An Overview On Reason Behind the Climate Changes

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ABSTRACT: ***Global warming is just one aspect of climate change. The increase in average temperature is just one indication of larger effects that include severe heat, drought, floods, storms, rising sea levels, food production consequences, and infectious illnesses. Despite the fact that scientists have known for many years that greenhouse gases (GHGs) and climate change are linked, global governments have been sluggish to respond and take steps to minimise the dangers. The periodic reports of the Intergovernmental Panel on Climate Change (IPCC), established by the United Nations and the World Meteorological Organization in 1988, synthesise key sources of knowledge on climate change. The general consensus is that human emissions of fossil fuels and deforestation contribute significantly to the rise in atmospheric CO2 and other GHGs. The impact on actuarial techniques and assumptions, particularly future growth projections, is widespread in actuaries' work, including conventional life and non-life insurance, health and pensions, investing practises, and emerging sectors such as enterprise risk management.***

KEYWORDS: ***Climate Change, Global Warming, Greenhouse, Resource Sustainability, Temperature.***

1. INTRODUCTION

Climate change refers to how weather patterns change over decades or longer periods of time. Climate change is caused by both natural and human factors. Humans have contributed to climate change via the emissions of greenhouse gases and aerosols, as well as changes in land use, since the Industrial Revolution (i.e., 1750), resulting in an increase in global temperatures. Increases in global temperatures may lead to more storms, floods, droughts, and rising sea levels, as well as the melting of ice sheets, sea ice, and glaciers.

1.1. Process of Global Warming:

The sun's radiation provides energy to the planet. GHGs are essential for trapping heat and keeping the earth's temperature at a level that allows life to thrive. The greenhouse effect is a natural and essential phenomena for the survival of life on Earth. The planet would be about 33°C colder now if the greenhouse effect did not exist. As a consequence of increasing fossil fuel burning and deforestation in recent centuries, humanity have contributed to a rise in atmospheric GHGs. The main driver of global warming during the past century has been the increase in GHGs[1]. Since 1850, three major databases have been used to estimate global surface temperatures. Since 1900, these datasets indicate warming of between +0.8°C and +1.0°C. 4 Land-only data show rising trends of between +1.1°C and +1.3°C since 1950, indicating that land temperatures react to climate change faster than ocean temperatures. While global warming is usually assessed on multi-decadal time scales (30 years or more), attributing trends over shorter time periods may be difficult owing to natural variability.

Climate changes caused by internal interactions between the atmosphere, ocean, land surface, and sea ice are referred to as natural variability. These fluctuations occur whether or not climate change is present, and are often referred to as "noise" or typical variations around a "normal" number. Due to the flow of heat between the seas and the surface along the equatorial Pacific, the El Nio Southern Oscillation (ENSO) cycle is believed to be the greatest source of internal natural variability. Global warming does not always proceed linearly in response to increases in GHG concentrations due to this internal and natural variability, and different periods of accelerated warming and warming slowdowns are a natural source of variability[2].

1.2. Causing Global Warming:

A variety of variables have an impact on the earth's climate. The sun's energy output (warming effect), volcanic eruptions (cooling effect), GHG concentrations in the atmosphere (warming effect), and aerosols are among these variables (cooling effect). Carbon dioxide (CO2) has been the most significant contributor to global warming since the Industrial Revolution (i.e., 1750), followed by methane (CH4).

Not all industrial emissions contribute to global warming. Due to their ability to prevent solar radiation from reaching the earth's surface, aerosols produced by industrial pollutants have helped to counteract approximately 26% of greenhouse warming[3]. However, owing to aerosol interactions with clouds, there is a lot of ambiguity about how much of an impact aerosols have on climate. When compared to aerosols, 10 GHGs (especially CO2) have a longer residence period in the atmosphere (100 years) (only 10 days). As a consequence, industrial pollution may have a cooling impact in the near term, followed by long-term warming. Due to residence time, aerosols are anticipated to counteract a smaller proportion of greenhouse warming in most future scenarios, allowing for future warming to accelerate even without an increase in GHG concentrations. When solar energy collides with the earth's surface, it is retransmitted to the atmosphere as infrared heat radiation, causing the greenhouse effect.

The wave frequency of this radiation is lower than that of solar energy. Low-frequency heat radiation is absorbed by GHG molecules, causing them to vibrate. Infrared photons are emitted by these greenhouse molecules, and many of them return to the earth's surface. Heat is not absorbed by non-GHGs such as oxygen and nitrogen. Radiative Forcing (RF) in watts per square meter (W/m2) is used to quantify the greenhouse effect[4]. The total RF is predicted to have risen by 2.3 W/m2 (1.1 W/m2 – 3.3 W/m2; 90% confidence interval) during the Industrial Revolution, owing to the net impact of increasing GHG and aerosol concentrations in the atmosphere. Climate sensitivity is the reaction of the climate to changes in the earth's energy. According to the IPCC, equilibrium climate sensitivity (ECS) is used to assess the long-term reaction (100+ years) to a doubling of CO2 concentrations in the atmosphere, with estimates ranging from 1.5°C to 4.5°C. This equates to a +3.7 W/m2 increase in RF (+3.0 W/m2 to +4.4 W/m2) A Transient Climate Response (TCR) estimate, on the other hand, is used to determine the shorter-term (i.e., over 20 years) effects of doubling CO2 concentrations in the atmosphere, with estimates ranging from 1.0°C to 2.5°C. Because it takes time for the seas to warm up, the projections for the near term are lower.

1.3. Environmental and Social Impacts of Climate Change:

Climate change may have a wide range of environmental, social, and economic consequences. In most cases, these effects will be negative; but, in a few rare cases, they may be positive (such as increased crop yield). The intensity of the negative consequences will worsen as the average world temperature rises[5]. Even if global warming is limited to 2 degrees Celsius over pre-industrial levels, negative consequences will occur, and the world will need to adapt to new climatic conditions. It has been estimated that if the temperature rises above the 2°C barrier, despite global efforts, the effects would become more severe, pervasive, and permanent. Between 1950 and 2010, Canada's average temperature increased by 1.5°C. 18 Extreme weather events such as heat waves, heavy rain, floods, storms, droughts, and forest fires are projected to become more often and/or severe as a result of climate change in Canada. The locations where unfavorable effects will be felt across the world are listed below.

a. Floods and Droughts:

Flooding is projected to become more common over more than half of the planet's surface. They may diminish in certain areas. Snowfall is anticipated to decrease in the mid-latitudes throughout the winter, resulting in fewer severe snowmelt floods in the spring. Rainfall is expected to rise throughout the nation in Canada[6]. On the other hand, due to reduced rainfall and increased evaporation, meteorological droughts (less rainfall) and agricultural droughts (drier soil) are projected to become longer or more frequent in some regions and seasons, especially under the RCP 8.5, especially in British Columbia and the Prairies. Droughts that are more severe

may place extra strain on water supply systems in dry regions, but they may be tolerable in wetter locations if adaptation steps are taken.

b. Reduction in Water Resources:

In certain places, renewable water supply is projected to decrease, while in others, it is expected to increase. Because of increasing stream flow variations (due by greater volatility of precipitation and increased evaporation throughout all seasons) and periodic reductions, temporary water resource shortfalls are still conceivable in areas where increases are anticipated (because of lower accumulation of snow and ice)[7]. A warmer climate may cause poorer water quality, resulting in a reduction in clean water supplies. Toxins produced by algae, for example, may degrade the quality of water sources such as lakes. The rivalry for water will increase among agriculture, ecosystems, towns, industry, and energy production, impacting regional water, energy, and food security.

c. Rising Sea Levels:

Tides are up to three feet higher in certain areas, such as the United States' Eastern Coast, than they were 50 years ago. Rising sea levels will have an increasing number of negative effects along the coastlines, such as floods, shoreline erosion, and the submergence of low-lying areas, putting people, infrastructure, animals, and plants at danger. Rising sea levels, floods, and more severe storm surge threaten low-lying areas (like Bangladesh) and whole islands (like the Maldives and Kiribati) in the near future. Around 200 million people live within 30 miles of the ocean, and 15 of the world's 20 largest cities are situated near the coast (14 in Asia). According to a Reuter's estimate, more than $1.4 trillion of real estate on the coast would be at danger.

Ecosystems Changes Climate change has happened at a slower rate in the previous millions of years, allowing ecosystems to adapt. However, many believe that we have entered the Anthropocene in the twentieth century. The rate of extinction of species has accelerated by up to 100 times the “normal” rate (i.e., without anthropogenic impact). We are in the midst of a massive biodiversity crisis, and we may be on the verge of a sixth "mass extinction." All RCP scenarios increase the danger of extinction for terrestrial and aquatic species in the twenty-first century and beyond. Rapid changes in land and ocean ecosystems are anticipated to endanger both land and ocean ecosystems as early as 2050, especially under RCP 6.0 and RCP 8.5. It should be emphasized that ecological changes are considerably more than only a result of climate change[8]. Many causes contribute to mass extinctions, including urbanization, increasing global population, and so forth. Climate change, of course, has made its contribution, which will continue to grow over time.

d. Food Production and Security:

Climate change has already had an effect on terrestrial food production in certain areas across the world. Climate extremes such as droughts have occurred in key producing regions in recent years, resulting in many periods of food and grain price increases. Although these impacts are helpful in certain places, they have more negative repercussions than positive ones, particularly since major production centers (such as California) are situated in historically favorable areas that will become unfavorable. Many climate change effects, especially in low-latitude areas, will have an increasing influence on food security, which will be compounded by rising food demand. 26 Ocean level rise is expected to endanger important food-producing regions along the coastlines, such as India and Bangladesh, which produce a lot of rice.

2. DISCUSSION

2.1. Economic Impacts of Climate Change:

Climate change's environmental and social effects, as described above, will almost certainly have financial ramifications for many sectors of the economy. According to the Stern Review on the Economics of Climate Change, doing nothing about climate change would cost the world an annual loss of 5% or more in global GDP in perpetuity[9]. The projected costs may reach 20% of GDP or more if a wider range of impacts and eventualities are included in the study. In contrast, trying to stabilize atmospheric GHG levels within a range of

500–550 ppm CO2 equivalent is projected to cost 1% of global GDP per year, assuming we start adopting aggressive mitigation measures right now. As a result, this cost-benefit analysis provides a strong economic incentive to take decisive action sooner rather than later.

A worldwide shift away from fossil fuels and toward renewable energy, such as that predicted by RCP 2.6, would have far-reaching local and global implications for all economic sectors, and will offer both possibilities and dangers. For example, historically, the increase of energy consumption has been closely linked to the development of GDP per capita, particularly in low- and middle-income countries. Moving away from fossil fuels carries the danger of "stranded assets," but taking steps to combat climate change would open up new markets for low-carbon energy technology and other products and services[10]. “These markets have the potential to develop to be worth hundreds of billions of dollars each year, resulting in increased employment in these industries. There is no need for the world to choose between combating climate change and supporting growth and development. As a result, both the physical effects of climate change and adaptation strategies will have an influence on almost every area of the economy. Here are a few examples.

- The insurance sector will be impacted by the increasing frequency and severity of severe weather events, generating more damage and higher loss volatility in property/casualty, life, and health insurance. It may make it more difficult for insurance companies to offer coverage at a fair rate and raise risk-based capital.
- Human health effects will increase the demand for healthcare and put further strain on current healthcare systems.
- The financial services sector may be affected on many levels depending on the susceptibility of their asset/loan portfolios to climate change.
- Weather-sensitive industries including agriculture, forestry, fishing, tourism, hydropower, transportation, and mining will all be affected.
- Productivity and economic growth may suffer.
- Extreme weather and climatic events may jeopardize pipelines, power networks, and transportation infrastructure.
- In both residential and commercial buildings, the demand for heating may decrease while the need for cooling increases.

Economic cost estimates and forecasts are complicated and depend on a variety of difficult-to-determine assumptions. They varies greatly across nations. “To evaluate the possible effects of climate on major economic systems and sectors, greater research, gathering, and access to more comprehensive economic data, as well as the development of analytic techniques and tools, will be required.”

World Perspective on Climate Change Consequences As average global temperatures rise, the climate change impacts described above will result in increased risk exposure. The degree of extra danger associated with various degrees of possible global warming based on two RCPs, as well as the projected global warming trends. Climate change effects are expected to vary significantly across areas and occur on various time periods, according to climate change predictions. It's essential to remember, however, that there are a plethora of interrelationships between communities all around the globe. Climate change impacts in one area may have repercussions all across the world via globally interconnected systems like the economy. Extreme weather disrupting agricultural harvests or rising sea temperatures reducing fishing yields in a particular area, for example, may have a global impact on both pricing and food supplies. Furthermore, climate change may alter human, other living creatures, and physical material migration patterns, resulting in unintended effects elsewhere, even in distant regions. “Migration can have a positive or negative impact on many aspects of the regions people leave, as well as many aspects of the destinations they choose, such as income levels, land use, natural resource availability, and the health and security of the people affected these effects can be positive or negative.

In addition, the population is expected to reach 8 billion people by 2030. According to the United States National Intelligence Council's "Global Trends 2030: Alternative Worlds," demand for food, freshwater, and energy will increase by 35 percent, 40 percent, and 50 percent in less than two decades due to rising global population and changing consumption patterns of a growing global middle class. 36 Water, food, and energy are becoming more intertwined, according to new research. As a result, sustainable solutions to problems such as water scarcity, food security, and energy difficulties should take this connection into account to prevent unexpected effects in other areas. For these reasons, rather than concentrating on a region- or sector-specific perspective, we must keep global well-being in mind in order to serve the public interest and offer the best recommendations to our customers.

2.2. Sun Causes:

Warming of the Planet because the sun is the main facilitator of the earth's energy content, one of the most obvious reasons is that the sun governs the ups and downs of the earth's climate. The sun's change in radiative force has been estimated in a variety of ways. Between 1750 and 2011, the IPCC AR5 report projected a range of 0.0 to +0.1 W/m2 change, with human forcing contributing 2.3 W/m2. Solar radiation has been decreasing since the beginning of the satellite era in 1979. Solar forcing is thought to have been somewhat higher in the first half of the twentieth century, contributing between 0.1°C and 0.2°C of warming, and has been relatively flat since 1950. 80 79 While there is a positive connection between solar activity and earth's temperature before 1940, the two diverge in years thereafter. As a result, the sun is no longer a viable explanation for global warming.

3. CONCLUSION

The purpose of the article was to provide generally recognized global perspectives on climate change and resource sustainability. It is difficult to get 100 percent acceptance on any controversial subject. There are certainly opposing viewpoints on these two topics. Each point of view must be assessed on its own merits. Many actuaries, on the other hand, must translate this data in order to evaluate past, present, and future hazards. The planet has been dramatically warming in recent years. This is mainly due to rising levels of greenhouse gases (GHGs), especially carbon dioxide. The combustion of fossil fuels and deforestation are widely acknowledged as the main contributors to the rise in CO2 concentration. This is creating climate change, which will have far-reaching consequences for life on Earth. Extreme temperatures, floods, hurricanes, storms, droughts, and rising sea levels, to mention a few, will all become more common. If no urgent action is done and GHG concentrations continue to rise unabated, the effects may be catastrophic, and mankind could approach a point of no return.

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