



WHAT IS CLIMATE CHANGE? IT'S CAUSES AND CONSEQUENCES

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WHAT IS CLIMATE?



Climate is the average daily weather for an extended period of time at a certain location.

MEANING CONT. ...

- ▶ Weather reflects short term conditions of the atmosphere, it can change from minute-to-minute, hour-to-hour, day-to-day and season-to-season. Climate is the average of weather over time and space.
- ▶ Unlike “weather,” which means temperature, rainfall, humidity of a particular time at a local area, “climate” has spatial and temporal components.
- ▶ It consists of many kinds of weather events, their periodicities, intensities, and nature of dynamism.
- ▶ When we talk about climate change, we actually understand more than the literal changes of weather events over the time and space of that climate.

Meaning cont.....

- ▶ E.G., changes in ocean current, melting of ice, and loss of biodiversity are included in climate change; they are not discussed as conventional events of weather.
- ▶ By climate change, we understand detrimental effects in environment - emission of pollutants, temperature rise, precipitation change, sea level rise, flooding, intensified cyclones, abrupt frequency of events, ozone layer depletion, biodiversity loss, vegetation change, and drought - almost all negative impacts.
- ▶ Climate change is a term that refers to major changes in temperature, rainfall, snow, or wind patterns lasting for decades or longer.
- ▶ *According to Working Group II of the Intergovernmental Panel on Climate Change (IPCC); Climate change refers to any change in the climate over time, whether due to natural variability or as a result of human activity*

CAUSES OF CLIMATE CHANGE

WHAT CAUSES CLIMATE CHANGE?



CAUSES OF CLIMATE CHANGE

- 1) NATURAL CAUSES -----
 - i) Volcanic eruptions
 - ii) Ocean current

- 2) HUMAN CAUSES-----
 - i) Human activities---
Burning of oil, deforestation, fertilizers

CAUSES CONT. ...

- ▶ since the industrial revolution began in 1750 human activities have contributed substantially to climate change by adding CO₂ and other heat trapping gases to the atmosphere. These greenhouse gas emissions have increased the greenhouse effect causing Earth's surface temperature to rise.

Causes cont. ...

- Earth's temperature depends on the balance between energy entering and leaving the planet's system.
- When incoming energy from the sun is absorbed by the Earth system, earth warms.
- When the sun's energy is reflected back into space, earth avoids warming.
- When absorbed energy is released back into space, earth cools.
- Many factors both natural and human can cause changes in earth's energy balance including :-

Causes cont. ...

- a) Variations in the sun's energy reaching earth
- b) Changes in the reflectivity of earth's atmosphere and surface
- c) Changes in the greenhouse effect, which affects the amount of heat retained by earth's atmosphere.

▶ **THESE FACTORS HAVE CAUSED EARTH'S CLIMATE TO CHANGE MANY TIMES.**

Causes cont. ...

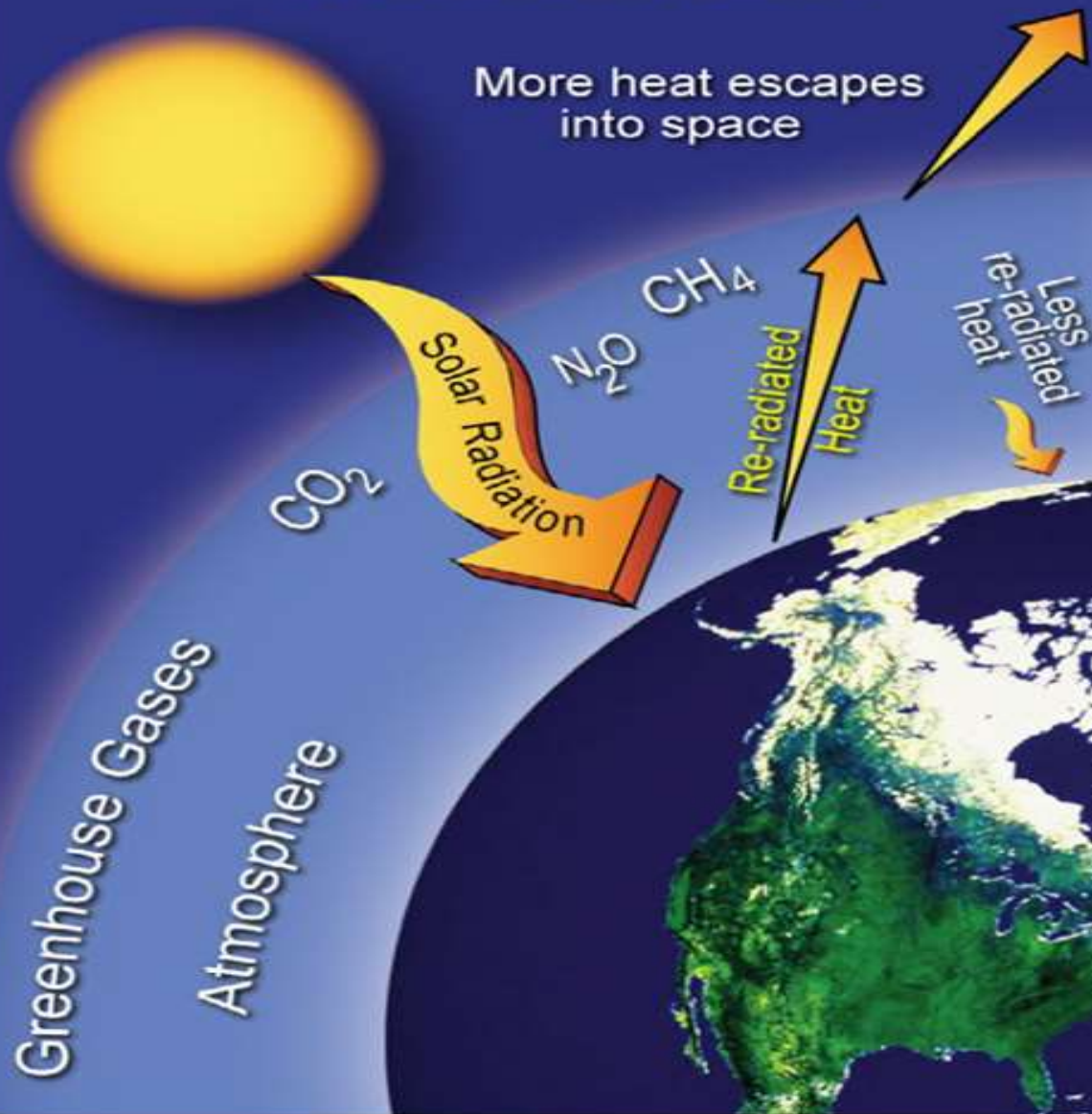
- ▶ Climate Change prior to the Industrial Revolution in the 1700 can be explained by natural causes, such as changes in the solar energy, volcanic eruptions, and natural changes in the greenhouse gas concentrations.
- ▶ Recent climate changes, however cannot be explained by natural causes alone as most research indicate that natural causes do not explain most observed warming especially warming since the mid-20th century.
- ▶ Humans are increasingly influencing the climate and the earth's temperature by burning fossil fuels, cutting down rainforests and farming livestock.

Causes cont. ...

- ▶ These human activities release large amounts of CO₂ (which is the primary greenhouse gas) in addition to those naturally occurring in the atmosphere, increasing the greenhouse effect and global warming.
- ▶ Scientists have known that CO₂ is one of the main greenhouse gases of importance to Earth's energy balance.
- ▶ Since CO₂ is already in the atmosphere naturally, why are EMISSIONS from human activity significant?
- ▶ Human activities have significantly disturbed the natural carbon cycle by extracting long-buried fossil fuels and burning them for energy thus releasing CO₂ to the atmosphere.

Natural Greenhouse Effect

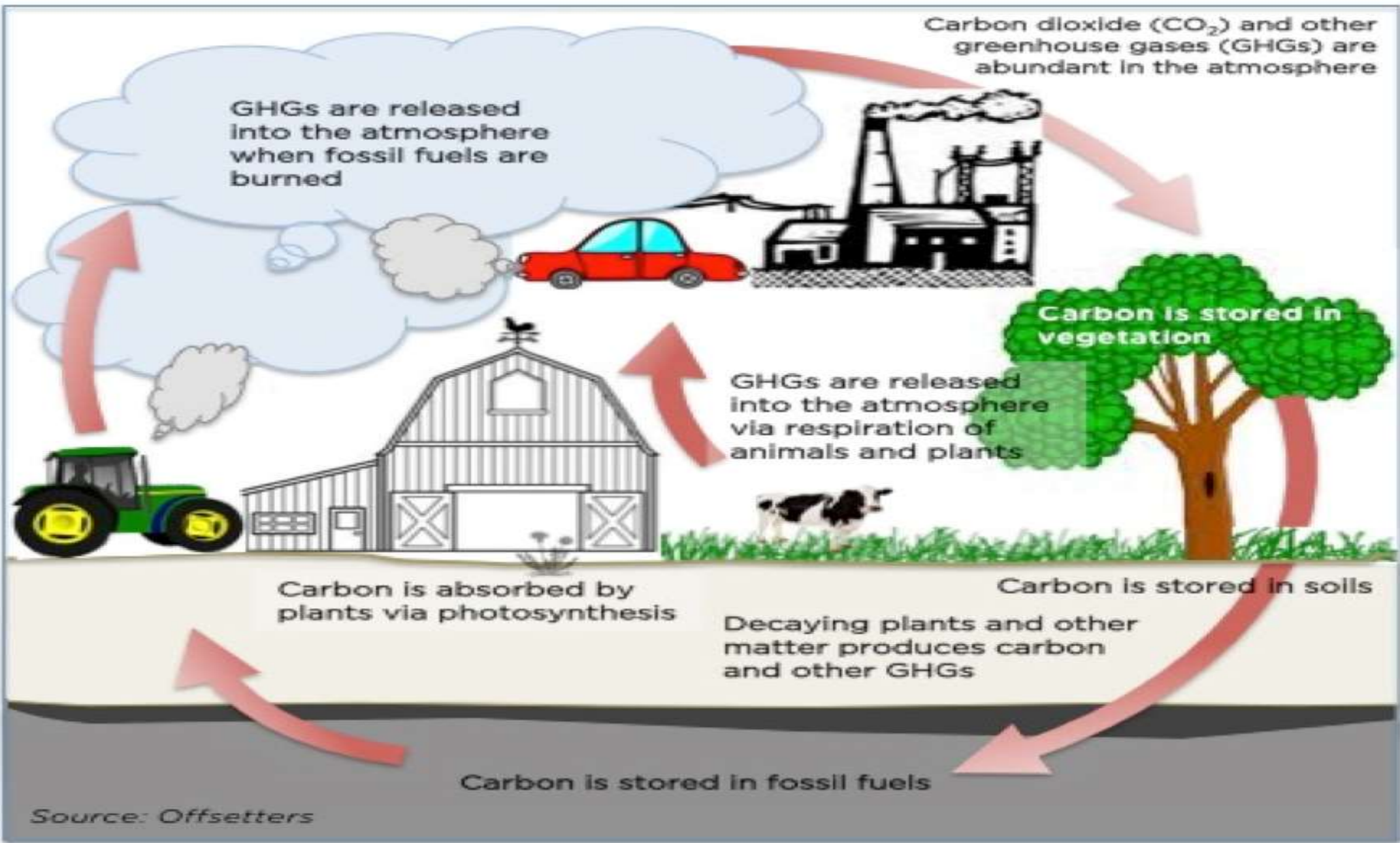
More heat escapes into space



Greenhouse Effect Intensified by Humans

Less heat escapes into space





CONSEQUENCES

- Expansion of Greenhouse Effect

- The sun's radiation that strikes the Earth's atmosphere in the form of light, Ultraviolet Radiation (UV) and Infrared Radiation (IR).
- UV radiation has a shorter wavelength and a higher energy level than visible light, while IR radiation has a longer wavelength and a weaker energy level.
- 30 percent of the radiation striking Earth's atmosphere immediately reflected back out to space by clouds, ice, snow, sand and other reflective surfaces,

CONSEQUENCES

- Expansion of Greenhouse Effect cont. ...
- The remaining 70 percent of incoming solar radiation is absorbed by the oceans, the land and the atmosphere. The oceans, land and atmosphere release heat in the form of IR thermal radiation, which passes out of the atmosphere and into space.
- The exchange of incoming and outgoing radiation that warms the Earth is often referred to as the greenhouse effect because a greenhouse works in much the same way.
- Incoming UV radiation easily passes through the glass walls of a greenhouse and is absorbed by the plants and hard surfaces inside. Weaker IR radiation, however, has difficulty passing through the glass walls and is trapped inside, thus warming the greenhouse.

CONSEQUENCES

- Global warming

- Gas molecules that absorb thermal infrared radiation, in sufficient quantity, can force the climate system. These type of gas molecules are called greenhouse gases
- Examples of greenhouse gasses are Carbon dioxide (CO₂), water vapor, methane, nitrous oxide (N₂O), etc.
- The greenhouse gases act like a blanket, absorbing IR radiation and preventing it from escaping into outer space.
- The net effect is the gradual heating of Earth's atmosphere and surface, a process known as global warming.

CONSEQUENCES

- **Melting of polar ice sheets and glaciers**
- Large ice formations, like glaciers and the polar ice caps, naturally melt back a bit each summer. But in the winter, snows, made primarily from evaporated seawater, are generally sufficient to balance out the melting.
- Higher temperatures caused by global warming have led to greater-than-average summer melting as well as diminished snowfall due to later winters and earlier springs.
- Increased heat is also causing the massive ice sheets that cover Greenland and Antarctica to melt at an accelerated pace.
- Scientists also believe meltwater from above and seawater from below is seeping beneath Greenland's and West Antarctica's ice sheets, causing them to move more quickly into the sea.

CONSEQUENCES

- Increase in sea level which results in flooding and erosion of coastal and low lying areas
- The two major causes of global sea-level rise are thermal expansion caused by warming of the oceans (since water expands as it warms) and the loss of land-based ice, such as glaciers and ice sheets, due to increased melting.
- **Extreme weather**
- flooding, forest fires, wildfires, droughts, heat waves

CONSEQUENCES

- Risk to human health
 - increase in number of heat-related and cold-related deaths
- Risk for wildlife extinction
 - Loss of habitat and species
- Imposes heavy cost on society and economy
 - agriculture, forestry, fisheries, tourism, infrastructure

To conclude, the changes because of climate change, include:

- ▶ Atmosphere and sea-level pressure
- ▶ Wind fields
- ▶ Sea ice drift
- ▶ Melting ice coverings
- ▶ Change in precipitation patterns
- ▶ Changes in hydrology
- ▶ Change in ocean current
- ▶ Water mass distribution
- ▶ Carbon cycle altered
- ▶ Biological systems affected
- ▶ Arctic oscillation

HOW DOES CLIMATE CHANGE AFFECT MALAYSIA?
Malaysia is located near the equator and is generally rather warm with rainfall throughout the year with monsoon seasons,



POLICY STATEMENT

Ensure climate-resilient development to fulfil national aspirations for sustainability

With climate change, the weather in Malaysia is getting unbearably hot, We now get torrential rain which is electrifying.

We go from droughts to floods

- ▶ Malaysia is a Party to the UNFCCC and has ratified the Kyoto Protocol.
- ▶ Malaysia is already committed under the UNFCCC to, inter alia, “formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases...”.

- ▶ **Copenhagen Accord commitments** : The Malaysian prime Minister, Datuk Seri Najib announced on 17 December 2009 (at Copenhagen) that Malaysia would cut “40 per cent of its 2005 GDP emission intensity levels by 2020 as its contribution to combat climate change”. This in principle commitment has, however, been undermined by a lack of subsequent action.
- ▶ In mid 2009 Malaysia launched its **Green technology strategy**, which remains the principal strategy through which Malaysia intends to meet its carbon intensity reduction goals.
- ▶ **The small Renewable Energy power (sREp) program**, in place since 2001, aims to promote the wider use of the renewable energy resources available in Malaysia. Eligible renewable energy sources include biomass, biogas, municipal waste, solar, mini-hydro and wind. The program allows for small power generation plants utilising renewable energy (under 10MW) to sell their electricity to the utility through the distribution grid system.

THANK YOU

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