ISSN: 2755-0168

Journal of Biotechnology & Bioinformatics Research

SCIENTIFIC Research and Community

Review Article

Open Access

Certain Aspects of Climate Change that are Resulting in Major Changes to the World as we know it

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Received: July 29, 2024; **Accepted:** August 05, 2024; **Published:** August 12, 2024

Introduction

The human population on planet earth has increased dramatically in the past 80 years. In early times, humans were a part of nature. They interacted with it and were integrated with plants and other animals. What do humans do that other organisms do not? All organisms communicate to one degree or another; even plants communicate with one another by indirect methods. Ants build nests, honeybees make hives and birds sometimes dig holes in trees to build nests. However, at some point, humans began to exploit not only natural resources, but other animals and plants. We can trace these activities to ancient structures. A favourite one is the pyramids of Egypt. No other animal on earth has left such obvious evidence of their presence.

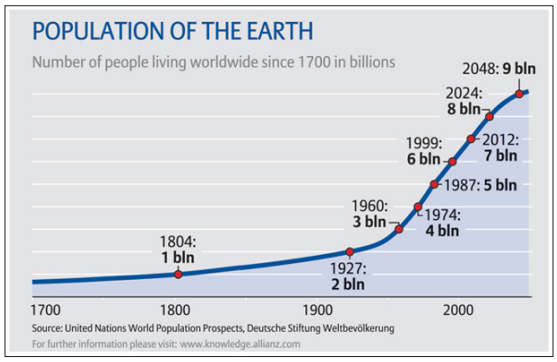

Figure 1: Increase in population since 1900

There remain remnants of those ancient connections. After a certain point, however, humans did what other organisms never did, they exploited nature. Once their numbers were above a certain point, they started accumulating resources and materials and disrupting nature, instead of remaining in equilibrium with it. Instead of using horses to travel or sails on boats to travel across oceans, the mining for coal and oil resulted in development of railways, vehicles, ships and aircraft. With these developments, the Global temperature and population of humans increased, with the quantity of "Glasshouse Gases" – carbon dioxide, methane and nitrous oxide all increasing. Since c 1800, the increasing global temperature has coincided with the human population also increasing, since the start of the Industrial revolution.

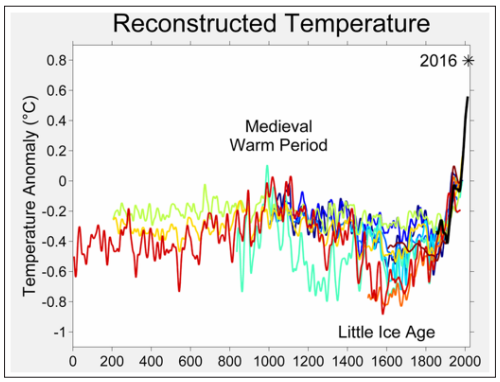

Figure 2: Changes in Temperature Suddenly Increasing from 1800

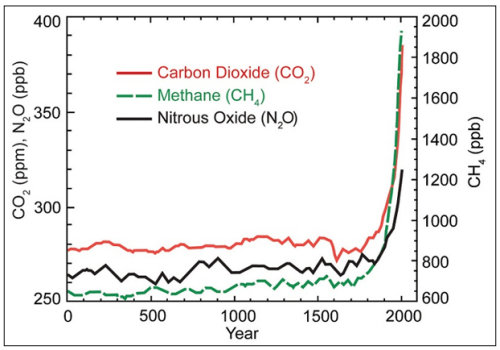

Figure 3: Changes in Quantities of Carbondioxide, Methane and Nitrous Oxide in the Atmosphere

Farming is one of the sources of carbon emissions, as well as Methane and Nitrous oxide due to emissions from belching cows, nitrogen fertilizers and other practices on farms. Already it has been suggested that action is needed to make farming greener, such as managing slurry and using additives to cattle feed to make cows release less methane, as well as increasing woodland area and restoring peatland to store carbon.

As the global temperature increases, it has a major impact on the temperature of water in the oceans, which has increased the quantity of rain. With movement of clouds affected by wind

direction, some relatively dry areas have had more rainfall, resulting with flooding in some places. Apart from flooding, the rain washes pesticides off plants sprayed with a formulation that is mixed in water. Once the pesticide is moved to the soil, it can be absorbed by plant roots, but pesticides also pollute rivers [1]. Instead of using a formulation that is mixed in water, the formulation should include a botanical oil, such as Cotton seed oil and sprayed on crops at ultra-low volume (ULV), so the deposit is not washed off the plants and less active ingredient is needed. Spread of certain more persistent chemicals that have been sprayed on crops has also had a detrimental impact on beneficial insects such as bees and predators of pests.

The effect of climate change on insects is extremely important. The severeness of pest insects is very much affected by the climate. The population of desert locusts can decline and then, when the rainfall in certain desert areas is high, the small population of locusts suddenly expands, and swarms develop and start the severe problem of the desert locusts damaging crops as and the swarms spread rapidly to vast areas of crops. From 2010 to 2019, there were relatively few locust outbreaks, but suddenly in 2019 -2022 their outbreaks as swarms spread east to Iran, Pakistan and India, while other swarms moved into Ethiopia, Somalia, and other parts of East Africa. Fortunately, a biopesticide had been registered in Somalia and was successfully sprayed to control the locusts without affecting their bees.

Movement of warmer air upwards has also affected movement of some insects. As an example, Spodoptera frugiperda, the fall armyworm (Figure 4) was well established in USA, but suddenly arrived in West Africa, which possibly occurred if a warm air resulted in the moths being lifted and caught by jet streams of air across the Atlantic. They spread rapidly in Africa and onward to Asia [2]. They then arrived in Australia. Another report has pointed out that Invasive species, the silent intruders of ecosystems, are wreaking havoc across India's natural landscapes [3].

Figure 4: (a) *Spodoptera frugiperda* Moth and (b) A Larva Feeding on a Plant

The presence of mosquitoes is also affected by weather conditions. They occur mostly in warm climates and where there are areas of water in ponds, lakes, etc where the larval stage develops. With the rise in temperature, there are more occasions when normally arid areas, can suddenly become flooded.

As mentioned earlier the main cause of the changes in the climate is considered to be the presence of so called "Glasshouse gases" The presence of carbon dioxide in the atmosphere is just one of the problems. This is due to the increase in the number of cars and other vehicles now being used and spreading the exhaust from the engines that contains CO2 and has become a major source of this gas in the environment. There is the view that the existing type of vehicles should be replaced by using cars powered by electricity obtained by using power from wind turbines, usually sited in groups where the wind can rotate the blade. The electric power can be transferred to a battery to power the engine of vehicles. (Figure 5), both on land and also placed at sea, usually near the coast.

A wind turbine converts the kinetic energy of wind into electrical energy. There are now hundreds of thousands of large turbines in wind farms, were generating over 650 gigawatts of power. Wind turbines are an increasingly important source of intermittent renewable energy and are used in many countries to lower energy costs and reduce reliance on fossil fuels. One study has claimed that wind had the "lowest relative greenhouse gas emissions, and the least demands for water consumption and the most favourable social impacts" compared to photovoltaic, hydro, geothermal, coal and gas energy sources.

Figure 5: Wind Farm Showing a Group of Wind Turbines

An alternative way of collecting energy is to construct solar panels, which can be fitted on the top of buildings to face the sunshine.

Figure 6: Solar Panels on a House

Apart from being used to supply power to individual houses, it can be used to recharge batteries to use in cars or other items requiring electric power. The panels have also been established on open fields, although this method can reduce the area within a farm needed for growing crops or for cattle and sheep.

Figure 7: Solar Panels in a Field

At present there is no guarantee that there would be sufficient energy, if there is insufficient wind or sunshine to provide enough energy. Power needed on the National Grid will require other sources such as diesel generators or eventually nuclear power, designed to avoid any unacceptable gases in the environment and provide energy when needed

The expansion of the world occupied by people cannot continue as it has so far, as areas for farming cannot cover much more area than at present. Clearly governments need to understand the problems of farming and instead of reducing the extent of agricultural research, more attention is needed on improving yields by development of new crop varieties to increase yields without increasing the area used to grow crops.

Over the years the expansion of human populations, their homes, travel around the world using roads, ships, trains and aircraft and other factors now need to be adjusted to avoid further expansion of the global population, so that everyone can survive and enjoy a more stable way of life.

Before the Industrial Revolution, the world had two natural situations that acted to adjust temperatures around the world, namely the presence of Glaciers and Volcanoes.

Glaciers provided a protective cover, although they functioned primarily in the Arctic and Antarctic. They did melt to some extent during periods of sunny weather, so some very cold water entered the warmer ocean currents and raised sea levels. The other glaciers were in Mountain areas, notably in the Alps, the Himalayas and in Argentina and Chile. The bright white areas of ice reflected excess heat into space to keep the Earth cooler. These glaciers are now melting because of the global higher temperatures.

Glacial ice is the largest reservoir of fresh water on Earth, holding with ice sheets about 69 percent of the world's freshwater. The Oceans cover 2/3 of our planet and house 80% of all animal life with coral reefs, mangrove, etc with many types of fish, seals, sharks, manatees, whales and octopuses etc, some of which are found very deep in the Oceans, as shown on television by David Attenborough.

Figure 8: Glacier of the Geikie Plateau in Greenland

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Figure 9: Part of the Alps in Austria

In contrast to the glaciers, a volcano is when there is a rupture in the crust of the Earth, that allows hot lava, volcanic ash, and gases to escape from a magma chamber below the surface. They occur mostly where tectonic plates are diverging or converging, and many occur under water, such as at the Mid-Atlantic Ridge.

Perhaps the most famous volcano was the 'Vesuvious', which destroyed the city of Pompeii in AD79. It is still active and is surrounded by several million people living in the area of Naples. Another example is 'Etna' situated in Sicily which on one occasion in 1669 caused the death of 20,000 people.

Volcanoes have continued to erupt in many different parts of the World. Among the recent volcanoes, Mount Saint Helens, volcanic peak in the Cascade Range, southwestern Washington, U.S. Its eruption on May 18, 1980, was one of the greatest volcanic explosions ever recorded in North America. Ash from this most deadly and economically destructive eruption reached all the way to Montana. Casualties were limited, owing to the evacuation of the surrounding forest, with exception of loggers who did not depart in time; incinerated in large forest fire that was a result of one of seventeen pyroclastic flows. The Sound of eruption could be heard 700 miles (1127 km) away and the entire flank of mountain collapsed.

There is no doubt that volcanoes will continue to explode and Glaciers may return, if it is possible to stop the Global temperature increasing, if the impact of the gases in the atmosphere can be significantly reduced.

References

1. Matthews G (2024) A Future for Ultra-Low Volume Application of Biological and Selected Chemical Pesticide. Journal of Nutrition Food Science and Technology 5: 1-4.
2. Sarkowi FN, Mokhtar AS (2021) The Fall Armyworm (FAW) Spodoptera frugiperda: A review on Biology, Life history, Invasion, Dispersion and control. Outlooks on Pest Management 32: 27-32.
3. Vidhi Churiwala (2024) Invasive species threaten India's ecosystems: A growing concern. IAPPS. Available at: https://iapps2010.wordpress.com/2024/07/10/india-invasive-species-threaten-ecosystems/.