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Impact of Climate Change on Tourism

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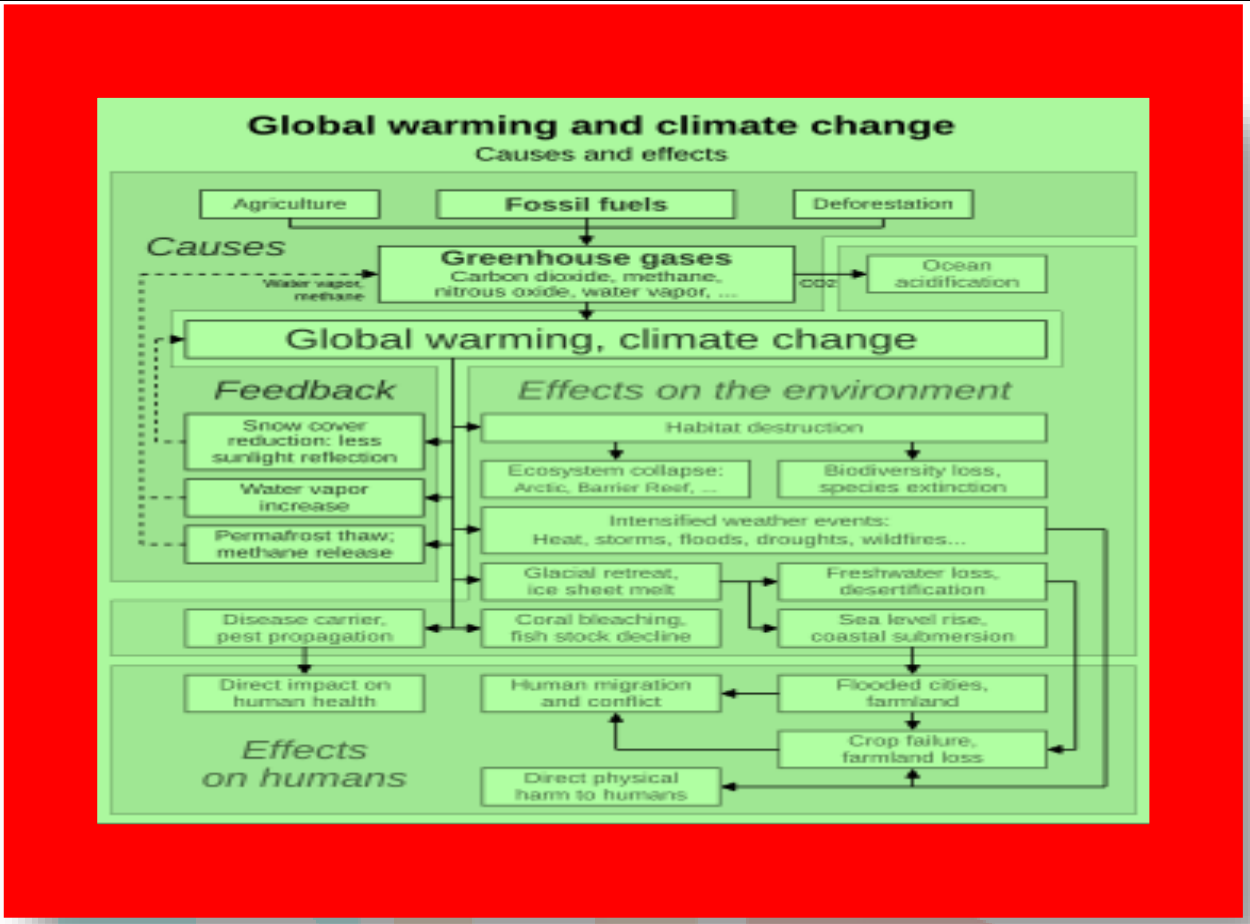
ABSTRACT

Effects of climate change are well documented and growing for Earth's natural environment and human societies. Changes to the climate system include an overall warming trend, changes to precipitation patterns, and more extreme weather. As the climate changes it impacts the natural environment with effects such as more intense forest fires, thawing permafrost, and desertification. These changes impact ecosystems and societies, and can become irreversible once tipping points are crossed. Climate activists are engaged in a range of activities around the world that seek to ameliorate these issues or prevent them from happening.

INTRODUCTION

The effects of climate change vary in timing and location. Up until now the Arctic has warmed faster than most other regions due to climate change feedbacks. Surface air temperatures over land have also increased at about twice the rate they do over the ocean, causing intense heat waves. These temperatures would stabilize if greenhouse gas emissions were brought under control. Ice sheets and oceans absorb the vast majority of excess heat in the atmosphere, delaying effects there but causing them to accelerate and then continue after surface temperatures stabilize. Sea level rise is a particular long term concern as a result. The effects of ocean warming also include marine heatwaves, ocean stratification, deoxygenation, and changes to ocean currents. The ocean is also acidifying as it absorbs carbon dioxide from the atmosphere.

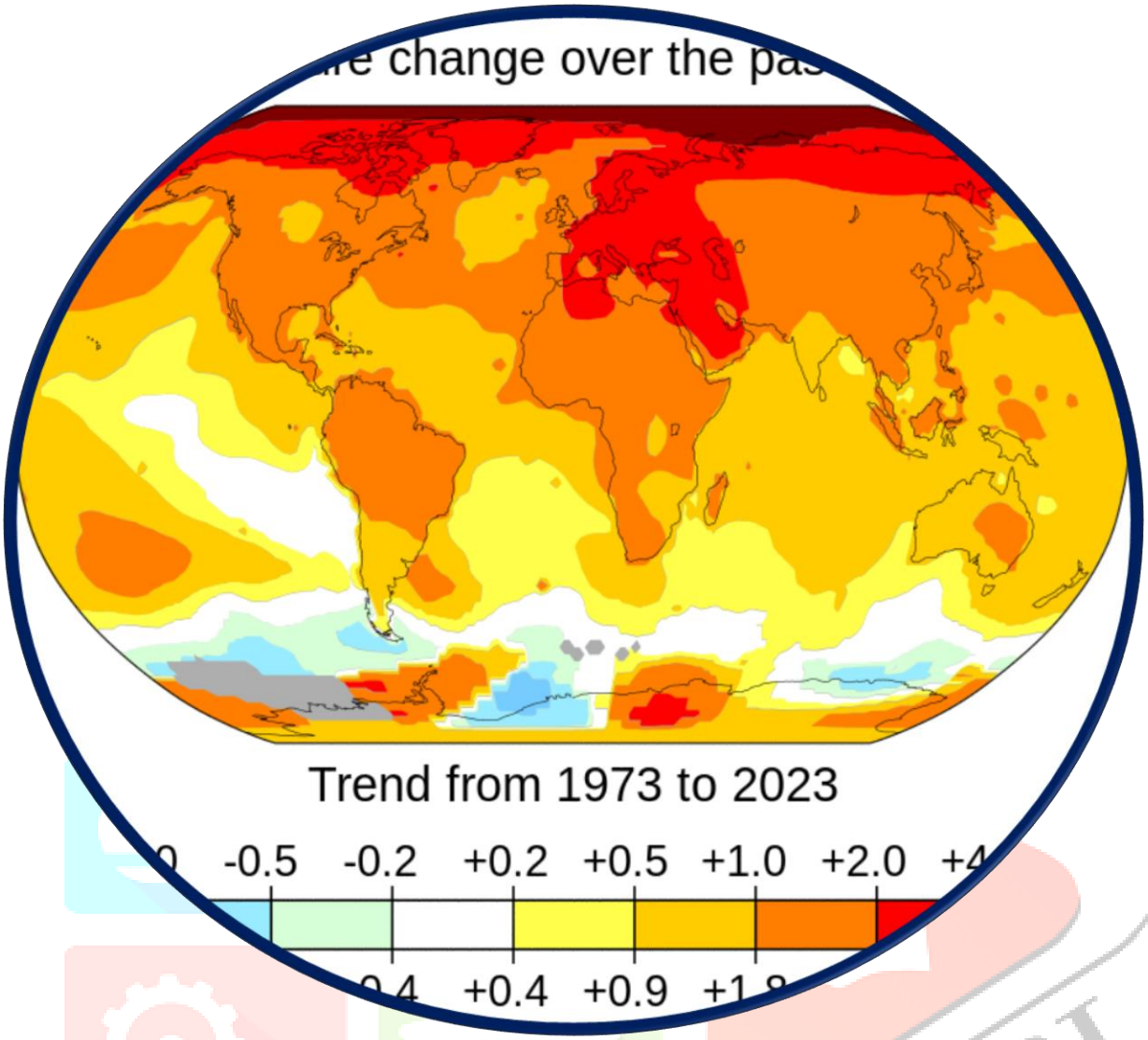


The primary causes and the wide-ranging impacts of climate change. Some effects act as positive feedbacks that amplify climate change.

The ecosystems most immediately threatened by climate change are in the mountains, coral reefs, and the Arctic. Excess heat is causing environmental changes in those locations that exceed the ability of animals to adapt. Species are escaping heat by migrating towards the poles and to higher ground when they can. Sea level rise threatens coastal wetlands with flooding. Decreases in soil moisture in certain locations can cause desertification and damage ecosystems like the Amazon Rainforest.[11]:9 At 2 °C (3.6 °F) of warming, around 10% of species on land would become critically endangered.

Humans are vulnerable to climate change in many ways. Sources of food and fresh water can be threatened by environmental changes. Human health can be impacted by weather extremes or by ripple effects like the spread of infectious diseases. Economic impacts include changes to agriculture, fisheries, and forestry. Higher temperatures will increasingly prevent outdoor labor in tropical latitudes due to heat stress. Island nations and coastal cities may be inundated by rising sea levels. Some groups of people may be particularly at risk from climate change, such as the poor, children, and indigenous peoples. Industrialised countries, which have emitted the vast majority of CO_2, have more resources to adapt to global warming than developing nations do.[13] Cumulative effects and extreme weather events can lead to displacement and migration.

Changes in temperature



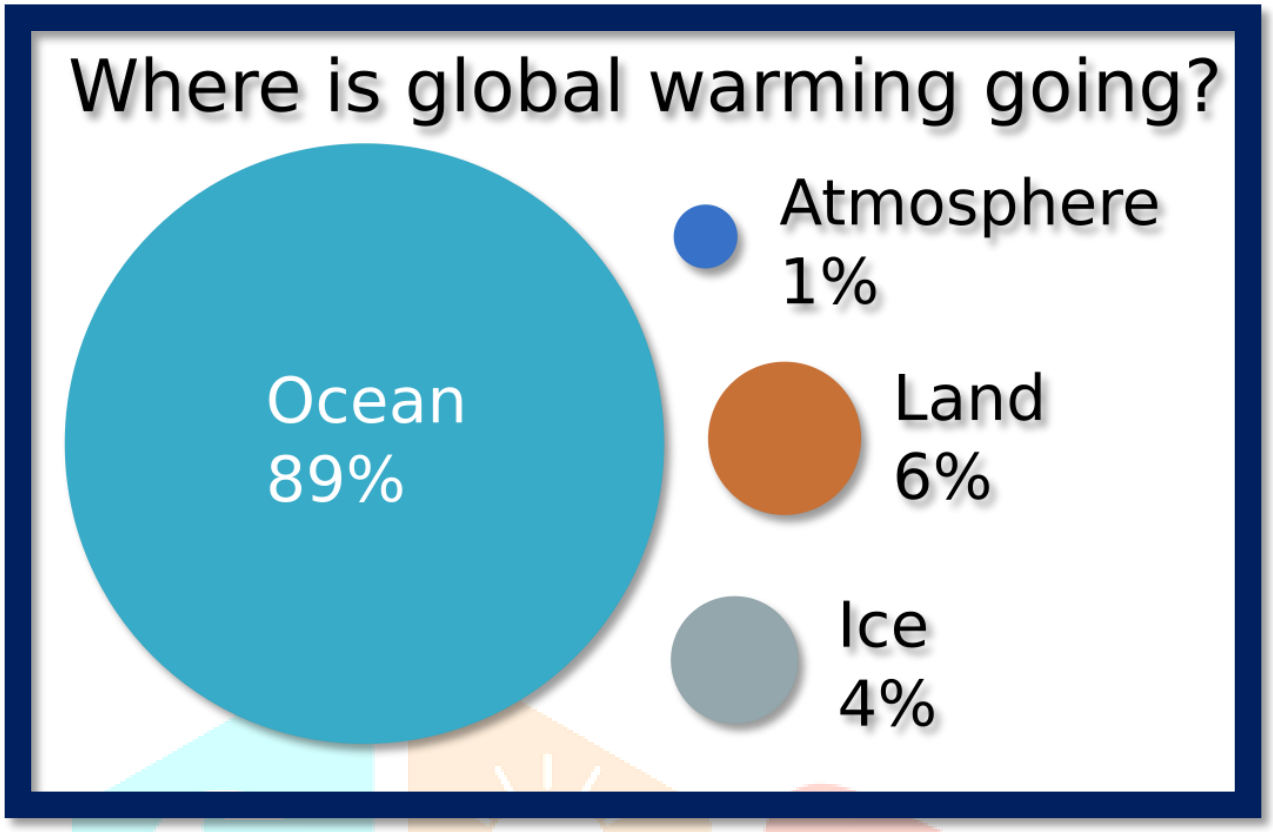
One is to investigate past natural changes in climate. To assess changes in Earth's past climate scientists have studied tree rings, ice cores, corals, and ocean and lake sediments. These show that recent temperatures have surpassed anything in the last 2,000 years. By the end of the 21st century, temperatures may increase to a level last seen in the mid-Pliocene. This was around 3 million years ago. At that time, mean global temperatures were about 2–4 °C (3.6–7.2 °F) warmer than pre-industrial temperatures. The global mean sea level was up to 25 metres (82 ft) higher than it is today. The modern observed rise in temperature and CO_2 concentrations has been rapid. Even abrupt geophysical events in Earth's history do not approach current rates.

How much the world warms depends on human greenhouse gas emissions and on how sensitive the climate is to greenhouse gases. The more carbon dioxide (CO_2) is emitted in the 21st century the hotter the world will be by 2100. For a doubling of greenhouse gas concentrations, the global mean temperature would rise by about 2.5–4 °C (4.5–7.2 °F). If emissions of CO_2 stopped abruptly and there was no use of negative emission technologies, the Earth's climate would not start moving back to its pre-industrial state. Temperatures would stay at the same high level for several centuries.

Extreme storms

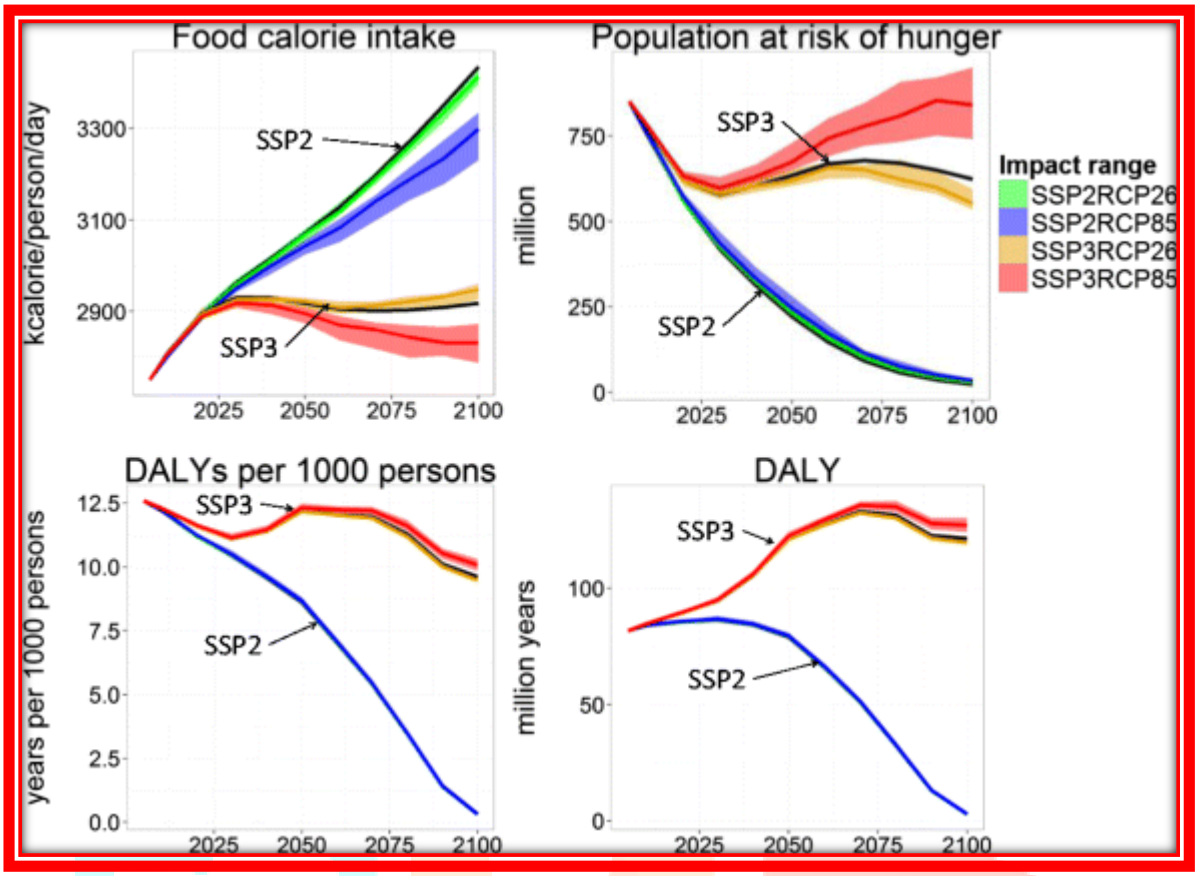
Storms become wetter under climate change. These include tropical cyclones and extratropical cyclones. Both the maximum and mean rainfall rates increase. This more extreme rainfall is also true for thunderstorms in some regions. Furthermore, tropical cyclones and storm tracks are moving towards the poles. This means some regions will see large changes in maximum wind speeds. Scientists expect there will be fewer tropical cyclones, but they expect their strength to increase. There has probably been an increase in the number of tropical cyclones that intensify rapidly. Meteorological and seismological data indicate a widespread increase in wind-driven global ocean wave energy in recent decades that has been attributed to an increase in storm intensity over the oceans due to climate change.Atmospheric turbulence dangerous for aviation (hard to predict or that cannot be avoided by flying higher) probably increases due to climate change.

Oceans



There are many effects of climate change on oceans. One of the most important is an increase in ocean temperatures. More frequent marine heatwaves are linked to this. The rising temperature contributes to a rise in sea levels due to the expansion of water as it warms and the melting of ice sheets on land. Other effects on oceans include sea ice decline, reducing pH values and oxygen levels, as well as increased ocean stratification. All this can lead to changes of ocean currents, for example a weakening of the Atlantic meridional overturning circulation (AMOC). The main cause of these changes are the emissions of greenhouse gases from human activities, mainly burning of fossil fuels and deforestation. Carbon dioxide and methane are examples of greenhouse gases. The additional greenhouse effect leads to ocean warming because the ocean takes up most of the additional heat in the climate system. The ocean also absorbs some of the extra carbon dioxide that is in the atmosphere. This causes the pH value of the seawater to drop.[87] Scientists estimate that the ocean absorbs about 25% of all human-caused CO_2 emissions.

Food security



Climate change will affect agriculture and food production around the world. The reasons include the effects of elevated CO_2 in the atmosphere. Higher temperatures and altered precipitation and transpiration regimes are also factors. Increased frequency of extreme events and modified weed, pest, and pathogen pressure are other factors. Droughts result in crop failures and the loss of pasture for livestock.] Loss and poor growth of livestock cause milk yield and meat production to decrease. The rate of soil erosion is 10–20 times higher than the rate of soil accumulation in agricultural areas that use no-till farming. In areas with tilling it is 100 times higher. Climate change worsens this type of land degradation and desertification.

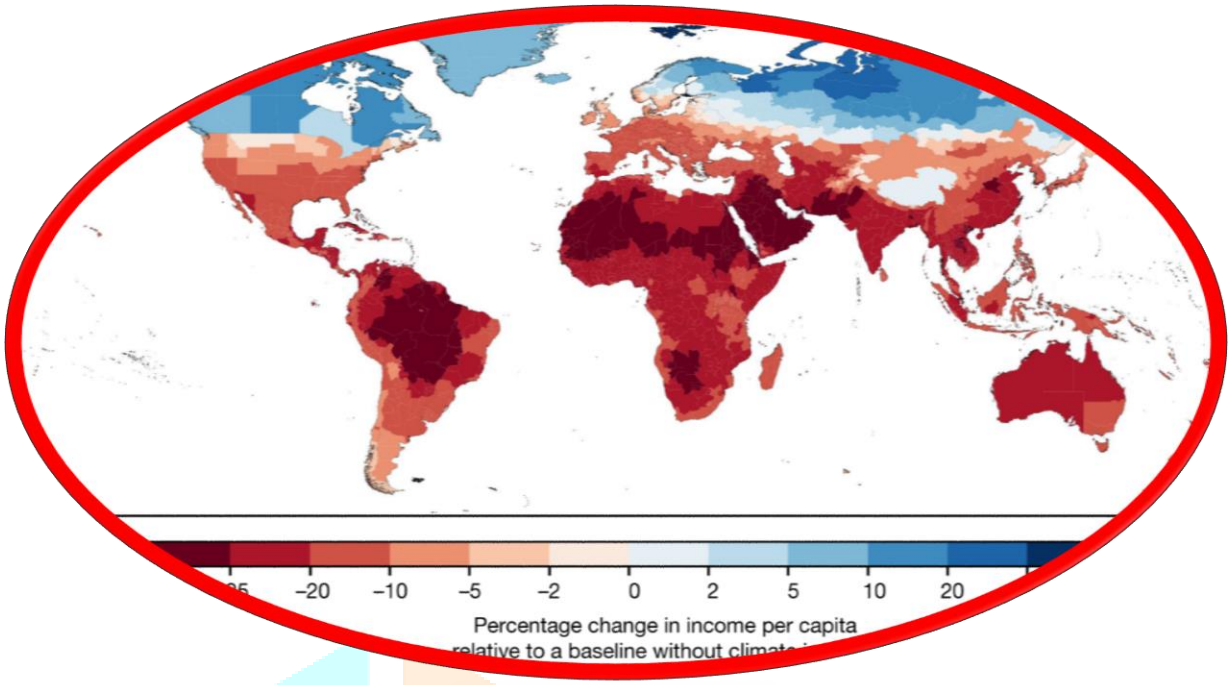
Climate change is projected to negatively affect all four pillars of food security. It will affect how much food is available. It will also affect how easy food is to access through prices, food quality, and how stable the food system is.] Climate change is already affecting the productivity of wheat and other staples.

In many areas, fishery catches are already decreasing because of global warming and changes in biochemical cycles. In combination with overfishing, warming waters decrease the amount of fish in the ocean. Per degree of warming, ocean biomass is expected to decrease by about 5%. Tropical and subtropical oceans are most affected, while there may be more fish in polar waters.

Water security

Water resources can be affected by climate change in various ways. The total amount of freshwater available can change, for instance due to dry spells or droughts. Heavy rainfall and flooding can have an impact on water quality. They can transport pollutants into water bodies through increased surface runoff. In coastal regions, more salt may find its way into water resources due to higher sea levels and more intense storms. Higher temperatures also directly degrade water quality.

Economic impacts



Economic forecasts of the impact of global warming vary considerably. The impacts are worse if there is insufficient adaptation. Economic modelling may underrate the impact of catastrophic climatic changes. When estimating losses, economists choose a discount rate. This determines how much one prefers to have goods or cash now compared to at a future date. Using a high discount rate may understate economic losses. This is because losses for future generations weigh less heavily.

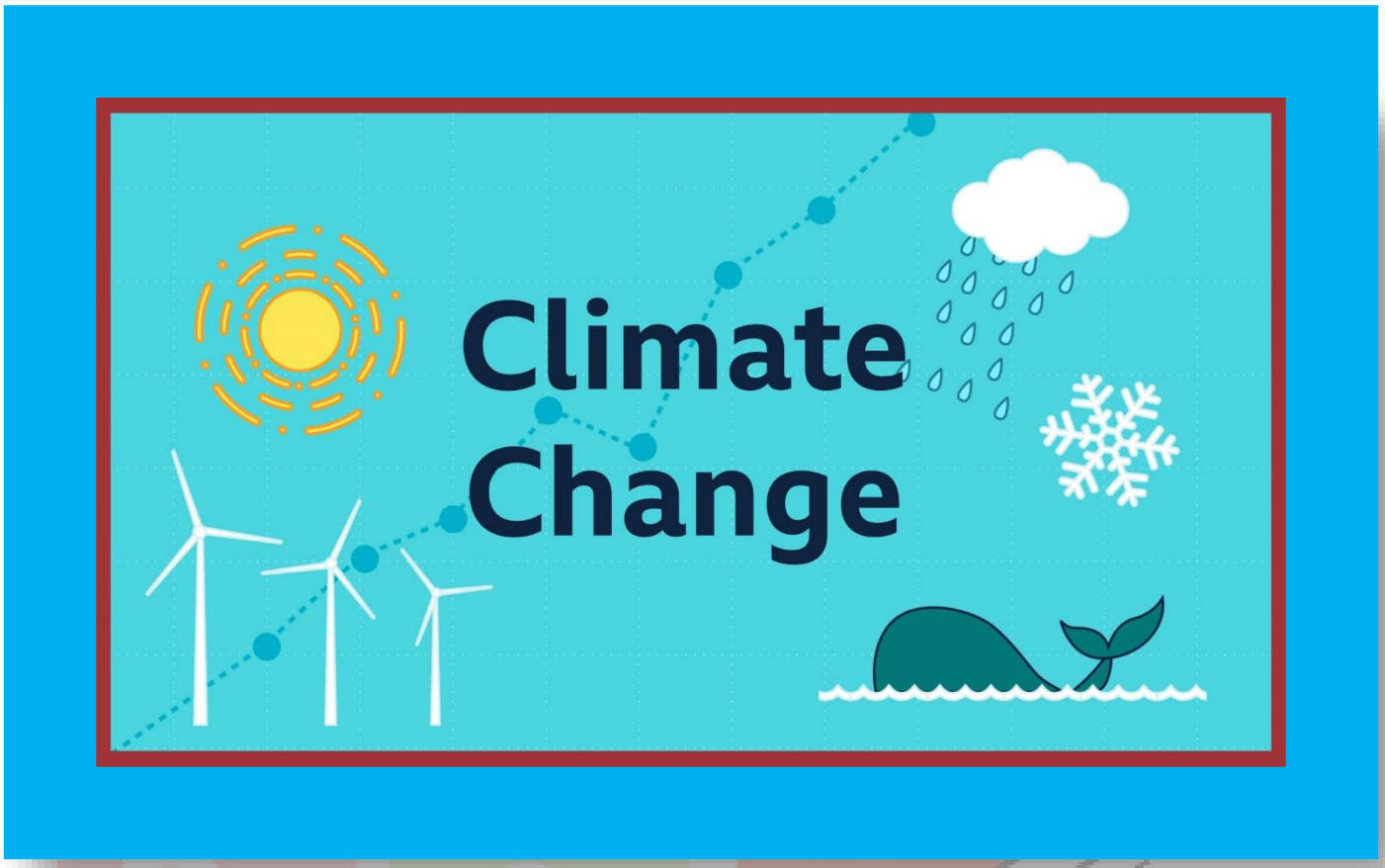
Economic impacts are bigger the more the temperature rises. Scientists have compared impacts with warming of 1.5 °C (2.7 °F) and a level of 3.66 °C (6.59 °F). They use this higher figure to represent no efforts to stop emissions. They found that total damages at 1.5 °C were 90% less than at 3.66 °C. One study found that global GDP at the end of the century would be 3.5% less if warming is limited to 3 °C (5.4 °F). This study excludes the potential effect of tipping points. Another study found that excluding tipping points underestimates the global economic impact by a factor of two to eight. Another study found that a temperature rise of 2 °C (3.6 °F) by 2050 would reduce global GDP by 2.5%–7.5%. By 2100 in this scenario the temperature would rise by 4 °C (7.2 °F). This could reduce global GDP by 30% in the worst case. A 2024 study, which checked the data from the last 120 years, found that climate change has already reduced welfare by 29% and further temperature rise will rise the number to 47%. The temperature rise during the years 1960-2019 alone has cut current GDP per capita by 18%. A 1 degree warming reduces global GDP by 12%. An increase of 3 degrees by 2100, will reduce capital by 50%. The effects are similar to experiencing the 1929 Great Depression permanently. The correct social cost of carbon according to the study is 1065 dollars per tonne of CO2.

Global losses reveal rapidly rising costs due to extreme weather events since the 1970s. Socio-economic factors have contributed to the observed trend of global losses. These factors include population growth and increased wealth. Regional climatic factors also play a role. These include changes in precipitation and flooding events. It is difficult to quantify the relative impact of socio-economic factors and climate change on the observed trend. The trend does suggest social systems are increasing vulnerable to climate change.

Economic inequality

Climate change has contributed to global economic inequality. Wealthy countries in colder regions have felt little overall economic impact from climate change or may have benefited. Poor hotter countries probably grew less than if there had been no global warming.

CONCLUSION



The scientific evidence is now overwhelming: climate change is a serious global threat, and it demands an urgent global response.

This Review has assessed a wide range of evidence on the impacts of climate change and on the economic costs, and has used a number of different techniques to assess costs and risks. From all of these perspectives, the evidence gathered by the Review leads to a simple conclusion: the benefits of strong and early action far outweigh the economic costs of not acting.

Climate change will affect the basic elements of life for people around the world – access to water, food production, health, and the environment. Hundreds of millions of people could suffer hunger, water shortages and coastal flooding as the world warms.

Using the results from formal economic models, the Review estimates that if we don't act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more.

In contrast, the costs of action – reducing greenhouse gas emissions to avoid the worst impacts of climate change – can be limited to around 1% of global GDP each year.

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