British Journal of Global Ecology and Sustainable Development
Volume-24, January, 2024
ISSN (E): 2754-9291

GLOBAL WARMING

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Introduction

Global warming is the phenomenon of an increase in average air temperatures at the Earth's surface over the past hundred years. Since the early 20th century, climate scientists have systematically collected detailed data on various weather conditions, such as temperature, precipitation, and storms, and studied their associated climate impacts, such as ocean currents and atmospheric chemistry. [2] These data indicate that the Earth's climate has varied over almost every known time period since the geological past, and that the impacts of human activity have had an increasingly pronounced impact on the nature and the scale of modern climate change.

For more than a century, scientists have understood the basic physics of why greenhouse gases such as carbon dioxide cause warming. These gases make up only a small fraction of the atmosphere, but have a significant impact on Earth's climate, trapping some of the planet's heat before it escapes into space. [4] This greenhouse effect plays an important role: it is thanks to it that liquid water and life exist on a planet so far from the sun. However, during the Industrial Revolution, people began burning coal and other fossil fuels to power factories, iron furnaces, and steam engines, leading to increased concentrations of greenhouse gases in the atmosphere. Since then, human activity has been warming the planet.

We know this to be true thanks to a huge body of evidence, starting with temperature measurements taken at weather stations and ships since the mid-19th century. Later, scientists began monitoring surface temperatures using satellites and looking for signs of climate change in the geological record. All of this data tells the same story: The Earth is warming. [3]

Average global temperatures have risen 2.2 degrees Fahrenheit or 1.2 degrees Celsius since 1880, with the largest changes occurring in the late 20th century. Land has warmed more than the sea surface, and the Arctic has warmed the most, by more than 4 degrees Fahrenheit, just since the 1960s. Temperature extremes have also changed. In the United States, daily maximum temperatures are now twice the minimum.

This heating process is without precedent in recent geological history. A famous figure, first published in 1998 and often referred to as a “hockey stick” graph[10], illustrates how temperatures remained relatively stable for centuries (the long part of the stick) before rising sharply upward (the blade). It is based on data obtained from tree rings, ice cores and other natural indicators. The basic idea, which has withstood years of scrutiny from climate scientists and opponents of the theory, is that the Earth is much hotter today than it has been in at least the last 1,000 years, and likely for much longer. [6]

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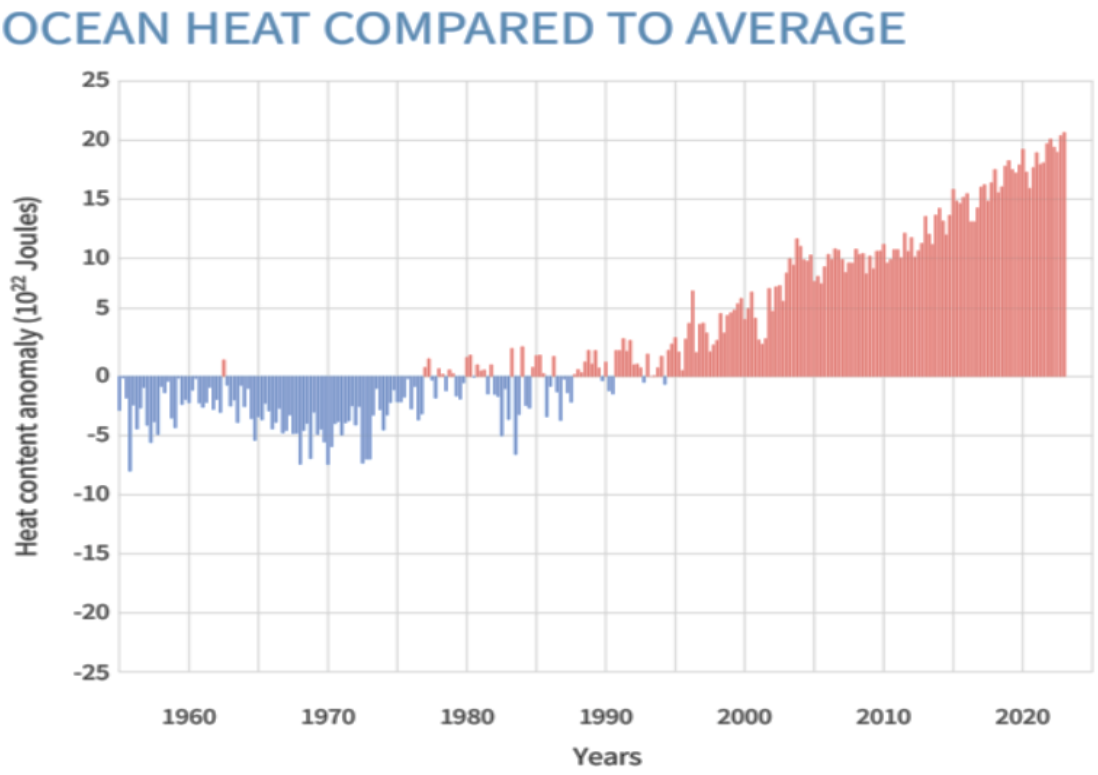

Fig.1

In fact, surface temperatures mask the true extent of climate change because the ocean absorbs 90 percent of the heat trapped by greenhouse gases. Measurements collected over the past six decades by oceanographic expeditions and networks of floating instruments show that every layer of the ocean is warming. According to one study, the ocean absorbed as much heat between 1997 and 2015 as it did in the previous 130 years. [10]

We also know that climate change is happening because we see its effects everywhere. Glaciers and glaciers are shrinking, and sea levels are rising. Arctic sea ice is disappearing. In spring, the snow melts earlier and plants bloom earlier. Animals move to higher altitudes and latitudes in search of colder conditions. And droughts, floods and wildfires are becoming more extreme. Models predicted many of these changes, but observations indicate they are now occurring.

The ocean is the largest solar collector on Earth. Water not only covers more than 70 percent of our planet's surface, but it can also absorb large amounts of heat without significantly increasing temperatures. This amazing ability to store and release heat over long periods of time gives the ocean a key role in stabilizing the Earth's climate system. The main source of heat in the ocean is sunlight. In addition, clouds, water vapor, and greenhouse gases radiate the heat they have absorbed, and some of this thermal energy enters the ocean. Waves, tides and currents constantly stir the ocean, moving heat from warmer latitudes to colder and deeper levels.

Heat absorbed by the ocean moves from one place to another, but does not disappear. This thermal energy is eventually returned to the rest of the Earth's system through

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melting ice shelves, evaporation of water, or direct reheating of the atmosphere. Thus, thermal energy in the ocean can warm the planet for decades after it is absorbed. If the ocean absorbs more heat than it releases over a given period of time, its thermal content increases. Knowing how much thermal energy the ocean absorbs and releases is essential to understanding and modeling global climate.

Greenhouse gases such as water vapor and carbon dioxide play an important role in climate. Without them, the Earth would be too cold to support liquid water, and humanity would not exist. The way it works is this: The planet's temperature is primarily a function of the energy the Earth absorbs from the Sun (which heats it) and the energy the Earth emits into space as infrared radiation (which cools it). Because of their molecular structure, greenhouse gases temporarily absorb some of this outgoing infrared radiation and then re-emit it in all directions, sending some of this energy back to the surface and warming the planet. Scientists have been observing this process since the 1850s. [8, 11]

If we continue with the current pattern, by the end of the century heatwaves in the Middle East and South Asia will be too hot to go outside. Droughts will affect Central America, the Mediterranean and southern Africa. Many island nations and low-lying areas, from Texas to Bangladesh, will be inundated by rising sea levels. On the other hand, climate change could bring welcome warming and extended growing seasons to the upper Midwest, Canada, the Nordic countries and Russia. However, further north, the loss of snow, ice and permafrost will change indigenous traditions and threaten infrastructure.

President of Uzbekistan Shavkat Mirziyoyev expressed his opinion on the importance of preserving nature and the transition from the previous, inefficient economy to an economy with sustainable environmental principles in his speech at the launch ceremony of large joint projects in the field of green energy.[1] The President also emphasized that the country is committed to the development and implementation of green energy projects, which will help reduce the negative impact on the environment and promote sustainable development. In his speech, he also highlighted key areas, including renewable energy sources and other measures aimed at reducing greenhouse gas emissions.

This emphasis on green technologies and sustainable development demonstrates the country's commitment to a balanced approach between economic growth and environmental responsibility. These initiatives can also help attract investment into the clean energy sector and help create jobs in promising industries.

Overall, these efforts represent an important step towards sustainable development and contribute to global efforts to combat climate change. Not only is the desire for economic development emphasized, but also the awareness of the urgency of taking action to reduce environmental impact. Green energy projects not only promote environmental sustainability, but also create favorable conditions for economic growth, innovation and improving the quality of life of citizens. Overall, these initiatives highlight Uzbekistan's

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ambitious strategies to implement a sustainable and balanced approach to the country's development.

In conclusion, global warming is one of the most pressing and multifaceted problems facing humanity today. The evidence supporting the reality of climate change is backed by extensive scientific observations and research conducted over many decades. The consequences of this warming trend affect various aspects of our planet, from ecosystems to the level of human societies.

One of the main factors of global warming is the increase in the concentration of greenhouse gases in the Earth's atmosphere. Human activities, such as leaf burning and deforestation, have significantly increased levels of carbon dioxide, methane and other greenhouse gases. These gases trap heat, causing global temperatures to gradually rise. The consequences are becoming clear in unprecedented changes in our climate system. Rising temperatures are causing glaciers and polar ice caps to melt, causing sea levels to rise. Coastal areas, including densely populated cities, are becoming increasingly vulnerable to flooding and erosion. The frequency and intensity of extreme weather events such as hurricanes, droughts and wildfires are increasing, causing devastating impacts on societies and ecosystems. [7]

The complex interaction between the warming atmosphere and the oceans further complicates the situation. The oceans act as both a heat sink and a heat source, absorbing much of the excess heat. [9] While this mitigates the immediate effects of global warming, it has dire consequences for marine life, contributing to coral die-offs, altered ocean currents, and disruption of ecosystems.

The impacts of global warming extend beyond the ecological realm, permeating the socio-economic structure of nations. Climate change is impacting agricultural productivity, leading to food insecurity and economic instability. Climate migration is becoming a reality as communities are forced to move due to rising sea levels or uninhabitable conditions. The spread of disease, influenced by climate change, poses additional threats to public health.

Mitigating the impacts of global warming requires collective and decisive action at the global level. International cooperation, interventions by politicians and professors.

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