Phase to Control on Global warming and protect the Earth Surface Review

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Abstract* — *This study on impact from climate change as a result of global warming, including deadly heat waves, extreme weather events, and threats to life on earth. There is no denying that human activities, including the burning of fossil fuel and destruction to our natural environment, is behind global warming. This is contributing to the increasing population health risk resulting from pollution exposure. . Literature on the seasonal spatial-temporal distribution of air pollutants within urban cities is presently scanty. This study evaluates the local and global warming and climate change, air pollution trends in educational to assess the outdoor air quality. The finding the cities from the center of economy in many countries, so climate changes impact on urbane populations also damage the nations .for every meter rise in sea levels , the world bank loss of 2% in national gross domestic product due to shortage, of fresh water , and reduce the sefty. With solution on the reviews new work plan separate into three work group .1 has goal technically support and guide particles' impactions actions. In particular, this foresees the provision of guidance on adaptation planning and implementation at the national level.2 focus on the implementation of adaptation measures to ensure that Parties have the financial, technological and capacity-building means to implement adaptation actions. Finally, 3 aims at the timely and adequate reaction to climate change threats and therefore concentrates on awareness-raising.

Keywords*— *Global warming, climate change, greenhouse gases, uncertainties, feedback mechanisms

• INTRODUCTION

Global warming is in the news. While scientists agree that temperatures are rising, they disagree as to the causes and the rate of change. How much will temperatures rise, and how soon, and what will be the effects? There's a lot we still don't understand, because climate is enormously complicated. So are the factors that make the Earth habitable, of which temperatures only one. For example, certain types of air pollution cool the atmosphere and thus might act as agents to offset global warming, but they also make the air hard to breathe.

- Earth's atmosphere creates natural greenhouse effect which keeps the earth's surface warmer than it would have been otherwise. Life is an integral part of the earth system and all living things influence the composition of greenhouse gases in the atmosphere by "inhaling" and "exhaling" carbon dioxide and oxygen, thereby maintaining chemical balance in the atmosphere.
- A range of human activities, which include majorly the burning of fossil fuels, industrial activities and the cutting down of forest for agricultural purposes and urbanization, are substantially increasing the concentrations of greenhouse gases in the atmosphere, thereby upsetting this atmospheric chemical balance. The municipalities are inefficient and unsuccessful in managing the garb a menace in cities.
- These include the magnitudes and patterns of long term natural variability and the time-evolving patterns; and responses to changes in the concentrations of greenhouse gases and aerosols, and land surface changes.
- An international environmental treaty, called Kyoto Protocol, linked to the United Nation Framework Convention on Climate Change (UNFCCC).
- The details of our complex climate systems are no sufficiently known to enable us predict the exact consequences of the increasing greenhouse gases on global temperature in particular and climate change in general.

The governments of industrialized nations to take appropriate measures that would control and stabilize global warming by reducing greenhouse gas emissions to a level that would prevent dangerous anthropogenic interference with the climate systems.

- **EVIDENCES OF GLOBAL WARMING FROMINDEPENDENT MEASUREMENTS**
  - Results from the analysis of three independent sets of **observations** namely, surface air temperature measurements, sea level changes and temperature profiles in boreholes all shows that the surface temperature of the earth is on the increase there by warming up the globe. Results obtained from each of these sets of observations confirm and complement each other. In addition, images from satellite observations of the earth surface and lower atmosphere reveals details of the effects of the increasing concentration of greenhouse gases on global warming.

I Surface temperature

- The daily temperature measurements are combined to produce mean weekly, monthly and annually temperatures Thus, the average annual temperature change from year to year can easily be tracked.
- Measurements of air temperature made at weather stations were integrated with measurements of sea temperature to produce mean annual temperature for the entire globe.

Figure 1. Global mean annual temperature obtained combining air temperature measured at weather stations on continents and sea temperature measured along ship tracks on the oceans .This time series is the direct, instrumental record of global warming from 1850 to 2008; the year 2007 was the eight warmest year on record, exceeded by 2005, 2003, 2002, 2004, 2006, 2001 and 1998 (Climate Research Unit, 2009).

- The graph shows a gradual increase in temperature with a minimum anomaly of about -0.5°C to a maximum of about +0.5°C. The graph indicates a steady increase in surface temperature between 1860 and 1910 and a rapid increase between 1910 and 1945, stabilizing for about 3 decades and increasing rapidly again after 1975.
- In the last two decades, the global mean temperature has increased by 0.1°C per decade, with 2005 being the warmest year on record (NASA, 2005; 2009). Statistical methods are used to close the gaps in the measurements. The effects of large population centers on the global mean temperature, called "urban heat island "effect" are computed and corrected for; however, this account for less than 15% of the observed global warming. Global warming is not uniform across the globe,
- Both in time and in space; high latitude regions generally experience more warming than low latitude regions. All regions of the earth have experienced years of cooler temperature imbedded within the warming trend. The observed spatial and temporal irregularity global warming is an indication of a chaotic nature of global warming and climate change

II Sea level rise

- Another pointer to global warming and climate change comes from a completely independent set of observations (the measurements of sea level changes). The volume of water in the oceans is increasing due to thermal expansion of water in the oceans, and the melting of glacier and polar ice, resulting from increasing warming of the earth. As in temperature measurements, daily sea level observations are made at many locations; daily sea

level fluctuations, mainly due to tides and storms, are averaged out to obtain mean sea level over a given period of time.

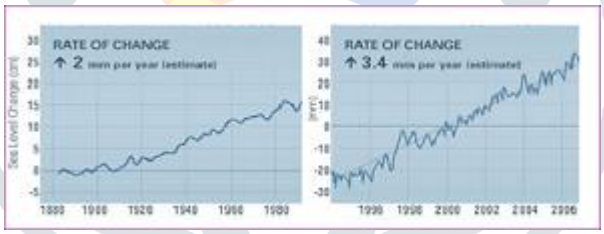

Figure 2. Mean annual sea level rise associated with the thermal expansion of sea water due to warming and widespread melting of ice sheets. Left chart: Historical sea level data derived from 23 tide-gauge measurements. Right chart: Average sea level since 1993 derived from global satellite measurements (NASA, 2009).

- The mean annual sea level change the mean annual sea level change between 1880 and 2008 is shown in Figure 2. The mean sea level rose by about 18 cm in the last century (IPCC Report, 2007b); it rose by an estimated average of 2 mm per annum between 1880 and 1990 (left chart in Figure2) and is currently rising at the rate of about 3.4 mm perineum (right chart in Figure 2). Like global temperature changes, sea level changes are no steady and the detailed changes are not exactly synchronous with surface temperature measurements. The thermal expansion of the water column tends to come later than the corresponding change in surface temperature; the differences are affected by ocean currents. The observed irregularity in sea level changes is another indication of the complexity and chaotic character of the interactions being witnessed by our planet resulting in climate change.

III SATELLITES OBSERVATIONS OF EARTHLIGHTS

- The solar radiation from the sun is balanced by the thermal radiations emanating from the earth; this energy balance determines the surface temperature of the earth. The incoming solar radiation depends on the solar output and the distance between the sun and the earth, and is independent of the surface temperature of the earth. On the other hand the outgoing thermal radiation from the earth strongly depends on the earth's surface temperature.
- If the atmosphere was composed only of nitrogen and oxygen molecules, which do not absorb thermal radiation, the surface temperature of the earth would be controlled to about -6°C by the energy balance.
- The presence of greenhouse gases, majorly water vapor, carbon dioxide and methane, in their natural abundance in the atmosphere would cause some of the outgoing thermal radiation to be trapped, thereby establishing a new energy balance

with a surface temperature of about +15°C. This phenomenon, which amounts to 21°C of warming of the earth's surface, is usually called natural or beneficial greenhouse effect.

- Details of the effect of greenhouse gases in the atmosphere are confirmed by satellite observations of the earthlight (Figure 3), the outgoing thermal radiation from the earth. Without an atmosphere to absorb thermal radiation, the atmospheric radiance is mapped by as smooth curved called the spectrum which peaks at wavelength of about 20μm, almost 40times the wavelength of the incoming visible light. But not all the thermal radiation gets out, as much of the thermal radiation is absorbed by greenhouse gases: water vapor (45%),carbon dioxide (30%), methane (20%), and other minor greenhouse gases that account for the remaining 5%.
- This shows that most of the outgoing thermal radiation is absorbed by water vapour and carbon dioxide. But the change that occurs in the amount of water vapour in the atmosphere due to human activities is negligible. The greenhouse gases (Figure 4) that are changing rapidly as result of human activities are carbon dioxide, methane, nitrous oxide, ozone and chlorofluorocarbons (CFCs),and carbon dioxide is the most worrisome. The irradiative forcing increases with increasing atmospheric concentration of the human-derived greenhouse gases. The five gases shown in Figure 4 account for about 97%of the direct climate change forcing by long-lived greenhouse gas increases since 1750 and the remaining 3%is contributed by an assortment of 10 minor halogen gases

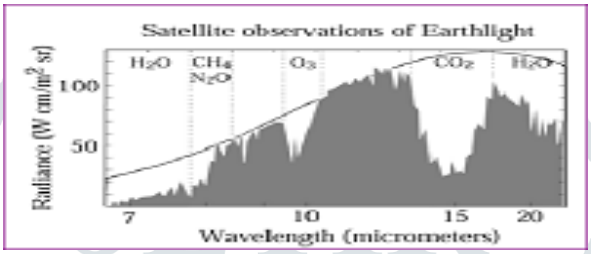

Figure 3. Earthlight confirms greenhouse effect; thermal radiation emitted from the earth's surface as observed by satellite instrument looking down the earth (irregular line). .

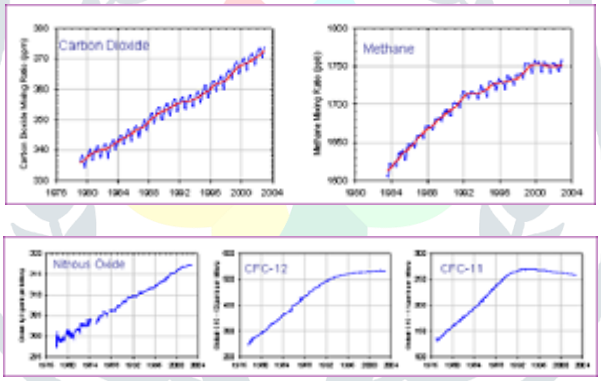

Figure 4 Global trends in major long-lived greenhouse gases between 1997 and 2003. The five gases shown account for about 97% of the direct climate change forcing by long-lived greenhouse gas increases since 1750 and the remaining 3% is contributed by an assortment of 10 minor halogen gases.

- The major sources contributing to the increasing concentration of carbon dioxide in the atmosphere include the burning of fossil fuels, cutting down of forest for agricultural purposes and industrial activities. About5.4 billion metric tons of carbon is released into the atmosphere annually from the burning of fossil fuel. About 1.6 billion metric tons of carbon is in addition emitted into the atmosphere by deforestation for agricultural and other land use purposes.

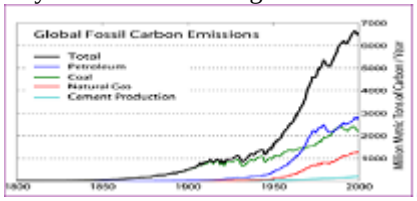

figure 5 Global annual fossil fuel carbon dioxide emissions in million metric tons of carbon

- Figure 5 shows the global annual fossil fuel carbon dioxide emissions in million metric tons of carbon.. The data for the plots in Figure 6 were originally presented in terms of solid (coal), liquid (petroleum) and gas (natural gas) fossil fuel sources, and separates terms for cement production and gas flaring (natural gas lost during exploitation of oil and gas). The plot for gas flaring is the smallest of all the categories and was added to the total emission of carbon dioxide from burning of natural gas.
- The combined emissions of carbon dioxide from fossil fuel sources and deforestation amount to about 30% increase in the concentration of carbon dioxide in the atmosphere from 280 to 385 parts per million by volume (ppmv) since 1860.

- The results show a rise and fall of carbon dioxide in the atmosphere to about 6 ppmv per annum, indicating the growing and dormant seasons for plants; but the annual maximum and minimum carbon dioxide increases by about 1.5 ppmv. This annual growth in the concentration of carbon dioxide in the atmosphere poses a major threat to global warming and climate change because the average lifetime of carbon dioxide in the atmosphere is 100 to 150 years.
- Carbon dioxide can only be depleted by dissolution in the oceans over time, but much of it is spewed back to the atmosphere as a result of warming.

- **UNCERTAINTIES IN THE FUTURE COURSE OF GLOBAL WARMING AND CLIMATE CHANGE**
  - Observations made from surface temperature measurement at weather stations, sea level rise and borehole temperature profiles Global climate change desert encroachment, deforestation, more turbulent weather, increased flooding and drought, and many more – attributed to the global warming are being witnessed across the globe.
  - The concept of global warming and the consequent climate change has not been generally accepted by all players; most governments have not made reasonable efforts to reduce the emissions of greenhouse gases. This is because th following hypothesis could explain global warming and climate change: possible variations in solar radiation or natural variations in earth's temperature independent of human activities, which are yet to be understood, may be responsible for the observed warming and climate change.
  - Atmospheric abundance of greenhouse gases is increasing due to human activity.
  - increased concentration of greenhouse gases in the atmosphere leads to warming at the earth's surface.
  - Carbon dioxide build up is particularly serious because it remains in the atmosphere for decades to centuries
  - - Build up of aerosols, anthropogenic or natural, inhibits incoming solar radiation and thus tends to offset global warming by cooling.
  - - The earth's surface has warmed on the average by 1°C over the past century. The global mean amount of water vapour in the atmosphere will increase with increasing global mean temperature.
  - The 20th century global warming is consistent with model predictions of expected greenhouse warming
  - Doubling carbon dioxide concentration in the atmosphere from 270 to 540 ppmv will lead to a total warming of about 1.5 to 4.5°C.
  - Sea level could rise by 25 to 75 cm by the year 2100 caused mainly by thermal expansion of sea water, and melting of ice sheets could lead to a further sea level rise.
  - Higher latitudes of the northern hemisphere will experience temperature changes much more than the global experience temperature changes much more than the global mean increase.
  - The range in the above predictions is caused by the uncertainties in modeling based on two important mechanisms: forcing and feedbacks, which determine the direction of changes in the climate system. Climate forcing are the initial drivers of climate change. Solar irradiance is one important climate forcing that scientists are not too confidence about. The sun has a well known eleven year irradiance cycle that produces 0.08% variations in output (IPCC 2007c) which have been incorporated into climate models.
  - Aerosols forcing is another substantial uncertainty in the prediction of climate change. Aerosols from both natural and man-made sources have different effects on climate. Sulphate aerosols from the burning of fossil fuels and volcanic eruption tend to cool the earth, but other kinds of atmospheric particles have opposing effects. The global distribution of aerosols has only been tracked for about a decade, from the ground and satellites, and these measurements cannot accurately distinguish between particulates.

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- **POSSIBLE MEASURES TO REDUCE GLOBALWARMING AND CLIMATE CHANGE**
  - The use of non-fossil fuels can be greatly improved by unleashing our engineering, economic and political entrepreneurs. This could help us in moving towards greater use of renewable energy resources and non-fossil fuels. Technological development geared towards energy efficiency, renewable sources and non-fossil fuels could allow developing countries to skip the carbon intensive energy production stage of industrialization.
  - This approach could simultaneously reduce the excessive energy consumption in developed countries, thereby controlling global warming and climate change in the short-to-medium term. Other ways carbon dioxide emission could be reduced include establishment of stringent standards for power plants, development and marketing of high efficiency but cost effective automobiles, and provision of financial incentives for energy efficiency in industries and homes.
  - The planting of more trees is a more direct and practical way of combating global warming and climate change because forests sequester a large amount of carbon dioxide in the leaves and soil. However, this would require vast regions and would compete for lands needed for agricultural purposes to feed the growing population.
  - Improvement in agricultural technology and productivity for crops like rice, wheat, maize and barley is required to best make use of the limited crops lands. Storing carbon in forest and agricultural areas is an important and cost effective part of the bigger strategy that should be used to control carbon dioxide emission into the atmosphere.
  - Pollution model is another proposed technique that could be used to combat global warming and climate change. Sulphur could be injected into the stratospheres as to block incoming solar radiation and thereby produce cooling at the earth's surface. Changing the reflectivity of the land and ocean surface could also increase the amount of solar radiation reflected back into space.
  - The oceans could be made to absorb more carbon dioxide by increasing its alkalinity. These proposed methods are not cost effective and could alter rainfall pattern across the globe, cause more damage to the ozone layer, and have other unexpected environmental draw backs on the long run.

- This assertion is based on the reality of population growth, energy consumption as it relates to standard of living, and energy production to meet the demand of the growing population.
- About 90% of the present global energy need is produced by burning of fossil fuels coal, oil and natural gas, which substantially increase atmospheric concentration of greenhouse gases, principally carbon dioxide and methane. Thus, the drive towards higher standard of living especially in the developing countries combined with the growing global population will aggravate the concentration of greenhouse gases in the atmosphere which will result in more severe effects of global warming and climate change.
- The developing countries are still seen as relatively small players on the energy scene. They accounted for only 15% of global demand for commercial energy in 1970 and increased to 26% in 1990 despite the crippling effects of oil price rises and heavy indebtedness.
- To expect the developing countries to cut down on fossil fuel consumption may seem unfair, given that there are enormous disparities between their stages of development and fossil fuel consumption. Also, it would be inequitable and unfair to propose that the developing countries forego opportunities for bettering their standards of living in order to solve a global problem which in any case is not of their making.
- As high-population countries such as Nigeria, India, Pakistan, China, and Indonesia increase their standard of living, the total global energy consumption will increase significantly. Thus, the energy consumption path these countries choose will have major implications on global energy demands and demands and will influence greenhouse gas emission onthe long run.

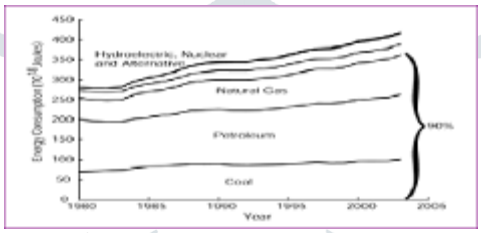

Figure 6 Global energy consumption with a growth rate of about 1.3% per year

The 1°C increase in surface temperature of the current warming episode and the prediction of a global mean temperature increase of 3°C in the next century are very unusual. This prediction is even more alarming as regional warming, for example in the arctic, is expected to be 3 times as great as the global mean

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Conclusion

- To effectively control and stabilize the effects of global warming and climate change would require the integration of global commitments, good public leadership initiatives as well as individual actions. Changing the future projections of the curves shown in Figures 7 and 8 would be the most general solution to the dilemma of global warming and climate change.

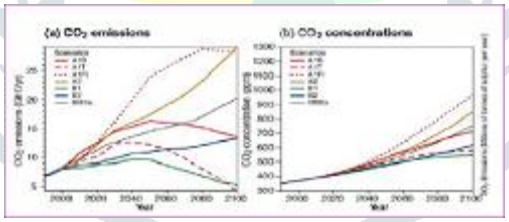

Figure7 The atmosphere of the 21st century.
Left: Seven scenarios for carbon dioxide emissions combined with projections for human population, technology, economics, and a sustainability ethic.
Right: Each emission scenario results in a growth of carbon dioxide concentration for the next 100 years (After IPCC, 2007c).

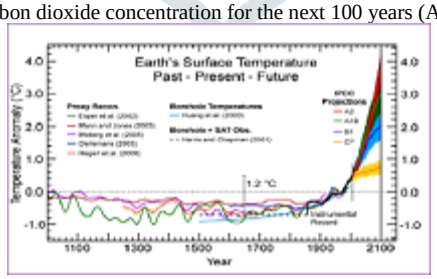

Figure 8. Projected global warming and climate change for the next century indicating continuous increase in surface temperature from 1 to 4 degrees C. Also shown are smoothed reconstructions of large-scale (Northern Hemisphere mean or global mean) surface temperature variations from seven different research teams, each with slightly different data sources, shown along with the instrumental record. However, all of the reconstructions provide a consistent picture of temperature variation over the last millennium (IPCC, 2007a).

- Global population growth should be brought under control (Figure 9),especially in developing countries that are already densely populated. Both the developed and developing countries should work towards achieving high standard of living within the sustainable per capita energy consumption range of 100 to 150 GJ (Figure 10). The developed nations, especially Canada, Australia and the United States should reduce their excessive energy consumption. Developing countries should strive to maximize their HDI at the least growth in energy consumption, using feasible and realistic models other than those used in the developed world.

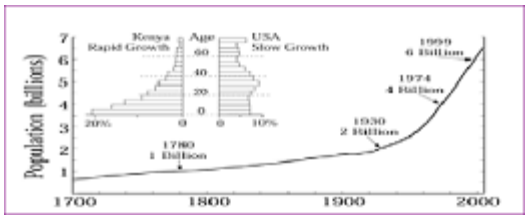

Figure 9. The global population growth traced from1700 to the present; population distributions, in five-year age brackets, are shown for rapid and slow growth countries (inset).

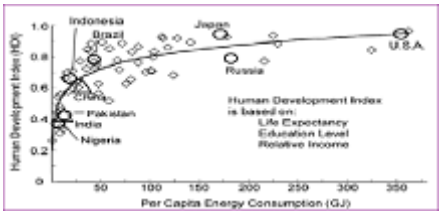

Figure10. The human development index (HDI) for individual countries showing a strong dependence on per capita energy consumption. Different symbols indicate country populations: 1 billion or more (triangles), 100 million to 1 billion (circles) and less than 100 million (diamonds).

- The creative talents of engineers and scientists should be harnessed and challenged to improve energy efficiency and the use of non-fossil fuel so as to reduce the dependency on fossil fuels (Figure 6).
- To achieve the economic potential of improved energy efficiency and non-fossil fuel utilization, governments and policies makers should provide a combination of targets and timetables, efficiency regulations and arrays of market-based incentives that would encourage businesses to make the necessary investments on the reduction of greenhouse gases emissions
- Such measures could include: mandating high energy-efficiency standards, retrofitting buildings to conserve energy, increasing subsidies that promote and encourage no fossil and renewable energy sources, encouraging the production and use of more energy efficient vehicles, and assisting municipalities with planning that minimizes vehicle use.
- stabilize global warming would mean more greenhouse gases in the atmosphere, more melting of ice sheets, more turbulent weather, and more redistribution of precipitation. The redistribution of Rainfall would mean more flooding and in places that previously have less of rain and more droughts in places that previously have more rain. More warming would mean more mass extinction, many species of plants and animals would go into extinction. For example, collar reefs, which have been around for about 250 million years, are collapsing due to climate change, acidification and ocean warming; about 20% of coral reefs have already disappeared and about 24% is gravely threatened.

REFERENCES

[1] Environment: ocean iron fertilization moving forward in a sea of uncertainty, Science 319.
[2] Global warming – more than hot air, J. Land Resour. Environ. Law, 27(1).
[3] Climate Research Unit (2009). available at [http://www.cru.uea.ac.uk/].
[4] Climate change on the Colorado Plateau of Eastern Utah inferred from borehole temperature, 100JGeophys. Res., p.6367.
[5] Evidence and implications of recent climate change in northern Alaska and other arctic regions. Clim. Change 72: 251- 298.
[6] IPCC (2007a). UN Intergovernmental Panel on Climate Change,Fourth Assessment Report – climate change, [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf].
[7] IPCC (2007b). UN Intergovernmental Panel on Climate Change, Supra notes 2.
[8] IPCC (2007c). UN Intergovernmental Panel on Climate Change, Fourth Assessment Report, Technical Summary, Section 2.7. p. 30,
[9] Lanchenbruch H, Marshall BV (1986). Changing climate geothermal evidence from permafrost in Alaska Arctic, 234 Science, 689.
[10] Mahlman JD (1997). Uncertainties in projections of human-caused climate warming. Science, 278: 1416
[11] Marland G, Boden TA, Andres RJ (2003). "Global, Regional, and National CO2 Emissions.