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Effect of Global Warming on Aqua Life

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Abstract

A broad array of species are found in freshwater ecosystems. Groundwater accounts for over 70 per cent of the freshwater of the world and plays an important role in sustaining most regions, with profound implications for human well-being and socio-economic development. Groundwater environments, which connect different kinds of other freshwater environments such as the lakes, rivers, springs and water lands, are among the most important corridors. Currently, virtually all climate scientists have concluded that climate change stems from the increase in atmospheric greenhouse gas emissions, which is the result of different human activities. The dissolution of carbon dioxide, the largest contribution to global warming and climate change for greenhouse gasses, in sea water is much more important compared to other atmospheric gases. That is why the oceans are major reserves. Since they are a large part of our planet and have a rich biodiversity, oceans and seas are aquatic ecosystems affected by global warming change. The decline of lake water, increase of sea level, change in streams and precipitation models has led to global warming and climatic changes, negative effects are beginning to occur on all aquatic organisms. KRILLS in the last 30 years have dropped by 80% on average. Bleaching of corals has dramatically increased. The number of fish from the Indian Ocean found in our country's waters is already 30. Sea turtle reproducing area has diminished, as the sea level rises to destroy coastal habitat. Many marine mammals have experienced extinction depending upon the decrease of sea ice.

Key words: Aquatic Ecosystem, Biodiversity, Carbon Dioxide, Global Warming, Greenhouse Effect

Introduction

"Global warming is the process by which the temperature of the Earth and the temperature on layers near the Earth are artificially rising as a result of the strong increase of some gasses caused by diverse human activities and qualified as greenhouse gasses within the atmosphere". The transition caused by global warming is mainly affected by oceans and seas, since it is part o`f our world and has high biodiversity [1]. An increase in temperature of just a few degrees will not only increase the temperatures of large masses of water, such as sea, lake and dam, but will also contribute to hydrological phenomena, resulting in changes in the physical and chemical features of water. The aquatic life is displayed in Figure 1.

Fig.1: Aquatic life

Water temperature is the major environmental parameter influencing aquatic living beings ' lives cycles, physiology and behavior. The aim of this report is to summarize the state of the art on the potential chemical toxicity to aquatic organisms and aquatic-dependent wildlife of ingested plastic and related chemical materials This paper focuses mainly on aquatic systems and, where applicable, details on the Greater Lakes and other freshwater systems. The amount of plastic waste coming into the marine and freshwater ecosystems has increased by several order of magnitude, since mass production of plastics began in the 1940s and 1950s.

As there are issues about the possible consequence of plastics on aquatic & aquatic-dependent wildlife in plastics on oceans, coasters & inland watersheds the U.S. Environmental Protection Authority (EPA) Office of Water has produced a state-of - the-art review that summarizes the scientific information available. Because plastics are a source of contaminants, both of the chemical components of the plastic produced are contaminants themselves. Selenium emissions can come from a number of sources including power plants and other installations that burn coal or oil, selenium refineries which supply selenium to industry users, metal foundations and refineries, resource mining, milling operations, and manufacturers of end products.

Airborne selenium particles can settle on surface water or on soil that can transport additional selenium and deposit it in water bodies through conveying or runoff of soil or surface water. In addition to the physical impacts on aquatic organisms, plastics can also play a role in the transition of plastics in the aquatic environment to the feeding chain. The main contaminants found in plastics in marine ecosystems include: phthalates, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), organ chlorinated pesticides (OCPs).

Greenhouse Effect

While the gases in the atmosphere and the gasses called greenhouse gases penetrate most shorts coming from the sun directly, they trap most of the long wave rays, which after the earth's warming are radiated back into the atmosphere as illustrated in fig 2. The "natural greenhouse effect" is this aspect of the atmosphere [2]. The current natural balance of the atmosphere is disturbed by a change in greenhouse gas rate in the atmosphere. This leads to a

global temperature rise or decrease. Carbon dioxide, chlorofluorocarbon compounds, methane, nitrous Oxides, ozone, and water vapor are the greenhouse gases that cause greenhouse effects.

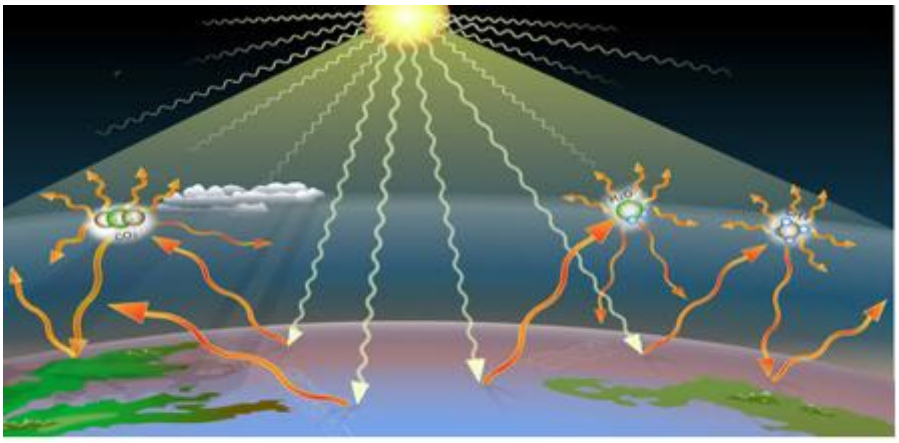

Fig.2: Greenhouse Effect

Our features, global warming shares and atmospheric densities are distinct. Because the short wave rays from the sun, but trapping the long wave rays radiated by the ground, carbon dioxide is a greenhouse gas with a very important role in warming the lower areas of the air. It is a very important greenhouse gas. This gasses is responsible for 50%-60% of the anthropogenic greenhouse effect. In the event of a doubling of the CO_2 density, global temperatures will increase by 3 ¶, based upon the mathematical computer trend established by scientists lately [3].

This results in an idea of how high the carbon dioxide level is in global warming. Consequently, a reduction of the carbon dioxide emissions comes first among the steps to be taken against global warming. There are impressive international efforts to this end. According to measurements taken in Hawaii since 1958, CO_2 increases year by year in addition to its seasonal emissions [4]. The figure 3 displayed that CO_2 in the atmosphere is rapidly increasing, called the "Keeling Curve" referring to the person who makes the measurements [5].

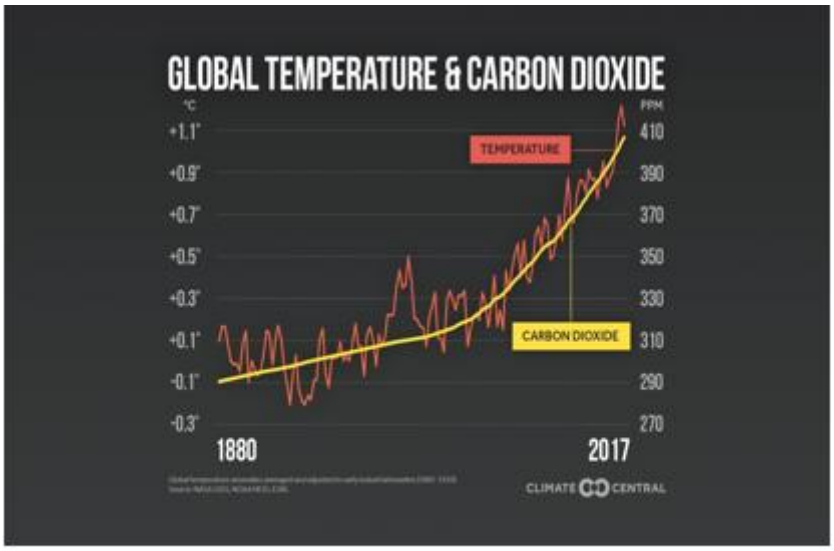

Fig.3: Rise of CO2 (Keeling curve)

Impact On Aquatic Life

Climate change impacts the marine environment in different ways. In addition to increasing the temperature of large water bodies such as rivers, seas, lakes and ponds in the atmosphere, the increased temperature often triggers hydrological events leading to changes in the physical and chemical characteristics of water [6]. Climate change impacts will range from direct effects from rising temperatures and CO_2 levels on domestic aquatic ecosystems to indirect consequences through hydrological alterations as a consequence of changes in the regimes of regional and global precipitation and the melting of glaciers and ice covers.

Ice cover on lakes and rivers in northern latitudes continues to break up at earlier times and to increase over time. Major changes in the structure, seasonality and productivity of plant communities and their food web interactions are likely to occur with consequent water quality changes. The most affected and increased winter precipitation is boreal peatland, with significant changes in the species composition of both plant and animal populations [7]. Many Arctic lakes dry up at a temperature increase of 2-3^{o}C.

Many wetland species will have to alter their seasonal pattern of migration and routes and may be endangered. By ocean heating, rising thermal stratification and decreasing upheavals, increasing marine level and increasing wave height and often, loss of ice, increased risk of marine BIOT disease and decreasing pH rates and carbonate ion concentration of the surface oceans, climate change can impact marine ecosystems. Theoretically, the low pH predicted in this century may affect the nutrient speciation. Decreases in both deep-water regeneration and growth and increased stratification of the upper ocean would limit and decrease availability of essential nutrients into the sunlit oceanic regions.

Increases in water temperature and lake drying, regressions of glaciers, sea levels rise, destruction of coastal ecosystems, changes in precipitation and models, frequency, intensity

and extinction of severe weather events, changes in streams and increasing extinctions can also be noted as an impact on the aquatic ecosystems.

1. Drying and Rise in Temp of Lakes:

As the water temperature rises and the lakes decline, the effect of global warming on lakes becomes apparent. It is recognized the Rio Grande that crosses the Mexico/US border and ranks among the longest 20 lakes on earth, Owes Lake in Northern America, Chad Lake one of the most important lakes in Africa, Ganges River in India and Platte Lake, which ranks as one of the largest lakes on the planet and in Asia, and the yellow river in China that ranks among the largest rivers in the world are start drying as represented in fig 4 [8].

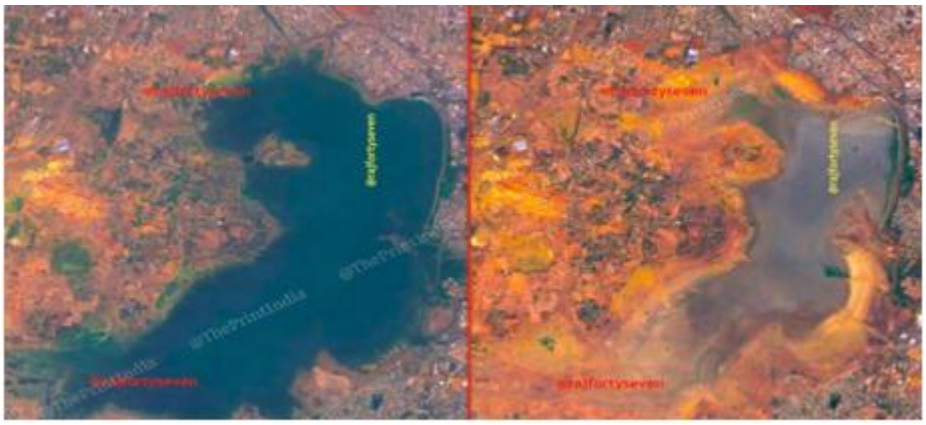

Fig.4: Lakes before 10 years and now due to greenhouse effect

2. Melting of Glaciers:

Glaciers constitute 98.5 percent of fresh water and are the second largest water deposits following the oceans and the largest freshwater deposits. Glaciers around the world are rapidly changing. Mount Kilimanjaro lost around 3⁄4 of its glacial mass in Africa in the twentieth century. In the Caucasus the mass of glaciers fell by half. In the past 40 years, Tien-Shan glaciers shrank 20% at the Chinese-Russian borders. In 20 years, New Zealand glaciers lost half of their masses. In Spain, which was 27 in 1980, the number of glaciers is now 13 as displayed in fig 5 [9].

Whilst QORI KALIS Glacier regressed 4 meter per year from 1963-1978 in the Andes Mountains in Peru, its rate of regression in 1995 reached 30 meters. GARHWAL'S Himalayan glaciers melt at a high rate. Investigators believe glaciers would have vanished by 2035 both central and west of the Himalayas. Snow decreasing in Southwest Asia due to climatic changes, especially in the Himalayas, results in less sunlight returning to space and the increase of temperature in the world.

Fig.5: Melting of Glaciers

The increasing temperature difference between land and sea reinforces the mouse winds. And the MOZON-blowing winds blow more strongly and bring the nutrients to the seas.

3. Rise of Sea Level:

Ice melts parallel with temperature rise, increasing the volume of water flowing from the glaciers and ice caps into the seas. Ocean waters are getting warmer and volumes growing. The IPCC notes that the worldwide sea level rose by 10-20 cm over the last century, primarily due to global warming and will increase by a further 40-60 cm in this century. In addition, the problem of salinity in freshwater reserves will be affected by the change in tidal amplitude in the gulfs, and chemicals, depending on the rise in sea levels, coastal erosion and coastal habitats [10].

Marine Biodiversity

The global warming is currently impacting the coastal marine habitats and their biodiversity. In addition, marine contamination caused by the breaking and recycling of pollutants from the industry, overproduction and inappropriate disposal of pharmaceuticals and overfishing has seriously affected marine diversity due to global food shortages (figure 6) [11].

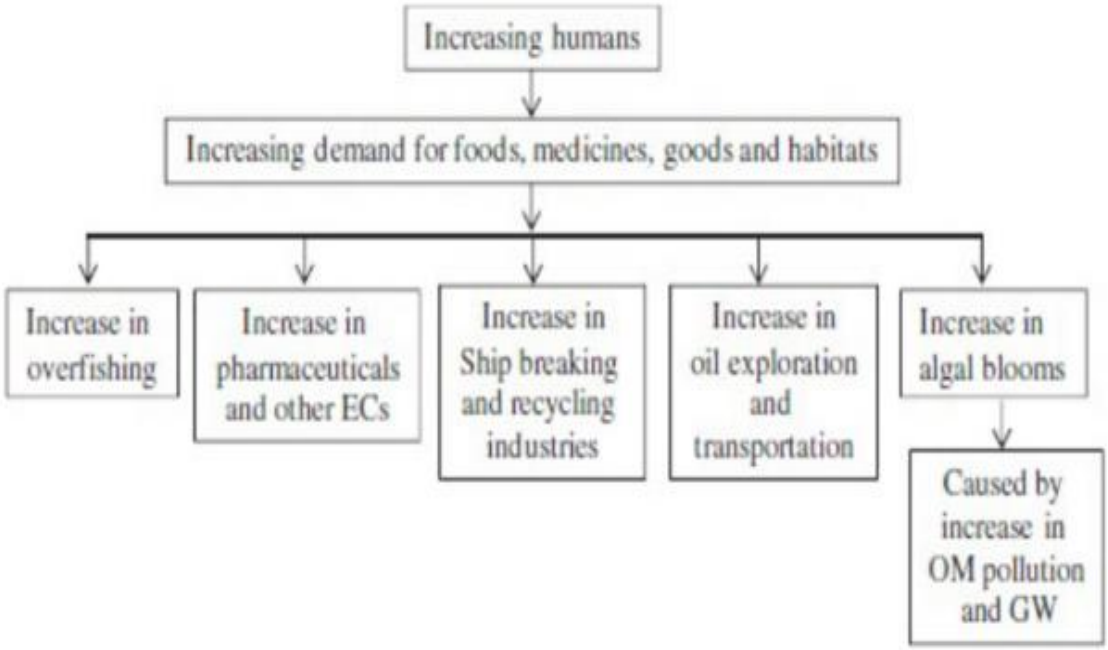

Fig.6: Effects of human on marine ecosystems

Conclusion

The ecological systems, habitats and human lives which have been the main challenges in the history of global warmings and climate change have shown their effects on all living beings, from plankton to mammals in the aquatic ecosystem. The studies conducted indicate that, while today, precautions are taken, the climate destruction caused by global warming will continue in the future. The impacts of the precautions to be taken, which may be considered positive, will, just like the climatic changes everyone are watching today, take almost the same period of time. As no one is unable to reverse the phenomenon of global warming and climate change, everyone must only minimize the expected future damage. To that end, human beings must understand and collaborate globally on the global warming issue.

References

1. D. Kweku et al., "Greenhouse Effect: Greenhouse Gases and Their Impact on Global Warming," J. Sci. Res. Reports, 2018.
2. J. A. Dunne, S. C. Jackson, and J. Harte, "Greenhouse Effect," in Encyclopedia of Biodiversity: Second Edition, 2013.
3. A. A. Lacis, G. A. Schmidt, D. Rind, and R. A. Ruedy, "Atmospheric CO2: Principal control knob governing earth's temperature," Science (80-.)., 2010.
4. W. Zhong and J. D. Haigh, "The greenhouse effect and carbon dioxide," Weather, 2013.
5. M. C. SERREZE, "Understanding Recent Climate Change," Conserv. Biol., 2010.
6. A. S. Ninawe, S. T. Indulkar, and A. Amin, "Impact of climate change on fisheries," in Biotechnology for Sustainable Agriculture: Emerging Approaches and Strategies, 2017.

7. F. Verones, M. M. Hanafiah, S. Pfister, M. A. J. Huijbregts, G. J. Pelletier, and A. Koehler, "Characterization factors for thermal pollution in freshwater aquatic environments," Environ. Sci. Technol., 2010.
8. T. DelSontro, J. J. Beaulieu, and J. A. Downing, "Greenhouse gas emissions from lakes and impoundments: Upscaling in the face of global change," Limnol. Oceanogr. Lett., 2018.
9. J. D. Shakun, P. U. Clark, F. He, N. A. Lifton, Z. Liu, and B. L. Otto-Bliesner, "Regional and global forcing of glacier retreat during the last deglaciation," Nat. Commun., 2015.
10. A. Cazenave and G. Le Cozannet, "Sea level rise and its coastal impacts," Earth's Futur., 2014.
11. B. W. Bowen, L. A. Rocha, R. J. Toonen, and S. A. Karl, "The origins of tropical marine biodiversity," Trends in Ecology and Evolution. 2013.