

1. What is climate?

Climate is the long-term pattern of temperature, rain, wind, and other weather conditions in a region, usually averaged over 30 years or more. Climate is about typical conditions (“winters are mild and dry here”), while weather is about what happens on a specific day or week (“it is raining today”).

2. The climate system

Earth’s climate system includes the atmosphere (air), oceans, land, ice, and living things, which all interact and move energy and water around the planet. Solar energy from the Sun drives this system, and changes in that energy or in the way Earth absorbs and emits it can shift the climate over time.

Key components to mention:

- Atmosphere: gases like nitrogen, oxygen, and greenhouse gases.
 - Oceans: store and transport heat.
 - Ice and snow: reflect sunlight and affect sea level.
 - Land and ecosystems: influence how heat and moisture are exchanged.
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3. Greenhouse effect and climate change

Some gases in the atmosphere (carbon dioxide, methane, nitrous oxide, water vapour) trap part of the heat that Earth would otherwise radiate back to space. This natural “greenhouse effect” keeps the planet warm enough for life, but adding more greenhouse gases strengthens the effect and warms the climate further.

Human activities such as burning fossil fuels, cutting forests, and some farming practices have increased greenhouse gas concentrations, leading to global warming and broader climate change. “Climate change” means long-term shifts in temperature, rainfall, and other patterns, not just one hot year.

4. How we know the climate is changing

Measurements from thermometers, satellites, ocean buoys, and ice cores show clear changes over the last century. Global average air temperatures have risen, oceans have warmed, glaciers and ice sheets have shrunk, and sea level has increased.

Common signs to include:

- Rising average surface temperatures.
 - More frequent or intense heat waves and heavy rainfall in many regions.
 - Melting glaciers and Arctic sea ice.
 - Rising sea levels and more coastal flooding.
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5. Impacts on people and nature

Climate change affects water, food, health, and ecosystems. Some areas face stronger storms and floods, others more intense droughts or wildfires, and many coastal and low-lying regions face higher risks from sea level rise.

Examples to list:

- Stress on crops and livestock from heat and changing rainfall.
 - Damage to coral reefs and other ecosystems from warming and ocean acidification.
 - Health risks from heat stress, poor air quality, and changing disease patterns.
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6. What can be done (basics)

There are two broad responses:

- Mitigation: Reduce the amount of greenhouse gases added to the atmosphere (for example, using renewable energy, saving energy, protecting forests).
- Adaptation: Adjust to changes that are already happening or very likely (for example, improving drainage for heavier rainfall, protecting coasts, changing crops).

Even small temperature differences matter; limiting warming reduces the speed and severity of sea level rise, extreme events, and ecosystem damage, giving societies more time to adapt.

1. Climate vs weather

Climate is the long-term pattern of weather in a region, usually averaged over 30 years or more. Weather is the day-to-day state of the atmosphere, like today's rain or sunshine in one place.

Key points to include as separate paragraphs:

- Climate: "typical" temperature, rainfall, and seasons over decades.
 - Weather: short-term changes from day to day or week to week.
 - Example: "Delhi has a hot, dry climate in May, but the weather today might be cooler after a storm."
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2. The climate system components

Earth's climate system is made of interacting parts: atmosphere (air), hydrosphere (oceans, lakes, rivers), cryosphere (snow and ice), land surface, and biosphere (living things). Energy from the Sun moves through this system, and how it is absorbed, reflected, and re-emitted determines climate patterns.

Write one short subsection per component:

- Atmosphere: main gases and greenhouse gases.
 - Oceans: store heat, move it via currents, influence coastal climates.
 - Cryosphere: ice and snow reflect sunlight and affect sea level.
 - Land and biosphere: vegetation, soils, and human land use modify heat and moisture flows.
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3. Greenhouse effect and warming

The natural greenhouse effect occurs when gases like carbon dioxide, methane, and water vapour let sunlight in but trap some of the outgoing heat, keeping Earth warm enough for life. Human activities have increased greenhouse gas levels, strengthening this effect and causing global warming and wider climate change.

Useful sub-chunks:

- Short definition of greenhouse gases.
- Simple explanation of "more greenhouse gases → more trapped heat → higher average temperature".
- Main human sources: burning fossil fuels, deforestation, some farming and industry.

4. Evidence that climate is changing

Multiple independent observations show that the climate is warming and other aspects are changing. Data from thermometers, satellites, ocean measurements, and ice cores all point in the same direction.

Break this into list-style chunks:

- Rising global average surface temperature.
 - Warming oceans.
 - Melting glaciers, shrinking Arctic sea ice, and loss of snow cover.
 - Sea level rise from melting ice and expansion of warmer water.
 - Shifts in extreme events like heatwaves and heavy rainfall in many regions.
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5. Impacts on people and ecosystems

Climate change affects water, food, health, infrastructure, and ecosystems. The impacts differ by region but often hit vulnerable communities hardest.

Example subsections:

- Water and food: droughts, floods, crop stress, fisheries changes.
- Health: heat stress, air-quality problems, changing disease patterns.
- Nature: coral bleaching, shifting species ranges, forest stress and fires.

Each subsection should be 1–2 short paragraphs so RAG can pull them independently.

6. Mitigation and adaptation

Mitigation means reducing the amount or speed of climate change by cutting greenhouse gas emissions or increasing removals. Adaptation means preparing for and managing the impacts that are already happening or very likely.

Good RAG-friendly chunks:

- Mitigation examples: renewable energy, energy efficiency, reforestation, cleaner transport.
- Adaptation examples: better drainage and flood defences, heat-resilient buildings, climate-smart agriculture, early-warning systems.

- Why early action matters: less warming means fewer extreme impacts and more time to adapt.
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7. Key climate terms (mini glossary)

A glossary chunk works very well with RAG because the model can retrieve precise definitions. You can include short definitions for terms such as:

- Climate, weather, climate system.
- Global warming, climate change, greenhouse gas, carbon footprint.
- Mitigation, adaptation, resilience, sea level rise, feedback loop, renewable energy.