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CLIMATE CHANGE AND ANIMAL EXTINCTION: THE GLOBAL WARMING QUESTION

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Abstract

The climate is changing faster than ever predicted and it is causing a huge decline in animal life. Temperature in the year 2014 was recorded as the hottest in the history of human existence. However, year 2015 is on track to be even hotter. The total amount of animal life on earth has halved in the last 35 years and bird population has decreased by 40%. This paper is aimed at critically appraising the causes, effects and possible solutions to this raging environmental menace. The incessant changes of climate and the resultant manifestation of fast disappearance of animals around the world has become a serious concern for environmental experts. As the global temperature is persistently on the rise, biotic communities are hugely on the decrease. Secondary data (review of relevant literature) and deductive techniques were used in data collection and appraisal. Global warming is discovered to be the major determining factor of animals going on extinction. Sea-level rise has inundated beaches and marshes has caused erosion on the coasts, diminished habitat for birds, invertebrates, fish, and other coastal wildlife. The study recommends that frantic effort should be made to reduce or eliminate elements promoting global warming such as use of fossil fuel and wildfire/bush burning on one hand and imbibe the culture of exploring nuclear power and massive afforestation on the other hand.

Keywords: World; Warming; Animal; Extinction; Temperature; Climate

Background of the Study

NWF (2015) has noted that global warming is quickly becoming the biggest threat to the long-term survival of world's wildlife. Average temperatures in the U.S. over the last century have already increased by more than one degree Celsius and in Africa by two degree Celsius. Seven of the top 10 warmest years on record for the contiguous 48 states have occurred since 1998, and 2012 was the warmest year on record.

Aliya Haq (2015) lamented that most endangered species are threatened due to destruction of habitat, hunting activities, pollution, overfishing and climate change but climate change is by far the worst. Climate change is caused by greenhouse gases (water vapour, CO2, methane, nitrous oxide and ozone) which are trapped in the atmosphere and forms a layer above the earth surface. The layer serves as a blanket; the thicker it becomes the warmer it is. These gases adversely affect the earth surface causing high temperature, shift in precipitation pattern, ocean acidity, and rise in sea level and increase in intensity and frequency of extreme weather events. These in turn directly affect the humans and animals causing a change in distribution and behavioural pattern. (IPCC, 1998).

According to Scientific America (2015), animal extinction is simply known as the end of existence of a group of organisms, caused by their inability to adapt to changing environmental conditions. The history of life on Earth is influenced by both evolution, which allows organisms to adapt an extinction. Extinction affects individual species that is, groups of interbreeding organisms as well as collections of related species, such as members of the same family, order, or class.

Chen et al (2011) were of the opinion that more

recently, palaeontologists have discovered that not all extinction is slow and gradual. At various times in the fossil record, many different, unrelated species became extinct at nearly the same time. The cause of these large-scale extinctions is always dramatic environmental change that produces conditions too severe for organisms to endure. Environmental changes of this calibre result from extreme climatic change, such as the global cooling observed during the ice ages, or from catastrophic events, such as asteroid or comet impacts or widespread volcanic activity. Possible causes even include bursts of radiation from exploding stars called supernovas. Whatever their causes, these events dramatically alter the composition of life on Earth, as entire groups of organisms disappear and entirely new groups rise to take their place. (Chen et al, 2011).

NWF (2015) defined Global Warming as simply a measurable increase in the average temperature of Earth's atmosphere, oceans, and landmasses. Scientists believe Earth is currently facing a period of rapid warming brought on by rising levels of heat-trapping gases, known as greenhouse gases, in the atmosphere.

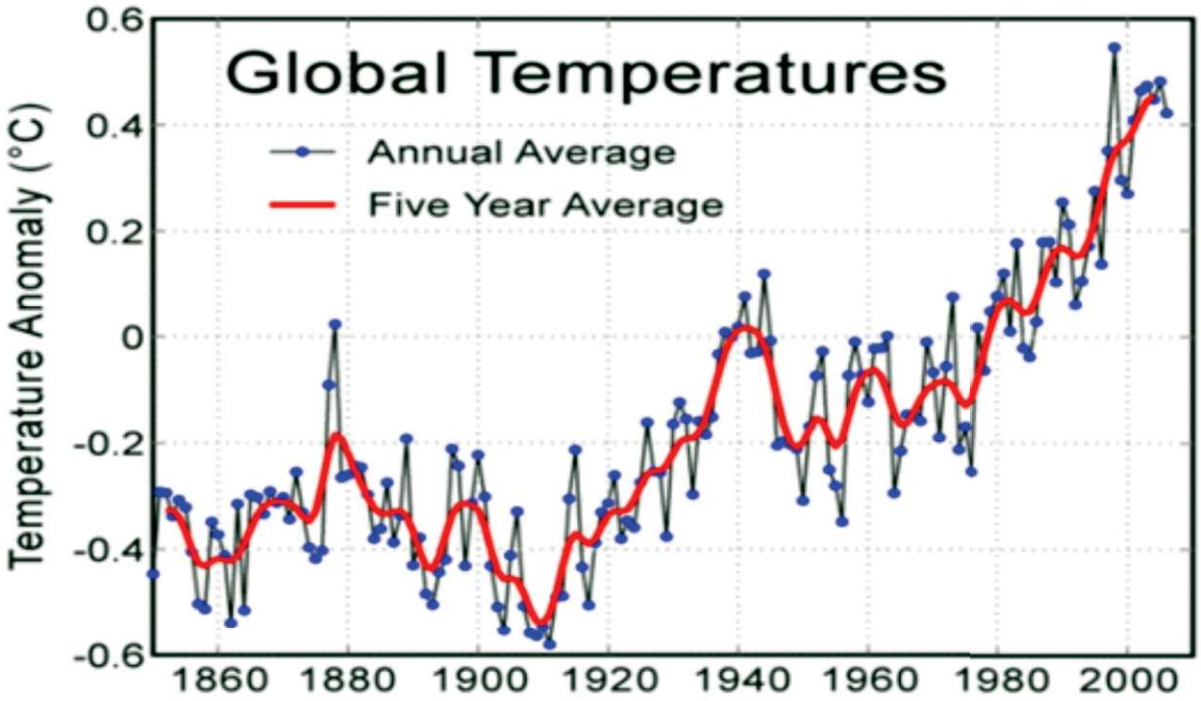

Figure 1: Global Temperature Rise Between 1860-2000 (Source: NASA, 2001)

UCS (2011) asserted that since the beginning of the Industrial Revolution in the mid-1700s, however, human activities have added more and more of these gases into the atmosphere. For example, levels of carbon dioxide, a powerful greenhouse gas, have risen by 35 percent since 1750, largely from the burning of fossil fuels such as coal, oil, and natural gas. With more greenhouse gases in the mix, the atmosphere acts like a thickening blanket and traps more heat thereby heating and making the environment warmer.

Objectives of the Study

The aim of the study is to critically appraise the environmental menace of incessant change in climate and the resultant manifestation of fast disappearance of animals around the world through review of relevant literatures. As the global temperature is persistently on the rise, biotic communities are hugely on the decrease. The aim of the study is pursued with the following objectives; to assess the causes, effects and proffer viable solutions on the peril of climate change on animal extinction.

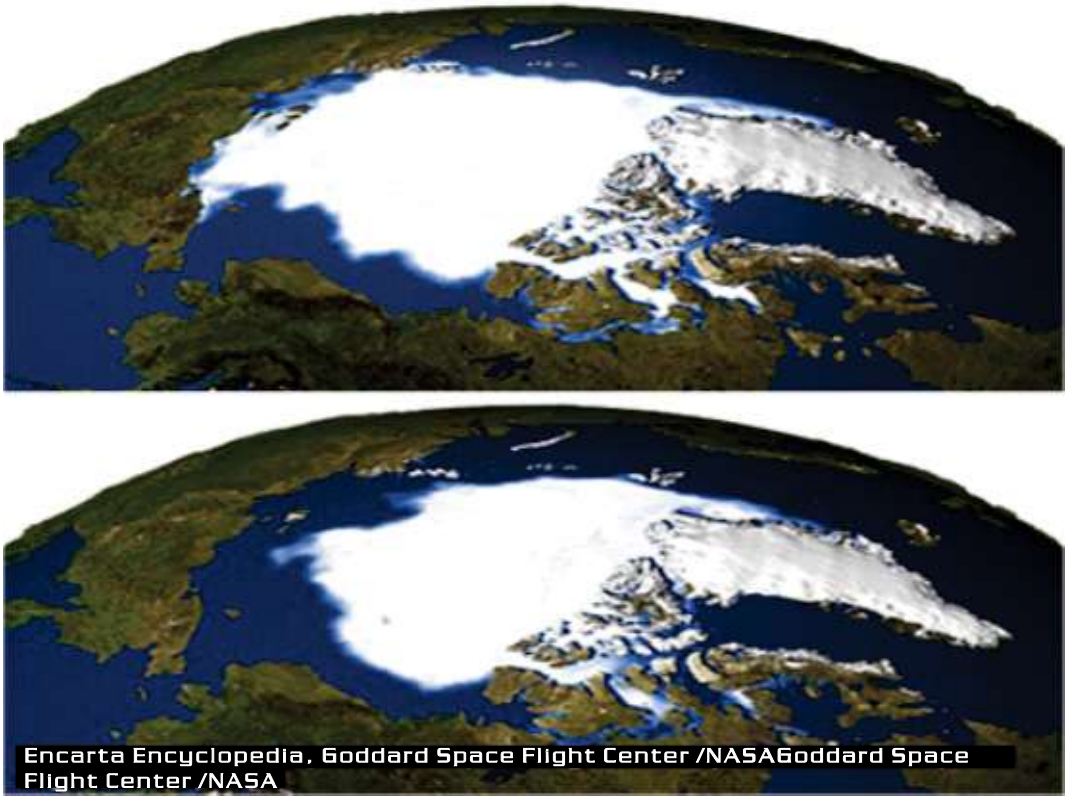

Figure 2: Melting of Ice Cover in the Arctic Region in 1979 and 2005
(Source: Microsoft Encarta, 2009)

Materials and Methods

The study involved the review of mainly secondary data sources for facts building and background information on the drastic effect of climate change (global warming) and animals going on extinction around the world. Deductive techniques were involved to practically ascertain critical areas around the world where extinction of animals is ravaging.

In the study, emphases were laid on most endangered species in critical areas of every continent of the world both tropical and temperate regions to appraise the extent, magnitude and intensity of animal extinction.

The Findings

Global Warming as a Cause of Animal Extinction around the World

Ecological model predicts that the distribution of world biomes will shift as a result of the climate changes associated with increased greenhouse gases (IPCC, 1998). Many species are moving towards the Polar Regions and higher up mountains in search of cooler regions. A study by Chen et al (2011) found that species are shifting to higher elevations at a meridian rate of 11m per decade and to higher altitude at a meridian rate of 16.9m per decade although individual species vary in their rates. Distance moved by species was also found to be greatest in areas with highest level of warming. Some of these species have been reported to include butterflies (Parmesan, 1996), birds (Thomas and Lennon, 1999) and mosquitoes (Epstein et al, 1998). In the event that no higher grounds are available, annihilation or even extinction is inescapable.

Microsoft Encarta (2009) observed that melting of ice due to high temperature and early arrival of spring is causing polar bears in Canada to lose weight because it deprives them of hunting which they do best on ice. They have to sometimes have to swim for up to 12 days in order to get to ice floes and in the process may drown. Scientific America (2015) also observed that in Hudson Bay

Canada for example, scientist has found that the major cause of death in cubs to be either lack of food or lack of fat on nursing mothers. U. S. Geological survey Projects that two-thirds of the world's polar bear population will go extinct by 2050. In Europe, the Roe Deer are reducing in number because early spring. They give birth about 36days after the bloom of the first flower in spring. Birds are nesting, breeding and migrating earlier as a result of early spring.

Figure 3: Some Extreme Cases of Global Warming: Death of Animals and Drought.
Source: IPCC, 1998

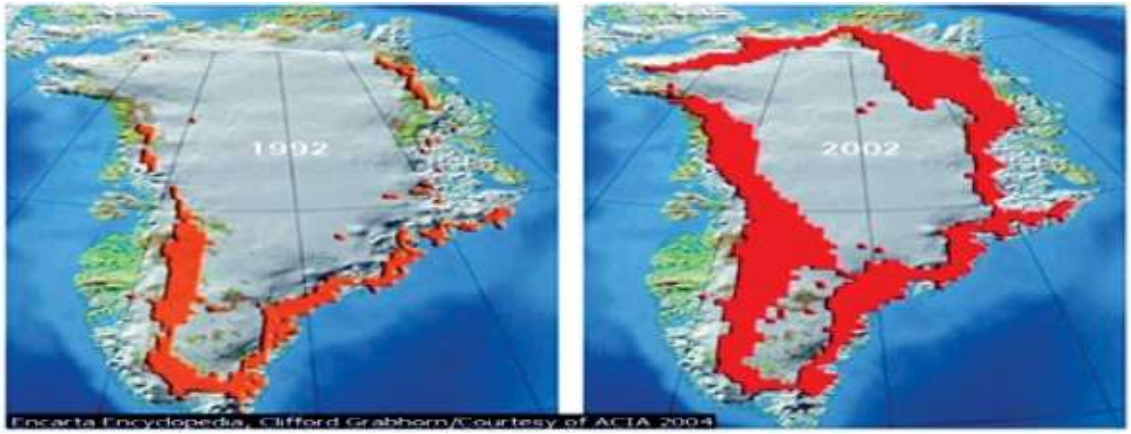

Figure 4: The Greenland ice sheet underwent extensive surface melting from 1992 to 2002,
Source: Microsoft Encarta Encyclopaedia, 2009

Rise in sea level upsets the wellbeing of many aquatic species e.g. a rise in sea level by 50cm can destroy nesting beaches for sea turtles, the Mediterranean Monk Seal raise their pulp on beaches which a rise in sea level can affect their ability to do so. Similarly, Whales and Dolphins need shallow water to rear their calves but unfortunately rise in sea level has made it difficult for them to do so.

UCS (2011) lamented that warming oceans become increasingly acidic, stressing coral reefs causing bleaching and dead as the heat destroys the colourful algae needed for their survival. Hence, species like Filefish which are totally dependent on coral reefs gradually reducing in number. Adeline Penguin that feed on tiny crustaceans called Krill are threatened because Krill that live on algae are declining in population hence causing penguins to migrate in search of food which in the process they lose energy needed for breeding and raising of young.

Japans' orange spotted file fish which is highly sensitive to high temperature has disappeared in 1988. In Central America, the golden Toad that lived on mountain top has been recorded to have gone extinct in 1989.

Effects of Global Warming on Animal Extinction

Changes in range: Wildlife and plants that are able to adjust are shifting their ranges northward or to higher altitudes to adjust to warming temperatures. Wildlife that already lives at high altitudes or latitudes, such as the American Pica or polar bears in the Arctic, may find them with nowhere to go.

Changes in timing of natural events: Many species take their cues about when to migrate, flower, nest or mate from seasonal changes in temperature, precipitation and daylight (phenology). Global warming is confusing those signals. The changes in the climate force wildlife to alter life cycle and seasonal events. Sometimes they might get out of synch with other species in their ecosystem or with other natural events. For example, some animals are laying eggs, migrating, or emerging from hibernation much earlier than they used to, only to find that the plants or the insects they need for food have not yet emerged.

Figure 5: Some Extreme Cases of Animal Extinction
Source: Microsoft Encarta Encyclopaedia, 2009

Widespread forest loss: In the western U.S., warming and drought stress are causing trees to die and making them more vulnerable to pine beetle and other insect infestations. Higher temperatures and increased fuel from dead trees have led to more wildfires.

Coral bleaching: Coral bleaching occurs when colourful algae that live in corals die or are expelled from corals under stress. The algae live symbiotically with coral polyps, providing them with nutrients and oxygen. If the algae die and are not replaced, the corals will also die. Scientists believe that the biggest cause of coral bleaching is warm sea surface temperatures caused by global warming. If coral reef bleaching continues, many other marine organisms that depend on coral reefs will also be in jeopardy.

Melting of Arctic sea ice: Arctic ice is melting at a faster pace than was predicted even a few years ago. Some scientists are now saying that the Arctic could be ice free in the late summer as early as 2012. Many Arctic mammals, such as polar bears, walrus, and seals depend on sea ice for their survival.

Loss of wetlands: Higher temperatures will lead to drier conditions in the Midwest's Prairie Pothole region, one of the most important breeding areas for North American waterfowl.

Sea-level rise: Sea-level rise will inundate beaches and marshes and cause erosion on both coasts, diminishing habitat for birds, invertebrates, fish, and other coastal wildlife.

Invasive species and disease: Higher average temperatures and changes in rain and snow patterns will enable some invasive plant species to move into new areas. Insect pest infestations will be more severe as pests such as mountain pine beetle are able to take advantage of drought-weakened plants. Pathogens and their hosts that thrive in higher temperatures will spread to new areas.

Solutions to Global Warming and Animal Extinction

The research also made effort to find solutions to the ravaging and alarming extinction of animals due to global warming around the world. Epstein et al (1998), David (2007) Chen et al (2011), Lara (2015), NWF (2015), suggested the following solutions;

Boosting energy efficiency: The energy used to power, heat, and cool our homes, businesses, and industries is the single largest contributor to global warming. Energy efficiency technologies allow us to use less energy to get the same or higher level of production, service, and comfort. This approach has vast potential to save both energy and money, and can be deployed quickly. (IPCC, 1998)

Greening transportation: The transportation sector's emissions have increased at a faster rate than any other energy-using sector over the past decade. A variety of solutions are at hand, including improving efficiency (miles per gallon) in all modes of transport, switching to low-carbon fuels, and reducing vehicle miles travelled through smart growth and more efficient mass transportation systems.

Reviving up renewable energy: Renewable energy sources such as solar, wind, geothermal and bio-energy are available around the world. Multiple studies have shown that renewable energy has the technical potential to meet the vast majority of our energy needs. Renewable technologies can be deployed quickly, are increasingly cost-effective, and create jobs while reducing pollution.

Phasing out fossil fuel energy: Dramatically reducing our use of fossil fuels especially carbon-intensive coal is essential to tackle climate change. There are many ways to begin this process. Key action steps include: not building any new coal-burning power plants, initiating a phased shutdown of coal plants starting with the oldest and dirtiest, and capturing and storing carbon emissions from power plants. While it may sound like science fiction, the technology exists to store carbon emissions underground. The technology has not been deployed on a large scale or proven to be safe and permanent, but it has been demonstrated in other contexts such as oil and natural gas recovery. Demonstration projects to test the viability and costs of this technology for power plant emissions are worth pursuing.

Managing forests and agriculture: Taken together, tropical deforestation and emissions from agriculture represent nearly 30 percent of the world's heat-trapping emissions. We can fight global warming by reducing emissions from deforestation and forest degradation and by making our food production practices more sustainable.

Figure 6: The Green Belt Movement in Kenya: An Example of Re-afforestation.
Source: Microsoft Encarta Encyclopaedia, 2009

Exploring nuclear power: Because nuclear power results in few global warming emissions, an increased share of nuclear power in the energy mix could help reduce global warming but nuclear technology poses serious threats to the security human beings and animals. The accident in 2011 at the Fukushima *Diaichi* plant in Japan illustrates how our health and the environment can be affected, unless great caution is exercised.

Developing and deploying new low-carbon and zero-carbon technologies: Research into and development of the next generation of low-carbon technologies will be critical to deep mid-century reductions in

global emissions. Current research on battery technology, new materials for solar cells, harnessing energy from novel sources like bacteria and algae, and other innovative areas could provide important breakthroughs.

Ensuring sustainable development: The countries of the world from the most to the least developed vary dramatically in their contributions to the problem of climate change (global warming) and in their responsibilities and capacities to confront it. A successful global compact on climate change must include financial assistance from richer countries to poorer countries to help make the transition to low-carbon development pathways and to help adapt to the impacts of climate change.

Conclusion

The enormity of global warming can be daunting and dispiriting. What can one person, or even one nation, do on their own to slow and reverse climate change? But just as ecologist Stephen Pacala and physicist Robert Socolow, both at Princeton University, concluded with some essential "wedges" for nations to utilize toward this goal each of which is challenging but feasible and, in some combination, could reduce greenhouse gas emissions to safer levels there are personal lifestyle changes that you can make too that, in some combination, can help reduce your carbon impact. Not all are right for everybody. Some you may already be doing or absolutely abhor. But implementing just a few of them could make a difference.

According to the UCS (2011), substantial scientific evidence indicates that an increase in the global average temperature of more than 2°c above where we are today poses severe risks to natural systems and human health. To avoid this level of warming, the U.S. needs to reduce heat-trapping emissions by at least 80 percent below 2000 levels by 2050. Delay in taking such action today will mean facing the need for much steeper cuts later, which will likely be more difficult and costly.

Recommendations

Recommendations have been made by the U.S. National Wildlife Federation and Union of Concerned Scientist report to safeguard wildlife. These include:

Forego Fossil Fuels: UCS (2016) was of the opinion that the first challenge is eliminating the burning of coal, oil and, eventually, natural gas. This is perhaps the most daunting challenge as denizens of richer nations literally eat, wear, work, play and even sleep on the products made from such fossilized sunshine. And citizens of developing nations want and arguably deserve the same comforts, which are largely thanks to the energy stored in such fuels.

Infrastructure Upgrade: Buildings worldwide contribute around one third of all greenhouse gas emissions (43 percent in the U.S. alone), even though investing in thicker insulation and other cost-effective, temperature-regulating steps can save money in the long run. Electric grids are at capacity or overloaded, but power demands continue to rise. And bad roads can lower the fuel economy of even the most efficient vehicle. Investing in new infrastructure, or radically upgrading existing highways and transmission lines, would help cut greenhouse gas emissions and drive economic growth in developing countries. (Chen et al, 2007).

Move Closer to Work: IPCC (2011) suggested that transportation is the second leading source of greenhouse gas emissions in the world. But it doesn't have to be that way all the time. One way to drastically curtail emission of carbon dioxide in the environment is to move closer to work, use mass transit, or switch to walking, cycling or some other mode of transport that does not require anything other than human energy. There is also the option of working from home and telecommuting several days a week.

Stop Cutting Down Trees: David Biello (2007) alarmed that every year, 33 million kilometre square of forests are cut down around the world. Timber harvesting in the tropics alone contributes 1.5 billion metric tons of carbon to the atmosphere. That represents 20 percent of human-made greenhouse gas emissions and a source that could be avoided relatively easily. Improved agricultural practices along with paper recycling and forest management, balancing the amount of wood taken out with the amount of new trees growing could quickly eliminate this significant chunk of emissions.

Create Future Fuels: UCS (2016) suggested that biodiesel hybrid electric vehicles (that can plug into the grid overnight) may offer the best transportation solution in the short term, given the energy density of diesel and the carbon neutral ramifications of fuel from plants as well as the emissions of electric engines. A recent study found that the present amount of electricity generation in the U.S. could provide enough energy for the country's entire fleet

of automobiles to switch to plug-in hybrids, reducing greenhouse gas emissions in the process.

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