

Original Article

Climate Change with Pollutants

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Abstract:

Widespread improvements in the quality of life of many of the world's populations have gone hand-in-hand with increased demands on natural resources. The planet is struggling to keep up. Increases in the average global temperature, and the frequency of extreme weather events are transforming ecosystems around the world and threatening entire species of plants and animals.

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Introduction:

Forests are drying up because there is less rainfall and thus more fires, and the glaciers of both the North and South Poles are shrinking. The consequences of climate change affect all of us, but to react and adapt to these challenges, we must first understand them.

- **CO₂:** parts per million (ppm)
- **Global temperature:** 1,1 °C since 1880
- **Arctic sea ice:** 13,1% loss per decade
- **Ice sheets:** 418 billion tons per year
- **Global sea level:** 3,3 mm per year

Climate, Weather, and Natural Disasters:

Climate is not the same as weather, but the two phenomena are closely related.

While weather refers to short-term conditions that can change quickly, climate determines the long-term character of a given place, for instance, whether it is temperate or tropical. The relationship between weather and climate is crucial: the former is subordinate to the latter. Climate determines temperatures, weather diversity, the traits of winters, rainfall totals, as well as the nature of meteorological phenomena such as the severity of storms. It is due to this delicate relationship that we are facing both temperature rises and more frequent weather extremes and natural disasters as a result of climate change.

Climate Phenomena: Extreme temperatures, drought, forest fires

Hydrological Phenomena: Floods, mass movements

Meteorological Phenomena: Tropical, extratropical, convective, and local storms

Discussion:

Geophysical Phenomena:

Earthquakes, tsunami, volcanic activity. Geophysical phenomena are not directly linked to climate and weather changes, although their effects are often extreme.

Number of natural disasters worldwide:

Hurricane Katarina 2010

Earthquake a tsunami in Japan

Methodology:

Planet earth as a Greenhouse:

Solar energy in the form of radiation reaches the earth, where two thirds of it is absorbed by the planet's surface. The rest is reflected in the atmosphere where greenhouse gases operate. These gases reflect the energy back to earth where it again converts to heat – this process keeps the planet habitable. This phenomenon is called the greenhouse effect. Naturally, with the increasing amount of greenhouse gases in the atmosphere, this effect intensifies, leading to global temperature rise. Excessive temperature rise due to human activity is called global warming.

What Causes Climate Change:

1. Greenhouse gases
2. Deforestation
3. Natural phenomena

Burning Fossil Fuels:

For millions of years, the concentration of greenhouse gases in the atmosphere fluctuated only slightly; natural processes removed as many greenhouse gases from the atmosphere as were released. Problems emerged as we began to extract and burn fossil fuels on a large scale, thus releasing unprecedented amounts of CO₂ into the atmosphere. The concentration of CO₂ has increased by almost 50 percent since the Industrial Revolution.

[Source: NASA](#)

Man-made Emissions:



Burning fossil fuels for electricity, heat, in industry and in transportation; deforestation; overuse of chemical fertilizers; and industrial animal production all increase the concentration of greenhouse gases in the atmosphere, leading to global warming. Future temperatures and the entire course of climate change are directly linked to the amount of greenhouse gases humans release into the atmosphere.

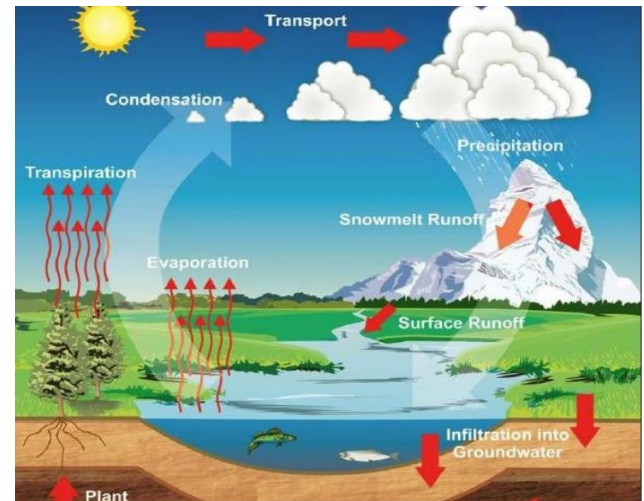
Positive Feedback: A Vicious Cycle:

Along with these so-called anthropogenic emissions (emissions generated by human activity), greenhouse gases leaking from melting soil (permafrost) or, for example, from drying peat bogs, play an increasingly important role. These are not released directly by humans, yet we are indirectly responsible for them by the role we continue to play in the warming of the planet. At the same time, frozen or snow-covered surfaces reflect some of the sun's rays, and the melting of these surfaces darkens the Earth's, thus increasing its warmth.

Source: Intergovernmental Panel on Climate Change
Source: NASA

Emissions by Sector:

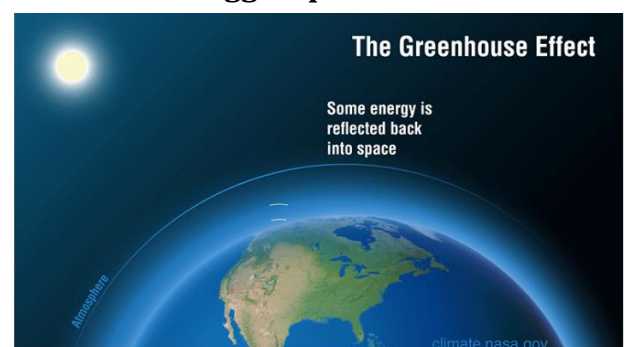
The largest emitter of greenhouse gas is the energy sector. Other significant sources of greenhouse gases include transportation, industry (especially construction and mining), and agriculture.



Different human activities produce different greenhouse gases. For instance, agriculture produces methane most notably, while the burning of fossil fuels releases carbon dioxide especially.

- per country
- per capita

Who are the biggest polluters?



Europe and the United States are mostly responsible for the current state of the atmosphere, having released more than 90 percent of the emissions that had accumulated in the atmosphere by the end of

the 20th century. In recent decades, however, the rest of the world has begun to catch up. This is particularly true in the case of China, which is experiencing an unprecedented economic boom.

[Source: Our World in Data](#)

Where Do Emissions Get Outsource:

CO₂ emissions are usually measured in terms of their production on the territory of individual states. However, this calculation does not give us a complete picture of who is truly responsible for their creation. International companies often employ cheap labour in developing countries where they process raw materials, with the resulting emissions being attributed to the place of assembly, though the products are produced for markets in richer countries, such as Europe or the USA - these countries thus "import" emissions created elsewhere. Typical "exporters" of emissions are China and Russia, while the USA, Western and Northern Europe, as well as a number of African countries are typical "importers" of emissions.

The largest exporter CO₂:

To calculate consumption-based emissions, it is necessary to monitor the movement of goods around the world. Whenever goods are imported, the emissions resulting from their production must be attributed to the country which receives the goods and, conversely, deducted from the country which produces and exports the goods.

Environmental Inequality:

Many of the countries that bear the most responsibility for greenhouse gas emissions are the least vulnerable to their consequences. Developing countries, which generally have less capacity to react and adapt, are the first to feel the most severe effects of climate change. They deal with the consequences in both temporary and permanent ways, such as migration. Thus climate change is an increasingly important issue in relations between developing and developed countries.

On Environmental Migration

Celebrities including Paris Hilton, Jennifer Lopez, Emma Watson, and Bill Gates have such excessive carbon footprint that they have been labeled "super emitters," largely due to extremely frequent flying. Bill Gates, who in 2017 produced 1,600 tons of CO₂ with his private jet, is at the top of this ranking.

This shows another inequality in relation to climate change: although climate change will affect everyone on the planet, only a fraction of the planet's population lives are enhanced by the benefits of climatically disastrous activities.

[Source: World Bank Group](#)[Source: The Independent](#)

Degrees of Global Warming:

Since the 19th century, the earth has warmed by about 1.1°C. A new United Nations report addresses the differing consequences of warming by 1.5° or 2°C.

Half a degree may not sound like much, but the effects of global warming, be it

a few tenths of a degree, may create a dramatic difference: such a change has the potential to expose tens of millions of more people around the world to dangerous heatwaves, water shortages, and coastal floods. Half a degree could also mean the difference between a world with coral reefs and a year-round polar cap, and a world without them.

[Source: Intergovernmental Panel on Climate Change](#)

Hothouse Earth:

Current rates of warming continue, the "Hothouse Earth" scenario, which assumes that most of the planet will become uninhabitable, may become a reality. According to this scenario, agriculture will be possible only in northern latitudes, the world's deserts will expand, tropical rainforests will be devastated, glaciers will melt, some cities will sink, most terrestrial biodiversity and marine life will be destroyed, the Gulf Stream will slow down or even stop, and a drastic reduction in the planet's habitability will follow.

Carbon Budget:

The carbon budget is the remaining amount of greenhouse gases that humans can emit before the planet warms by 1.5°C (or 2°C depending on the set limit). These calculations, like other climate models, are based on climate modeling. Research shows that climate modeling tends to predict the evolution of emissions and related warming relatively accurately. The risk of exceeding the 1.5 or 2 °C limit is therefore very real,

and although predictions of when exactly this will occur may vary by decades, we must remember that in general, every tenth of a degree has implications for the quality of human life. Therefore, it is appropriate to apply the precautionary principle.

Environmental Migration:

One of the biggest challenges we will face as a result of climate change is the massive migration of people to the less climate-endangered areas. Given that large portions of our planet will become virtually uninhabitable, people will begin to move en masse in an effort to fulfil their basic needs. There will be local conflicts over land and resources– the worst-case scenarios envisage a global conflict– and other impacts, for instance, increasing gaps and segregation between the rich and the poor, and the disintegration of nation-states.

Emissions Scenarios:

Climate Models:

Climate models are complex simulations of the planetary system that attempt to calculate possible future climate scenarios. There are many of these models, and they are constantly evolving. Based on climate models and hypothetical emissions scenarios, climatologists can devise trajectories of global warming to the year 2100. The best-known emissions scenarios are called Representative Concentration Pathways (RCP), which show the evolution of global warming at various hypothetical levels of greenhouse gas emissions.

What awaits the Czech Republic?

Climate change has already reached the Czech Republic. The average temperature in the Czech Republic has risen by 2°C (compared to temperatures before the Industrial Revolution) – a degree higher than the global average. For years, we have been struggling with more tropical days and droughts, as well as more frequent fires, torrential rains, and flash floods. Therefore, it is necessary to adapt to the changing climate in time and start working on mitigation measures. The changing climate is an existential problem for humanity, but we can bring about the necessary change. With social and political change, new technologies and management methods, and proper care, we can create an economy based on renewable resources and immaterialist patterns of behavior that will support us all without destroying the planet. However, a sustainable society requires us to understand and plan for our impact on the planet, and to learn to manage that impact. That, in turn, requires systemic changes, the promotion of science, the development of sustainable technologies, and a willingness on the part of individuals to change their behavior.

More solutions to the Climate Crisis:

International Commitments:

The solution to the climate crisis lies in reducing our reliance on fossil fuels such as oil, carbon, and natural gas, and replacing them with renewable and cleaner energy sources, all the while increasing energy

efficiency on the one hand, and the consumption of natural resources on the other. But effective change must come from above, starting at the level of international agreements and countries being truly committed to complying with them.

We have been helping for more than 10 years:

People in Need has been active in the struggle against climate change for more than a decade. We are working to help people around the world cope with its effects. We assist in crisis situations and we focus on prevention. We help communities with advocacy and with implementing innovative adaptation and mitigation measures. Help us fight climate change.

Reference:

1. Built-up area is defined as cities, towns, villages, and human infrastructure.
2. In 1800 when urbanization rates were low, agricultural employment was very high — including in today's rich countries. For example, [around 60% of the workforce](#) in France was employed in agriculture in 1800. Today this figure is only a few percent.
3. UN World Urbanization Prospects (2018). Available at: <https://esa.un.org/unpd/wup/Download/>.