GLOBAL WARMING AND ITS EFFECT ON THE ENVIRONMENT

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Abstract- Global warming is the enhancement in the average temperature of the air surface near the earth which is occurred during last decade. It is clear that global temperature has been rising since the nineteenth century and the specific density of greenhouse gases in the atmosphere is rising due to human use of fossil fuels as well. Increase in global temperature can cause changes such as rising sea levels, changes in precipitation patterns, melting ice glaciers and spread of diseases such as yellow fever, Dengue fever and malaria. In addition, global warming can affect animal evolution, the pattern of flowering plants and their interactions with pollinator insects, surface wind speed and agricultural production.Since the main cause of global warming is human emissions, reducing emissions cause reducing global warming in the future.

Keywords- Global warming, greenhouse gases.

I. INTRODUCTION

Global warming is the enhancement in the average temperature of the air surface near the earth and ocean's surface in recent decades and it is growing fast. Climate models represented by the Intergovernmental Panel on Climate Change project indicate that global surface temperature is likely to increase from 1.1°C to 6.4°C (2.0-11.5°F) during 1990 and 2100 [1]. Unfortunately, recent human activities are enhancing the natural greenhouse effect. So the density of some certain greenhouse gases in the atmosphere are increasing [2].
The main greenhouse gases in the atmosphere are aqueous vapor (H_2O), carbon dioxide(CO_2), nitrogen oxide(N_2O), methane(CH_4) and ozone(O_3)[3].Someof these gases are produced naturally and some others are the result of human activities[2].About 95% of the greenhouse effect includes aqueous vapor and CO_2 and the rest, about 5%, includes O_3, CH_4, N_2O and chlorofluorocarbons(CFCs). Aqueous vapor is the most abundant gases in the troposphere, but because its volume is almost fixed and it has short residence in atmosphere, its impact on global warming is negligible[3].

II. GREENHOUSE EFFECT

Greenhouse gases are the main cause of the greenhouse effect. Global warming as the results of green house effect refers to rising of the earth's surface temperature[3].Thus, most of the infrared radiation which is released by the earth's surface is being trapped, as a result the planet islosing less heat, so we are beginning to experience a phenomenon called "global warming"[2].

Greenhouse gases[4] contain carbon dioxide, methane, nitrous oxide, hydrocarbons, per fluorocarbons and sulfur hexafluoride. Among them, Carbon dioxide, methane and nitrous oxide are naturally produced and others like hydrocarbons (hydro fluorocarbons (HFCs), per fluorocarbons (PFCs), and sulfur hexafluoride(SF_6) and their derivatives are generated artificially.HFCs and PFCs are the most heat absorbent. In comparison with carbon dioxide, methane and nitrous oxide absorb more heat per molecule. For struggling and protection against many of these greenhouse gases, nature acts like a reservoir that takes up a chemical product from one part of the cycle to another. Soil and trees as a natural reservoir, absorb hundreds of billions tons of carbon in the form of CO_2[4]. Needless to say that activities such as uncontrolled deforestation would enhance global warming and could ultimately cause an environmental disaster[5].

III. CAUSES OF THE GLOBAL WARMING SINCE THE 19TH CENTURY UNTIL NOW

Measurements show that the global average near earth surface temperature has increased about 0.8°C since the 19th century. It is obvious that as the density of certain greenhouse gases increase, the global warming increase as well. The enhancement of the density of greenhouse gases have risen in Earth's atmosphere due to consumption of fossil fuels by humans and it should be noted to make conclusion about the rising of global temperature caused by the increasing the recent greenhouse gases, is difficult. Because the greenhouse gases are not the only factors affecting Earth's climate, external and natural factors such as volcanoes and changes in solar irradiance also alter global temperatures.
In a study in 2012, Michael j.ring and et.al have found two independent methods are used to analyze the temperature measurements: Singular Spectrum Analysis and Climate Model Simulation. The concurrence of the results of the two methods, each using 13 additional years of temperature measurements from 1998 through 2010, showed that it is humanity, not nature that has increased the Earth's global temperature since the 19th century. Humanity is also responsible for the most recent period of warming from 1976 to 2010. Their findings have confirmed that human emissions are the main

cause of the global warming over the past 150 years. Since human emissions are the cause of the global warming, reducing emissions will reduce the amount of warming in the future[6].

IV. HUMAN ROLE IN GLOBAL WARMING PRE INDUSTRY

Agriculture has started 11,000 years ago in the fertile area of the eastern Mediterranean, later followed by Chinese and American Indians. This activity grew very rapidly, about 2000 years ago all the major food crop has been cultivated. Agricultural activities have begun donating CO_2 greenhouse gases since about 8000 years ago, with the conversion of natural forest to agricultural land on a large scale in Europe and China. The remains of the burned or decomposing trees release CO_2 into the atmosphere[7]. Other greenhouse gases, CH_4, is produced by the agriculture supporting activities such as animal husbandry and burning of land for hunting, but the CH_4 in large numbers began to be donated about 5,000 years ago, since the discovery of wet fields techniques in southern China. This technique led to the decomposition of organic materials by anaerobic bacteria and produce CH_4[8]. This technique has spread to Southeast Asia and India since 3000 years ago[9].

V. INDUSTRIAL PERIOD

The industrial revolution in England began in 1765 with the discovery of steam engine works with coal fuel. This machine contributes the releasing of CO_2 and carbon black (aerosols) in the air, but an increase rate ofCO_2 emissions to the air on a large scale began with the discovery of gasoline engine(1876) and diesel(1893) of petroleum fuel. Industrial activity not only produces CO_2 and CH_4, but also produces various kinds of other greenhouse gases as set forth in the Montreal Protocol and Kyoto Protocol. CO_2 gas is the largest contributor of greenhouse gases. Since the industrial revolution, its levels in the atmosphere have increased up to 83 ppm, from 280 ppm(in 1800) to 363 ppm(in 1990). The main sources of CO_2 are coal and petroleum. The largest contributor of greenhouse gases up to now, although recent studies of some NASA researchers give opinion about a large number of the contribution of non- CO_2 gases in global warming[10]. The United States is the largest contributor to CO_2 and up to now is not willing to implement the Kyoto Protocol[3].

VI. EFFECTS OF GLOBAL WARMING

An increase in global temperatures can cause changes, including sea level rise, and changes in the amount and pattern of precipitation, resulting in floods and drought. Experts have also warned that the melting ice glaciers could release bacteria, fungi and viruses incorporated during the freezing process that have been lying dormant for thousands of years that people thought have been eradicated. Heat could make common viruses develop strains to which people have no resistance and increases in the ranges of disease vectors[1]. Global warming can reportedly influence animal evolution, increased disease prevalence and disease progression and even animal extinctions. [11].

Global Warming causing temperature rise in environment may effect to change in the atomic properties of the elements like motion, valiancy, magnetism, electrostatic, conduction, electronic structure, crystalline structure, electro positivity and electro negativity etc[12].

VII. GLOBAL WARMING AND INFECTIOUS DISEASE

Global warming has serious implications for all aspects of human life, including infectious diseases. The effect of global warming depends on the complex interaction between the human host population and the causative infectious agent. Global warming will certainly affect the abundance and distribution of disease vectors[4].Most infectious diseases are transmitted by insects and vectors that are accustomed to certain climate conditions. Climatic factors influence the emergence of infectious diseases by shifting the geographic range of the insect vectors, lengthening the reproductive cycles of insects and by shortening the incubation period of pathogens[13].

Malaria, dengue, plague, and viruses causing encephalitic syndromes areamong the many vector-borne diseases likely to be affected. Some models suggest thatvector-borne diseases will become more common as the earth warms, although caution is needed in interpreting these predictions. Clearly, global warming will cause changes in the epidemiology of infectious diseases[3].

For example, studies have been done on malaria has shown the Relationship of malaria with temperature and climate. One of the important reasons for this high incidence in tropical regions is the suitable climate and temperature, necessary for the development and survival of both mosquitoes as well as the parasite plasmodium. It is obvious that malaria cannot occur in the climates where mosquitoes do not survive. For the optimal development of Anopheles mosquitoes, the temperatures should be around 20 to 30 degrees centigrade. In addition, other factors necessary for mosquito development are high humidity, small stagnant pools of water, and availability of food[14]. The surrounding temperature also affects the development of plasmodium within the mosquito and it decreases with increasing temperature. However in colder conditions, this development time can exceed the total life span of a mosquito[15]. Therefore the total life span of the mosquito is very important; it shortens with very high

temperatures[16]. Apart from the seasonal variability, the daily maximum and minimum temperatures are also important for the development of plasmodium within the mosquito. Other climatic factors that are important include the fact that mosquitoes tend to flourish in areas with high humidity and ample rainfall. The above effects of temperature and climate on malaria have led many to believe that global warming will result in the spread of this disease, possibly to areas where previously it did not exist. The recent increase in malaria incidence in east African highlands and some Asian and South American countries has been attributed to global warming[15]. Nevertheless there are many other factors that might account for the increased incidence of malaria. It is very difficult to estimate the effects of temperature on malaria, and to forecast the future impact of global warming due to the complex epidemiology of the disease and other factors associated with it[17].

VIII. PHYSIOLOGICAL EFFECTS OF CLIMATE WARMING ON FLOWERING PLANTS AND INSECT POLLINATORS

Climate change is affecting a diversity of species in a variety of ways[18, 19]. In particular, climate warming is causing shifts in the timing of life history events for many species[19]. Insect larvae are maturing into adults sooner, some bird species are laying eggs earlier in the season, and many plants are blooming earlier[19]. Growing concern about the influence of climate change on flowering plants, pollinators, and the mutualistic interactions between them has led to a recent surge in research. Much of this research has addressed the consequences of warming for phonological and distributional shifts[19].

Elevated temperatures are known to affect the physiology of flowering plants in a number of ways, resulting in altered production of flowers, nectar, and pollen .With regard to insect pollinators, warming can influence foraging activity, body size at maturity, as well as individual life span[19].

IX. THE EFFECTS OF GLOBAL CLIMATE CHANGE ON AGRICULTURE

The climate change effects on agriculture will differ across the world. Determining how climate change will affect agriculture is complex; varieties of effects are likely to occur. Changes in temperature as well as changes in rainfall patterns and the increase in CO_2 levels projected to accompany climate change will have important effects on global agriculture, especially in the tropical regions. It is expected that crop productivity will alter due to these changes in climate and due to weather events and changes in patterns of pests and diseases. The suitable land areas for cultivation of key staple crops could undergo geographic shifts in response to climate change[20]. In fact, climate change can affect different agricultural dimensions, causing losses in productivity, profitability and employment[21].

X. CLIMATE CHANGE: EFFECT ON GROWTH OF ANIMALS

The impact of climate change on human, animals, ecosystems and energy is enormous. Climate change cycles have been long-term and short-term with many of them being dramatic and rapid. The larger sufferers of global warming would be ruminants as most of them depend on pastures and grazing lands. Increased temperature increases lignification of plant tissues and therefore reduces the digestibility, Growth of animals, the increase in live body mass or cell multiplication, is controlled genetically and environmentally. The average daily gain(ADG) is influenced by factors like available nutrients, hormones, enzymes and environmental factors like increased ambient temperature Exposure of sheep to elevated temperatures results in the decrease of body weight, average daily gain(ADG), growth rate and body total solid, which is reflected by impaired reproduction. As per NRCC(2007) the crossbreds and buffaloes are affected more than indigenous livestock. Since the crossbreds and buffaloes are more sensitive to temperature rise than indigenous cattle, a rise of 2-6 °C due to global warming will negatively impact growth, puberty and maturity of crossbreds and buffaloes and attainment of puberty is delayed by one to two weeks. Warmer temperature stunts the growth of animals and plants and could also affect food production in coming years[22].

XI. EFFECTS OF GLOBAL WARMING ON THE AVERAGE WIND SPEED IN JAPAN

Several studies on global warming effects indicate that rising temperatures might have changed surface wind speed. In a research which the effects of global warming on the average wind speed at the center of Japan was studied, researchers have indicated that Wind speed differs in area, land surface and topographical conditions. They have found that the highest annual wind speed is in mountains and coastal areas. Although increases and decreases of surface wind speeds in Central Japan are not found during 1961–2000, it is predicted that it will be happened during 2001–2099. Because of global warming, Changes in surface winds will have a wide range during 2001–2046. The differences between wind speed distributions are small in 2046 and 2099, and wind speeds in 2046 and 2099 are expected to exceed in 2001. Over the coastal and mountainous regions, the wind speed at 30 m AGL increases from 8 m/s in 2001 to 10 m/s in 2099. The areas with a wind speed of over 7 m/s are larger in 2046 and 2099 than those in 2001 at both 30 m and 100 m AGL. Therefore, if

global warming advances follow the IPCC A1B scenario, the wind speed in Central Japan would be expected to increase[23].

CONCLUSIONS

In this paper, the effects of global warming on humans, animals and plants were studied. One of the consequences of the greenhouse gases leads to global warming. Thus, as the global warming is increasing, the density of greenhouse gases is rising. Some greenhouse gases are produces naturally in the environment and the others are released by human activities into the environment. Human role in global warming is very strong, especially since the industrial revolution and when the fossil fuels take a part into the realm of human life. So to reduce global warming, human activity must be controlled.

REFERENCES

1. Global Warming.s Health Effects, eHealth Philippines. Available from: http://www.ehealth.ph/index.php/latest-ehealth-news/43. [Accessed on 2009 May 22].
2. Global Warming, the Ozone Layer and Acid Rain. Available from: http://www.ecocentre.org.uk/global-warming.html. [Accessed on 2009 May 22].
3. A.dwisetyawan,"Effect of global warming on plant evolution and diversity; lessons from the past and its potential recurrence in the future", bioscience, vol.1, no.1. Pp.43-52, March 2009.
4. Greenhouse Gases and Global Warming Potential Values—Excerpt from the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1999–2000. Environmental Protection Agency, Office of Atmospheric Programs, April 2002.
5. Intergovernmental Panel on Climate Change (IPCC). Houghton JT, ed. Climate Change 1995: The Science of Climate Change. Cambridge, UK: Cambridge University Press; 1996.
6. MJ. Ring, D. Lindner, EF. Cross, ME. Schlesinger,"Causes of the Global Warming Observed since the 19th Century", Atmospheric and Climate Sciences,vol 2, pp401-415, 2012.
7. Naik V, Mauzerall DL, Horowitz LW, Schwarzkopf MD, Ramaswamy V, Oppenheimer M,"On the sensitivity of radiative forcing from biomass burning aerosols and ozone to emission location", Geophys Res Lett 34: L03818, doi: 10.1029/2006GL028149.2007.
8. . Zhang L, Yu D, Shi X, Zhao L, Ding W, Wang H, pan J, Li C,"Quantifying methane emissions from rice fields in Tai-Lake region, China by coupling detailed soil database with biogeochemical model". Biogeosci Discuss, vol 5, pp 4867-4896, . 2008.
9. Ruddiman WF,"How did humans first alter global climate?", Scientific Amer,pp 46-53, (March 2005):
10. Hansen JE, Sato M,"Trends of measured climate forcing agents". Proc Nat AcadSci USA, vol 98 (26), pp 14778-14783, 2001.
11. Garg AD, Hippargi RV, Gadegone MM,"Global warming and its impact: A story of adaptations, extinctions and diseases". In: Souvenir of National Seminar on Eco-Environmental Impact and Organism Response. Department of Chemistry, Kamla Nehru Mahavidalaya, RTM Nagpur University, Nagpur (M.S.), pp 66-74, India: 2007.
12. PK.Bhattacharjee, Member, IACSIT,"Global Warming Impact on the Earth", International Journal of Environmental Science and Development, Vol 1, No 3, August 2010.
13. S. Grover, Rajeshwari, "Global warming and its impact on skin disorders", Indian J DermatolVenereolLeprol, Vol 75, Issue 4, July-August 2009.
14. AA.Khasnis,MD.Nettleman,"Global Warming and infectious diseases". Achieves of Medical Research;vol 36, pp 689-696, 2005.
15. Zell R,"Global climate change and the emergence/re-emergence of infectious diseases". International Journal of Medial Microbiology;vol 293, pp 16-26.2004.
16. Gubler DJ, Reiter P, Ebi KL,"Climate variability and change in United States: Potential impacts on vector and rodent borne diseases". Environmental Health Perspectives; vol109, pp 223-234.2001.
17. Nabi SAand Qader SS,"Is Global Warming likely to cause an increased incidence of Malaria?",www.ljm.org.ly, DOI: 10.4176/090105.
18. Parmesan C, "Ecological and evolutionary responses to recent climate change",Annu. Rev. Ecol. Evol. Syst.vol 37, pp 637–69, 2006.
19. VL. Scaven, NE. Rafferty,"Physiological effects of climate warming on flowering plants and insect pollinators and potential consequences for their interactions", Current Zoology, vol 59 (3):, pp18–426, 2013.
20. C.Aydinalp and MS. Cresser,"The Effects of Global Climate Change on Agriculture", American-Eurasian J. Agric. & Environ. Sci.,vol 3 (5), pp 672-676, 2008.
21. M. De Salvo, D.Begalli and G.Signorello,"Measuring the effect of climate change on agriculture: A literature review of analytical models", journal of development and agricultural economics, vol.5 (12), pp.499-509, December 2013.
22. P. R.J, N. Jacob, Climate change: "Effect on growth of animals", Basic Research Journal of Agricultural Science and Review ISSN 2315-6880 Vol. 2(4),pp 85-90, April 2013.
23. M. Rahim, J. Yoshino, Y.Doi and T. Yasuda,"Effects of Global Warming on the Average Wind Speed Field in Central Japan", Journal of Sustainable Energy & Environment, vol 3, pp 165-171, 2012.

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