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CAUSES AND EFFECTS OF GLOBAL WARMING & CLIMATE CHANGE – A STUDY

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ABSTRACT

Global warming and Climate change is defying our generation in this century. Both mankind and nature contribute to the global warming. However, the evidence has shown that the warming we are currently witnessing is largely due to the human forcing. The changes taking place in the environment affects the human health. The signs of global warming are becoming ever more prominent. The average pattern of weather, called climate, usually remains uniform for centuries if it is left to itself. However, the Earth is not being left alone. People are taking multi-dimensional actions that are gradually changing the morphology, physiology, and anatomy of the planet Earth and its climate in large scale. The climate change not only affects the marine environment, but also affects sea temperatures, ocean acidification, Green house gases, sea level rise, and changes in currents, upwelling and weather patterns, fundamental changes. These impacts may not be evident right away, but in near future they will affect our planet drastically. In this paper, the importance of Biodiversity in the environment and the effects of global climate change have been discussed. The paper will explore the impact of global warming and ways to reduce the global warming.

Keywords: *Global warming; Climate change; Weather; Greenhouse gases*.

I. INTRODUCTION

Over the last century, the temperature of the earth has been increasing tremendously. As the temperature of the earth goes on increasing, disasters such as hurricanes, tsunamis, floods and droughts are taking place more frequently. The industrial Revolution has played a major role in exposing the different poisonous materials in the form of gases in the environment, which causes the global warming [1]. The other human activity like deforestation is an important factor for global warming. The global warming means a continuous increase in the atmospheric temperature due to greenhouse effect. The green house gases are composed of carbon dioxide, carbon monoxide, methane, nitrogen oxide, chlorofluorocarbons, sulphuric fluoride, water vapour, hydrocarbons, etc. Since 1901, the average world temperature has been increased by 0.74 degrees [2-3]. The green house effect is a natural phenomenon because of chemicals present in the environment, in which gases and small particles trap the sun's heat energy and in that way maintain a temperature which is suitable for life. But however the human activities have affected the atmosphere condition and are intensifying the green house effect, leading to climate change more rapidly than has been experienced before [4]. Global warming and change in the climatic condition now a day's taking place more drastically. It is becoming very difficult to keep the balance in the atmospheric condition.

II. CAUSES & IMPACT

The single human activity that is most likely to have a large impact on the climate is the burning of "fossil fuels" such as coal, oil and gas. These fuels contain carbon. Burning them liberates carbon dioxide gas in the atmosphere. Since the early 1800s, when people began burning large amounts of coal and oil, the amount of carbon dioxide in the earth's atmosphere has increased by nearly 30%, and average global temperature appears to have risen between 1° and 2°F. This increment of temperature [5] is keenly related to the basic property of the gas. Carbon dioxide gas traps solar heat in the atmosphere, partly in the same way as glass traps solar heat in a sunroom or a greenhouse. For this reason, carbon dioxide is sometimes called a "greenhouse gas." As more carbon dioxide is added to the atmosphere, solar heat faces more trouble in getting out. The result is that, if everything else remains unchanged, the average temperature of the atmosphere would increase. As people burn more fossil fuels for energy they add more carbon dioxide to the atmosphere. This creates a blanket of carbon dioxide over the Earth's surface, which allows the short waves of the sun to penetrate the Earth's atmosphere, but prevents the long wave radiations (emitted from

the Earth's surface) to get out. If this activity continues for a long period of time, the average temperature of the atmosphere will almost certainly rise. This is commonly referred to as global warming. Global warming is thus the increase in the average temperature of the Earth's near-surface air and oceans in recent decades and its projected continuation. The term "global warming" is a sub-set of the universal set climate change [6], which also encompasses another sub-set namely "global cooling." The United Nations Framework Convention on Climate Change (UNFCCC) uses the term "climate change" for human-induced changes and "climate variability" [7] for other changes. Climate change is therefore any long-term significant change in the "average weather" that a given region experiences and involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years. The roots of these changes can be related to several dynamic processes on Earth, external forces including variations in sunlight intensity, and more recently by human activities.

Increasing of water temperatures and higher carbon dioxide concentrations than normal, which can make oceans more acidic, are already having an impact on oceans. The impact of ocean acidification will reduce the coral reefs [8], this reduction of coral reefs will reduce the habitats of many other sea creatures, and it will disrupt the entire food chain of the ocean. This climate change, Global warming and ocean acidification influence the major primary producer, like planktons growth, reproduction, skeleton and pigment concentration etc. Predicting the consequences of global environmental change on biodiversity is a complicated. Dying trees also emitting their stored carbon dioxide, it can add to atmospheric green house gases .Additionally, pollutants can alter habitat quality, reduce, nutrient availability and encourage harmful algae blooms (HAB) along coastlines [9], all of which can indirectly affect the survival of sensitive species. Because of this big complexity, environmental change is likely to seriously diminish the activity of wildlife. However, the current pace of environmental change is unprecedented [10] and it is unknown whether the capacity of species to adapt to such changes and counteract their harmful and often combined effects may be exceeded. In contrast, reproduction in wildlife is threatened by environmental changes operating at many different physiological process, seasonal distributions, geographic ranges, and patterns of migration, nutritional status, and ultimately the abundance and stock structure of some arctic species [11]. The survey of general circulation models (GCMs) on climate change illustrate that rising levels of greenhouse gases are likely to increase the global average surface temperature by 1.5-4.5°C over the next 100 years [12].

III. KEY FACTORS & THEIR EFFECTS

Global warming

Global warming is defined by gradual increasing of temperature by the higher emission of the Green house gases (GHGs) which results Green house effect. The Intergovernmental Panel on Climate shown global temperatures will increase between 1.4 and 5.8 °C by the year 2100, global warming research have now expected that average [10]. This Global warming include as well as increase in occurrence and severity of storms and other severe weather events.

Reduction of Biodiversity

Millennium Ecosystem Assessment (MEA) predict on climate change to be major threat to the biodiversity. Nowadays also many areas facing problem of water shortage. Plants are not having seasonal life cycle for their reproduction by the changing of climate/season. Due to the high temperature, forest fires also increased. In this changing of climate affects the birdlife and animals in a number of ways; birds are lay their eggs in earlier than usual, plants blossom earlier and mammals are come out of dormancy sooner. Animals distribution also affected; with many species moving closer to the poles as a response to the rise in global temperatures.

Anthropogenic activities

The human being is a very big source to increasing of climate change and environmental health hazards in history. Because, of the increasing of industrial revolution, over exploitation of natural resources, high emission of green house gases, using more number of vehicles and burning of fossil fuel to generate the electricity in power plants, cement production, industrialization, deforestation, changing of land usage, etc, [13]. Ocean pH will be significantly affected and will exert a drastic effect on calcifying marine organisms like Coccolithophores, Foraminiferans, Pteropods, Echinoderms, Molluscs and Coral reefs.

Coral bleaching

Nowadays a lot of drugs are taken from coral reef, animals and plants as suitable treatment for cancer, viruses, and other dreadful diseases. Each coral have a skeleton for itself, and these skeletons build up to create coral reefs, which can be providing habitat for lots of fish and other oceanic organisms [8]. It protects coastlines from the damage by impact of wave action and tropical storms and help with nutrient recycling.

Fish migration

Commonly fishes migrate to other places for breeding purpose only, but nowadays some fishes migrate just for survival purposes. At present rate of extinction, earth will lose 25% of its present number of species by 2050 [12].

Effect on Sea Levels

Climatic changes leads to sea level rise, flood, high tides, high sea surface temperature, ocean acidification, coral reef bleaching in the marine ecosystem. Some sensitive animals are going to extinct by slight climatic changes. For example the Polar bears are affected by reduction of Arctic ice cover. Studies show a decline in the polar bears weight from 325 kg in 1980 to 253 kg in 2004 [12].

Climate Change and Wildlife

Global warming is a major difficulty to the species extinctions of this century. Several researches reported that 1.5°C average increment of temperature may lead to extinction or relocation of 20-30% of species. If the warming condition of planet continues by more than 3°C, most ecosystems will face severe mass extinction.

Overall Effect on Human

Humans are affected by Cancer, skin allergy, Head ache, water borne disease like cholera, typhoid etc; spread of tropical and vector borne diseases like malaria, dengue etc. Peoples living near sea shore are affected by sea level rise.

IV. CLIMATE FORCING

The general state of the Earth's climate is a function of the amount of energy stored by the climate system. More specifically it can be stated that the Earth's climate is regulated by the balance between the amount of energy the Earth receives from the Sun, in the form of light and ultraviolet radiation, and the amount of energy the Earth releases back to space, in the form of infrared heat energy. Causes of climate change involve any process that can alter this global energy balance. Scientists call this "climate forcing." Climate forcing forces or induces the climate to change, although the acceleration of the process is highly variable. There are many climate forcing processes, but broadly speaking, they can be classified into internal and external types. External processes operate outside the planet Earth, and include changes in the global energy balance due to extraterrestrial factors like variations in the Earth's orbit around the Sun, and changes in the amount of energy received from the Sun. Internal processes operate from within the Earth's climate system, and include changes in the global energy balance due to changes in ocean circulation or changes in the composition of the atmosphere. Other climate forcing processes include the impacts of large volcanic eruptions, collisions with comets or meteorites etc. Luckily, the Earth is not hit by large comets or meteorites very often, perhaps every 20 to 30 million years or so, and therefore their associated climate changes occur rarely throughout Earth History. However, other causes of climate change influence the Earth on much shorter time scales, with changes sometimes occurring within a single generation. Indeed, our present oscillation of the composition of atmosphere due to emission of greenhouse gases [14] may be causing the global climate to change with an increased trend of atmospheric temperature. This man-made climate change associated with increasing trend of atmospheric temperature is popularly known as global warming. For convenience of the readers, we prefer to divide the causes of climate change into two broad domains: natural and manmade.

V. NATURAL & HUMAN FACTORS CAUSING CLIMATE CHANGE

The work of climatologists have found evidences to suggest that only a limited number of natural factors are primarily responsible for most of the past episodes of climate change on the Earth. These factors include

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- Variations in the Earth's orbital characteristics
- Atmospheric carbon dioxide variations
- Volcanic eruptions
- Variations in solar output
- Plate tectonics

While the influence of humans on environment cannot be neglected, our presence had made more drastic impact of our planet earth. Since we appeared on this earth millions of years ago we have been affecting our environment. During those days the effect on climate was very small and negligible because of very low density of population. Now a day's population is increasing that leads a bad effect on climatic condition. The acquisition of more and more land for houses as well as for the other uses for construction purposes such as industries, transport and consumption has resulted in vast deforestations. The industrial revolution has tremendous effect on climate. The invention of the motor engine and increased burning of fossil fuels like a coal, oil and natural gas supply most of the energy which is needed to run vehicles generate electricity for industries, households etc. The energy sector is responsible for the emission of about 3/4 of carbon dioxide, 1/5 of methane and large amount of nitrous oxide along with this it also produces the nitrogen oxides and carbon monoxide. These dangerous gases are very harmful to the human health as well [6-9].

VI. PREVENTIVE STEPS

To reduce this effect of climate change and global warming it can be achieved by two aspects Geo-engineering and Carbon sequestration. Geo-engineering can decrease the impact of global warming from the greenhouse gas emission. Another aspect is carbon sequestration called Carbon Capture and Storage (CCS).On the basis of IPCC, 2005 report major source of CO_2 emission can be collected and stored in underground geological formations. We can use the bio fuels to control the vehicular pollution and reduce the over exploitation (Fishing, land). Much attention should be focused on the effects of climate change on forests, farms, freshwater sources and marine environment. People can help these animals for adaptation by protecting and preserving their habitats.

- ***Electricity:*** it is the main source of power in urban areas. All our daily gadgets run on electric power that is generated mainly from thermal power plants. The thermal power plants run mainly on fossil fuels and it is responsible for emission of larger amount of greenhouse gases and other pollutants. Air conditioners should be reduced as an appliance of luxury. For this the installations of air conditioners should not be allowed in residential buildings.
- ***CFL and LED bulb:*** replace regular light bulb with compact fluorescent light (CFL) bulbs and LED bulbs. One 60 watt incandescent light bulb replaced by CFL bulb you can save $30 over the life of the bulb. Use as much as light is required and turns off lights when you leave a room. Even turn off your television, computer and video player when not using them.
- ***Reduce plastics use:*** we generate large quantities of waste in the form of plastics which remains in our environment for many years and cause the damage. We have to reduce the use of plastics in our daily life.
- ***Plant a tree and stop deforestation:*** In schools and offices we are using large amount of papers. For this number of trees are being cut in a day. For the construction of houses a large quantity of timber is being used that means large areas of forest have to be cut down. Trees and other plants absorb carbon dioxide during photosynthesis and gives off oxygen. During its lifetime a single tree can absorb approximately 1ton of carbon dioxide.
- ***Save water:*** washing the clothes, cleaning the vehicles, saving water unless actually needed for rinsing.
- ***Use of Renewable energy:*** Cars driven by renewable energy sources should be introduced which in turns reduce the global warming. Use of public transport and use of e-vehicles will reduce emissions. Less drive means less emission of pollutants in our environment.

VII. CONCLUSION

The present paper describes about the cause for the global warming in nature and the influence of the humans on our climate. The man plays an important role in changing the climatic condition in nature which is very harmful. The precaution to be taken to reduce the global warming has been discussed in this paper from this we can conclude that it is our responsible to reduce the global warming and save our environment. The study of coral reefs is essential for providing a clear, scientifically-demonstrable record of climatic events over the past million of years. The role of Science & Technology cannot be neglected. Suitable actions may be taken to counteract the effects of climate change on agriculture. Innovative agricultural practices and technologies can play a role in climate mitigation and adaptation. Whether constituted at the regional [8], national or international level, these coalitions should aim to bring about change in environmental management strategy to accelerate the process of adaptation of ecosystems and their components to oscillating climate of the planet Earth.

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