the global warming is volcanic eruption. In volcanic eruption the earth-surface gets opened due to high internal pressure of the magma (liquid and semi-liquid rocks). This resultantly lead to a limited explosion expelling the hottest liquid and solid materials. According to researchers, volcanic eruption has several benefits, as it leads to fertile soil, possibility of new minerals and hydrothermal energy. However, on the other hand, this eruption also leads to addition of thousands of tonnes of heat <sup>radiated</sup> in the atmosphere. Not only addition of heat, it also releases gases, like  $\text{CO}_2$ ,  $\text{CH}_4$ , CFCs, which are the top-contender for global warming and green-house gas effect. Unfortunately, volcanic eruption is a natural phenomena, which is can not be withhold, Therefore, volcanic eruption is also counted as one of the causes of global warming.

Global warming is not a natural phenomena as some of the causes discussed above ~~is~~ proves. These, cause, thus, opens-up doors for the discussion of their impacts.

Global warming has reached to that extent that it has now become a threat to life. Temperature is rising continuously. As discussed above the world Meteorological Department has declared first week of July <sup>2015</sup> as the hottest in the whole world. The meteorological department of Kuwait declares temperature in the range between  $61^\circ\text{C}$  and  $64^\circ\text{C}$ . Temperature in Antarctica led to the death of several people due to heat strokes. Similarly, in the past four

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Years Europe experiences demise of over 1600 people, owing to extreme weather conditions. While, in Karachi over 1200 people have died in the past 4 years, as per Dawn.com. By analyzing the above mentioned facts, it is proved that global temperature instead of a source of energy is now taking lives.

The second visible impact of global warming is diminishing glaciers, vital for the sustenance of life. Due to rise in global temperature, and black carbon, after emanating from the <sup>burning of</sup> solid wastes, is settling on the apex of such glaciers, are becoming the reasons quickly diminishing glaciers' quantity. As per International Commission on Ice and Snow, African glaciers are facing 82% retreat, 11% in New Zealand, 25% in Chinese glaciers located in Tibetan plateau, and Russian glaciers 25% retreat. Similarly, as per Aljazeera news, in 2018 Antarctica loses one of the ice sheets to salty ocean water having area equal to Los London City, and not only this its ice sheets are breaking on daily basis extinguishing the quantity of available fresh water. Therefore, the rise in global temperature is wreaking havoc on the fresh water reservoirs, and making fresh it dangerously scarce for the humanity.

Global warming is making the sea levels rising to dangerously high levels. According to a report published in the Economist, 50% of the world population is living near the coastal areas within the radius of 50 km. Similarly, in Karachi, Kolkata, Colombo (Sri Lanka), Melbourne (Australia) almost all of their population lives in

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the coastal areas. As per IPCC, due to the diminishing glaciers, about 8 inches global sea level has increased. This increment points towards an alarming situation in the form of catastrophic floods, which may wipe out population living in coastal areas. Hence, it is the global warming which is diminishing fresh water reservoirs and increasing the global sea level leading to threatened coastal life.

This increase in global sea level also leads to a situation where people are compelled to migrate to safe places. In recent years, due to rising temperatures and unpredictable weather patterns, in the form of torrential rains leading to floods, have displaced huge chunk of population living in coastal areas in different parts of world. As per World Bank, in the past few years, ~~to~~ 3 to 4 million people have been displaced, in Jakarta due to floods, and are living in camps as stateless nations. Similarly, the torrential floods of 2022 in Pakistan displaced more than 3 million people and were on roads, as per Pakistan Meteorological Department (PMD). Recently, the government of Pakistan evacuates several hundred people living besides Sutlej River, due to probable floods after the alarming rise in that river, Dawn.com reports. Due to global warming, temperatures are rising, glaciers are melting and, hence compelling people to migrate or displace.

As the level of emissions is increasing day-by-day, the intensity of heaven-breaking catastrophes are also increasing. In the recent years, frequency of natural disasters have intensively amplified

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by leaps and bounds. According to CNN news, the wildfire erupted in Canada caused in more than 500 locations caused immense loss to the natural forests and infrastructure. In addition, according to Aljazeera news, the Typhoon Doksuri in China caused landsliding and flooding in its Fujian province. This intensity of disasters is not only limited to developed countries but the real victims are the developing nations. According to NDMA (National Disaster Management Authority), the floods of 2022 led Pakistan to lose road infrastructure more than 1000 kms, and several dozens bridges. This unprecedented situation is because of the global warming which had led to unforgiving climate scenarios.

Global warming has affected the agricultural sector, especially of agrarian economies, first, the rise in temperature leads to premature ripening of the agricultural products. According to Economic Survey of Pakistan 2022-23, in 2022 Pakistan faced 30 to 40 per cent reduced yield of mangoes. The country, resultantly, faced lower exports than other years. Similarly, the floods of 2022, caused destruction in the ripe fields of wheat, grains, and other fruits. Pakistan, which is an agricultural country, has around 22 per cent of its GDP made from Agricultural sector, according to that survey. This means, floods and heatwaves not only damage the agricultural yield but also damages economy, employment ratio and social well-being of farmers. Thus, global warming immensely impact the sensitive agriculture of countries that could lead to global food insecurity.

Global warming has the ability to impact the political stability between states and regions. This is because, every other day countries are facing natural calamities. Some parts of the world are facing extreme weather scenarios, <sup>like droughts</sup> while ~~at~~ rest of the parts are submerged in the flood like situation due to ~~the~~ continuous rains and rising sea levels. These conditions then further fuel the risk of water security, and the availability of ~~the~~ water for irrigation and drinking. For instance, Pakistan and China India are contesting the issue of dams being constructed <sup>on the</sup> ~~by~~ <sup>Indus</sup> ~~river~~ the latter. This will, in turn, reduce the ~~ad~~ flow of water to ~~the~~ water-scarce Pakistan. Similarly, Afghanistan, too is making dams besides the water lane flowing towards Iran. Recently, they had <sup>an</sup> exchange of fire on borders due to this issue, as per AlJazeera news. Countries are making water reservoirs to save for future, due to unprecedented weather patterns. Moreover, the Global South is the victim of the climate changes due to the emission by the ~~of~~ Global North. Hence, this could lead to a situation where there might be wars on global level ~~due to~~ between the victims and the responsible.

Last, but not the least, global warming hugely impact the economic well-being of countries. Economies flourish due to economic activities, ~~due to~~ <sup>and</sup> manufacturing and production. However, due to floods, droughts and extreme heatwaves, either businesses are closing their set-ups, or do not want to operate in those countries which are at the forefront of climate

Charges. This is because, anytime there could be the prolonged & duration of rains, eruption of wildfires, which, in turn damage and disrupt the businesses. By generalizing this on national level, it means the country would have less production, little available for the policy and for exports. Moreover, the country <sup>world</sup> faces an increasing level of unemployment, because natural calamities sweep everything with itself. According to Pakistan Economic Survey of 22-23, in the floods of 2022 Pakistan receives a damage of \$30 billion to its economy, whose impacts will be felt for years to come. Thus, global warming has multidimensional impacts. These impacts translate into economic degradation of countries.

There is always a reason behind what happens in this world, and so is true with global warming. However, for rectification, solution exists as well. Therefore, the following section would focus on the much needed solutions—regarding global warming adaptation and mitigation measures.

The first and widely discussed solution is using renewable energy resources. These resources include use of solar energy, hydel energy, wind energy and nuclear energy instead of using fossil fuels. According to a column in Dawn.com, presently there is 40,000 billion tonnes carbon dioxide present in atmosphere, and 40,4,000 tonnes are being added every year. Thus, if countries, especially the Global North, start transforming their production, manufacturing and transportation towards sustainable production, manufacturing and transportation, the world would be

a much better place to live. This practice and its impacts were felt during Covid-19 pandemic when the ozone hole got recovered. Moreover, according to New York Times, in USA 50 per cent power production is solar based. This endeavour, undoubtedly, is encouraging. Therefore, the need of the hour is mitigating the causes of global warming, in which reducing use of fossil fuels is utmost significant.

Secondly, the world needs to give special attention to the transportation. It is undeniably true that to run the system of this world transportation plays significant role, especially for business purposes. However, the use of fossil fuels, including hydro-carbons, invites multiple hazards to the species living on this planet earth. Emit Emissions from vehicles not only leads to global warming but it also leads to air pollution. Therefore, governments need to encourage public transport instead of using personal vehicles. They also need to impose taxes on older models, as UK has banned vehicles made before 2010, as per the Economist. Similarly, it is the responsibility of governments to offer modern hybrid buses with good facilities, as it is encouraging that the government of Pakistan have come up with Green bus and Pink bus initiatives. In addition, citizens need to use electric scooters, electric bikes, and cycles for shorter commute. This will, in result, play a significant role in reducing global warming.

Awareness and education have always been beneficial in every sphere of our lives. When it comes to problems like global warming, this depart-

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can play its due role. First, awareness regarding causes of global warming should be part of formal education. Especially in developing countries it will have positive impacts on the minds of youth. Moreover, governments need to empower and authorize the local governments, especially union councilors, to hold campaigns by propagating awareness to the root level. Similarly, media can revolutionize this endeavour by spreading the benefits of forestation and using renewable energy sources. Lastly, clerics, whom huge chunk of people from every religion always look upto, can be significant in this regard. Mitigating the use of fossil fuels and sustainable practices is possible by changing the minds. Since, charity begins from home; therefore, awareness and education regarding global warming is of immense importance.

Different sectors, including power sector, and industries including manufacturing industry, shipping industry release huge amount of carbon dioxide to the atmosphere. This in result, as it is evident, a quick increase in the temperature of the globe. However, decarbonization of such sectors and production hubs can largely reduce the quantity of emissions into the atmosphere. Such sectors, for instance the shipping department can use renewable energy like green hydrogen (combination of Ammonia and Methanol) instead of using fossil fuels. Similarly, government can also fund such organizations to step-up their transformation towards sustainability. It is encouraging that IMO (International Maritime Organization) goes zero emissions by 2050 through the use of green hydrogen. Therefore,

It is incumbent on the individual sectors and governments at large to take serious steps towards the resolution of global problems, global warming.

The last, yet important of all, step is the mutual international cooperation. It is unfortunate that developing countries are withstanding the impacts of the global warming, due to the acts of developed countries. For this purpose, developed world has to play multidimensional role in ensuring sustainable practices in developing countries. First, developed countries need to provide financial assistance to the developing nations. This is because, most of the time implementation is at standstill due to lack of financial support. Secondly, they can offer technical support in manufacturing and using renewable things and machinery. For instance, they can send team of electric cars experts to companies to manufacture sustainable cars. Furthermore, the Global South and Global North can work together on scientific innovation in order to vanish the already bulky stock of carbon dioxide in atmosphere. Thus, if ~~these~~ sort of cooperation is materialized, then hopefully the world would reap the benefits in the form of peace, prosperity and growth.

To conclude the whole discussion, it is the need of the hour that everyone recognize the looming threat of global warming. The manifestation of this global problem lies in the form of unpredictable climate patterns and unprecedented increase in global temperature. To overcome these humankind

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caused problems the current global world will have to take paradigm shift to in order to escape the net of heaven-breaking impacts of global warming. The world is experiencing a quick decrease in the glaciers, rise in the global sea level, rising intensity and frequency of disasters leading to migration and displacement and overall economic degradation. Thus, it is paramount that the world ~~recognize~~ <sup>adopt</sup> use of sustainable practices in the form of using renewable energy sources, eco-friendly transportation and forestation. Otherwise, it is not far that the world may get into the pandemic of global disasters. "We are living together on a single planet, which is threatened by our own actions. And if we don't have some kind of global cooperation, nationalism is just not on the right level to tackle the problems, whether it's climate change or technological disruption," says Yuval Noah Harari.