

## Glossary of terms related to the environment and climate change, covering key concepts and definitions

<b>Abated and unabated</b>	<p>When fossil fuels such as coal, oil, and gas are burned, they release large amounts of greenhouse gases, including carbon dioxide, into the atmosphere. In discussions about fossil fuels, the term "<b>abated</b>" refers to efforts to reduce some of the emissions produced during combustion. This reduction can be achieved through methods such as afforestation, which helps absorb carbon from the atmosphere, or technologies like Carbon Capture, Utilisation, and Storage (CCUS).</p> <p>However, experts highlight that CCUS can only mitigate a small fraction of emissions and is currently neither financially nor scientifically viable as a large-scale solution for controlling carbon emissions. The use of the terms "<b>abated</b>" and "<b>unabated</b>" remains contentious, as there is no universally accepted definition of what qualifies as "<b>abated</b>" fossil fuel use.</p> <p>At <b>COP26 in Glasgow (2021)</b>, "abated" was officially mentioned in climate negotiations for the first time. "<b>Unabated</b>" fossil fuel use refers to scenarios where emissions are released directly into the atmosphere without any measures to offset or capture them, contributing significantly to rising global temperatures.</p>
<b>Abatement</b>	<p><b>Abatement</b> refers to the process of reducing greenhouse gas (GHG) emissions, either by directly lowering emissions at their source or by implementing measures that offset their impact. The term is commonly used in climate discussions to describe efforts aimed at mitigating the greenhouse effect, which contributes to global warming and climate change.</p> <p>Abatement can be achieved through various strategies, including:</p> <ul style="list-style-type: none"> <li>● <b>Emission Reduction:</b> Implementing cleaner technologies, improving energy efficiency, and transitioning to renewable energy sources like wind, solar, and hydropower.</li> <li>● <b>Carbon Sequestration:</b> Capturing and storing carbon dioxide (CO<sub>2</sub>) through natural methods such as afforestation and reforestation or technological solutions like Carbon Capture, Utilisation, and Storage (CCUS).</li> <li>● <b>Regulatory Measures:</b> Enforcing policies such as carbon pricing, emission caps, and stricter environmental regulations to encourage industries to cut down on emissions.</li> </ul> <p>In a broader sense, abatement is not just about reducing emissions but also about mitigating the adverse effects of climate change by adopting sustainable practices. It plays a crucial role in achieving global climate goals, such as those outlined in the <b>Paris Agreement</b>, which aims to limit global temperature rise well below 2°C above pre-industrial levels.</p>
<b>Aboveground Biomass</b>	<p><b>Aboveground biomass (AGB)</b> refers to all living plant material located above the soil surface, including stems, stumps, branches, bark, leaves, flowers, and seeds. It plays a crucial role in carbon sequestration, as plants absorb atmospheric carbon dioxide through photosynthesis and store it in their biomass. This makes AGB an essential component in mitigating climate change by reducing greenhouse gas concentrations. Additionally, it supports ecological functions by providing habitat and food for wildlife, contributing to nutrient cycling, and enhancing soil stability to prevent erosion. Scientists and policymakers monitor AGB to estimate forest carbon stocks, assess</p>

	<p>deforestation impacts, and guide sustainable land-use practices. Measuring AGB involves field assessments, such as evaluating tree height and density, as well as advanced remote sensing technologies like satellite imaging and LiDAR. Understanding and managing aboveground biomass is vital for forest conservation, afforestation, and carbon credit programs, ensuring that ecosystems remain resilient and contribute to global climate goals.</p>
<b>Abrupt Climate Change</b>	<p><b>Abrupt Climate Change</b> refers to sudden and significant shifts in the Earth's climate system that occur over a relatively short timescale, typically within decades, rather than over centuries or millennia. These rapid changes can disrupt global weather patterns, ecosystems, and human societies, often with widespread and severe consequences.</p> <p>Such shifts may be triggered by various factors, including the destabilization of ocean currents, rapid loss of ice sheets, changes in atmospheric circulation, or large-scale disruptions in carbon and methane cycles. Examples of abrupt climate changes include the sudden weakening or collapse of the <b>Atlantic Meridional Overturning Circulation (AMOC)</b>, rapid Arctic ice melt, and abrupt releases of methane from permafrost.</p> <p>The impacts of abrupt climate change can be profound, leading to extreme weather events, shifts in precipitation patterns, rising sea levels, ecosystem collapses, and challenges to food and water security. Unlike gradual climate change, these changes leave little time for ecosystems and human societies to adapt, making them a major concern for climate scientists and policymakers. Understanding the triggers and potential tipping points of abrupt climate change is critical for developing early warning systems and resilience strategies.</p>
<b>Absolute Humidity</b>	<p><b>Absolute Humidity</b> refers to the total amount of water vapor present in a given volume of air, typically expressed in grams per cubic meter (<math>\text{g/m}^3</math>). It represents the actual water content in the air, independent of temperature or pressure variations. Unlike <b>relative humidity</b>, which compares the current moisture level to the air's maximum moisture-holding capacity at a given temperature, absolute humidity provides a direct measurement of water vapor concentration.</p> <p>Absolute humidity plays a crucial role in weather forecasting, climate studies, and industrial applications. It influences cloud formation, precipitation patterns, and human comfort levels, particularly in enclosed environments such as greenhouses, factories, and HVAC systems. Higher absolute humidity can lead to increased discomfort, reduced air quality, and greater heat stress, whereas lower absolute humidity can contribute to dry skin, respiratory issues, and static electricity.</p>
<b>Absolute Risk</b>	<p><b>Absolute Risk</b> refers to the likelihood and potential severity of a specific event or impact, expressed either quantitatively or qualitatively. It provides a direct measure of risk without comparison to other scenarios or populations, making it essential for risk assessment in various fields such as finance, health, environmental management, and climate policy.</p> <p>In the context of climate action and carbon markets, absolute risk plays a crucial role in determining the vulnerability and potential failure of carbon offset projects. Under the <b>Voluntary Carbon Standard (VCS)</b> framework, absolute risk is calculated using a "<b>likelihood × significance</b>" methodology, where <b>likelihood</b> represents the probability of an event occurring, and <b>significance</b> measures the extent of its</p>

	<p>impact. The resulting value is then classified into different risk categories, which help project developers, investors, and policymakers make informed decisions about carbon credit viability and sustainability.</p> <p>Understanding absolute risk is particularly important in <b>climate finance, environmental conservation, and corporate sustainability</b>, as it helps organizations assess project feasibility, plan risk mitigation strategies, and ensure long-term resilience. By incorporating absolute risk assessments, stakeholders can improve decision-making, allocate resources effectively, and enhance climate adaptation efforts.</p>
<b>Accelerated Erosion</b>	<p><b>Accelerated Erosion</b> refers to the rapid loss of soil due to natural forces, such as gravity and water runoff, which are intensified by human activities and extreme weather events. While <b>erosion</b> is a natural geological process that gradually wears down land surfaces over time, accelerated erosion occurs at a much faster rate than normal, leading to significant soil degradation, reduced agricultural productivity, and water quality deterioration.</p> <p>This form of erosion is often triggered by land disturbances, including <b>deforestation, overgrazing, unsustainable agricultural practices, urbanization, and construction activities</b>, which leave the soil vulnerable to erosion by wind and water. Additionally, <b>climatic factors</b> such as prolonged droughts, heavy rainfall, and extreme storm events can further accelerate the erosion process by increasing the intensity and frequency of soil displacement.</p> <p>The consequences of accelerated erosion are far-reaching. It can lead to <b>loss of topsoil</b>, which is crucial for plant growth, disrupt <b>natural water filtration</b>, contribute to <b>sedimentation in rivers and lakes</b>, and increase the risk of <b>landslides and desertification</b>. To mitigate its effects, sustainable land management practices such as <b>contour farming, afforestation, cover cropping, terracing, and erosion control structures</b> are essential. Understanding and addressing accelerated erosion is critical for maintaining soil health, ensuring food security, and protecting ecosystems from long-term degradation.</p>
<b>Acceptable Risk</b>	<p><b>Acceptable Risk</b> refers to the level of potential loss or harm that a society, community, or individual is willing to tolerate, considering social, economic, political, cultural, technical, and environmental factors. It acknowledges that absolute safety is often unattainable and that some level of risk must be accepted in decision-making processes.</p> <p>The concept of acceptable risk is particularly relevant in <b>public health, environmental management, engineering, disaster preparedness, and finance</b>. It applies to situations where the probability of an adverse event is low, its consequences are minimal, or its associated benefits—whether real or perceived—are significant enough to justify exposure to the risk. For example, societies accept certain risks in industrial activities, medical treatments, or infrastructure development, balancing safety with economic feasibility and practicality.</p> <p>The idea evolved from the recognition that even minimal exposure to hazardous substances or potentially dangerous situations can pose some degree of risk. In cases where eliminating risks entirely is impractical or too costly, the goal of <b>risk management</b> is to reduce hazards to a level deemed "virtually safe" or manageable. This approach is crucial in <b>regulatory policies</b>, where authorities establish <b>threshold limits</b> for pollutants, radiation, and occupational hazards, ensuring that risks remain within acceptable bounds while enabling progress and innovation.</p>

	Acceptable risk assessments involve complex decision-making, considering factors such as <b>cost-benefit analysis, ethical considerations, public perception, and technological advancements</b> . Establishing what constitutes an acceptable level of risk requires collaboration among policymakers, scientists, industry leaders, and communities to ensure that societal well-being and safety are maintained without unnecessary restrictions on development and economic growth.
<b>Acclimatization</b>	<p><b>Acclimatization</b> is the process by which an individual organism gradually adjusts to changes in its environment, enabling it to maintain normal functioning across varying conditions. These environmental changes can include fluctuations in <b>temperature, humidity, light cycles (photoperiod), atmospheric pressure, or pH levels</b>. Unlike <b>adaptation</b>, which occurs over multiple generations through genetic changes, acclimatization happens <b>within an organism's lifetime</b>, typically over a period of <b>days to weeks</b>.</p> <p>This process allows organisms to modify their <b>morphological, behavioural, physiological, and biochemical traits</b> to cope with environmental stressors. For instance, mammals grow thicker fur in winter and shed it in summer, high-altitude climbers develop increased red blood cell production to cope with lower oxygen levels, and certain plants adjust their leaf structure to optimize water retention in dry conditions.</p> <p>Acclimatization can be a <b>temporary response</b> to environmental fluctuations or part of a <b>seasonal cycle</b> that organisms undergo regularly. It is a crucial survival mechanism for many species, enhancing their ability to endure shifting environmental conditions without requiring evolutionary change.</p>
<b>Adaptability</b>	<p><b>Adaptability</b> refers to the capacity of a system—whether natural, social, or economic—to respond to <b>climate change, including variability and extreme events</b>, in a way that minimizes potential damages, leverages new opportunities, or effectively manages its impacts. This ability enables systems to adjust proactively or reactively to shifting environmental conditions, ensuring resilience and long-term sustainability.</p> <p>In the context of <b>climate action</b>, adaptability involves implementing <b>technological innovations, policy measures, infrastructure improvements, and behavioural changes</b> to enhance preparedness and reduce vulnerability. For example, coastal cities can improve flood defences, agricultural systems can adopt drought-resistant crops, and businesses can develop climate-resilient supply chains.</p> <p>Adaptability is a key factor in <b>climate resilience</b>, determining how well individuals, communities, and ecosystems can withstand and recover from climate-related stresses. It is influenced by <b>economic resources, governance, scientific knowledge, and institutional capacity</b>, making it essential for long-term environmental and societal stability.</p>
<b>Adaptation</b>	Adaptation to climate change refers to the initiatives and measures taken to reduce the vulnerability of natural and human systems to actual or expected climate change effects. It involves understanding how individuals, communities, and ecosystems can prepare for and respond to climate-related changes, making it a crucial component of resilience-building.

	<p>Adaptation is not merely about coping but about developing the capacity to adjust strategies, ensuring flexibility and resilience in the face of changing conditions. It applies not only to climatic factors but also to other environmental challenges, such as soil erosion and land subsidence.</p> <p>Adaptation efforts can be both planned and autonomous. Planned adaptation results from deliberate policy decisions aimed at mitigating risks and seizing opportunities, while autonomous adaptation occurs spontaneously in response to environmental and economic changes. Adaptation can also be categorized into anticipatory (proactive) adaptation, reactive adaptation, private adaptation (initiated by individuals or businesses), and public adaptation (implemented by governments to address collective needs).</p> <p>In regions like South Asia, adaptation strategies may include the development of drought-resistant crops, enhanced flood defenses for vulnerable communities, improved early warning systems for climate-induced disasters, and the restoration of natural ecosystems such as mangroves, which act as protective barriers against extreme weather events.</p> <p>The Intergovernmental Panel on Climate Change (IPCC) distinguishes several types of adaptation:</p> <ul style="list-style-type: none"> <li>● <b>Anticipatory adaptation:</b> Actions taken before climate impacts are observed.</li> <li>● <b>Autonomous adaptation:</b> Spontaneous adjustments triggered by ecological, market, or social changes.</li> <li>● <b>Planned adaptation:</b> Policy-driven measures to address anticipated or ongoing climate shifts.</li> <li>● <b>Private adaptation:</b> Initiatives by individuals, households, or businesses for self-interest.</li> <li>● <b>Public adaptation:</b> Government-led actions addressing broader societal needs.</li> <li>● <b>Reactive adaptation:</b> Responses implemented after climate impacts have occurred.</li> </ul> <p>Overall, adaptation is a continuous process that enhances resilience, minimizes risks, and enables societies to navigate the evolving challenges posed by climate change.</p>
<b>Adaptation Assessment</b>	<p><b>Adaptation Assessment</b> is the process of identifying and evaluating potential strategies to adapt to the impacts of <b>climate change</b>. This assessment involves analysing various adaptation options based on key criteria such as <b>availability, benefits, costs, effectiveness, efficiency, and feasibility</b> to determine their suitability for implementation.</p> <p>The goal of adaptation assessment is to support <b>informed decision-making</b> by comparing different adaptation measures and prioritizing those that offer the most <b>sustainable and cost-effective solutions</b>. It is commonly used in <b>climate policy, urban planning, disaster risk reduction, and ecosystem management</b> to ensure resilience against climate-related challenges.</p> <p>Key components of adaptation assessment include:</p> <ul style="list-style-type: none"> <li>● <b>Risk and vulnerability analysis</b> to understand exposure to climate hazards.</li> <li>● <b>Cost-benefit evaluation</b> to compare economic viability.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Technical feasibility</b> to determine whether adaptation measures can be practically implemented.</li> <li>● <b>Social and environmental considerations</b> to assess their broader impacts.</li> </ul> <p>By conducting a thorough adaptation assessment, governments, businesses, and communities can develop <b>robust climate strategies</b> that enhance resilience, protect livelihoods, and optimize resource allocation in the face of climate variability and extreme events.</p>
<b>Adaptation Baseline</b>	<p><b>Adaptation Baseline</b> refers to a reference point or set of conditions against which changes related to <b>climate adaptation</b> are measured. It serves as a benchmark for assessing the effectiveness of adaptation strategies over time.</p> <p>There are two primary types of adaptation baselines:</p> <ul style="list-style-type: none"> <li>● <b>Current baseline:</b> Represents <b>existing, observable conditions</b> in the present, providing a snapshot of the current state before adaptation measures are implemented.</li> <li>● <b>Future baseline:</b> Represents a <b>projected scenario</b> of future conditions, assuming no intervention or excluding specific climate-driving factors.</li> </ul> <p>Different interpretations of reference conditions may lead to the establishment of <b>multiple baselines</b>, depending on the context of analysis. These baselines are crucial for evaluating progress in <b>climate resilience, policy impact, and environmental changes</b>, helping decision-makers compare different adaptation pathways and their outcomes.</p>
<b>Adaptation Benefits</b>	<p><b>Adaptation Benefits</b> refer to the <b>positive outcomes</b> gained from implementing adaptation measures, including <b>avoided damage costs and enhanced resilience</b> to climate change impacts. These benefits arise when proactive strategies reduce vulnerabilities, minimize economic losses, and improve overall sustainability.</p> <p>Adaptation benefits can be <b>direct or indirect</b>:</p> <ul style="list-style-type: none"> <li>● <b>Direct benefits</b> include reduced infrastructure damage from extreme weather, improved agricultural yields due to climate-resilient crops, and lower healthcare costs from mitigating climate-related diseases.</li> <li>● <b>Indirect benefits</b> include strengthened ecosystems, enhanced social stability, and long-term economic growth through sustainable resource management.</li> </ul> <p>By investing in <b>effective adaptation strategies</b>, governments, businesses, and communities can <b>reduce future risks, improve livelihoods, and enhance overall climate resilience</b>, making adaptation a crucial component of sustainable development.</p>
<b>Adaptation Cost</b>	<p><b>Adaptation Cost</b> refers to the financial resources required for <b>planning, preparing, facilitating, and implementing</b> adaptation measures to address the impacts of <b>climate change</b>. These costs encompass a range of expenditures, including <b>research and policy development, infrastructure upgrades, capacity building, and technology deployment</b>.</p> <p>Adaptation costs can be categorized into:</p>

	<ul style="list-style-type: none"> <li>● <b>Direct costs:</b> Expenses related to the construction of flood defenses, development of drought-resistant crops, or enhancement of early warning systems.</li> <li>● <b>Indirect costs:</b> Transition costs such as policy shifts, institutional adjustments, and changes in social behavior to support adaptation efforts.</li> </ul> <p>While adaptation costs may require <b>significant investment upfront</b>, they help prevent <b>larger economic losses</b> from climate-related disasters, making them essential for <b>long-term resilience and sustainable development</b>.</p>
<b>Adaptation Deficit</b>	<p><b>Adaptation Deficit</b> refers to the gap between <b>existing climate risks and the inadequate measures taken to address them</b>, resulting in increased vulnerability to climate impacts. This deficit arises when societies fail to implement effective adaptation strategies, leaving communities, economies, and ecosystems exposed to climate-related threats.</p> <p>Addressing the adaptation deficit is <b>essential for sustainable development</b>, but simply reducing the current gap is <b>not sufficient</b> for long-term climate resilience. Development decisions that ignore <b>present and future climate risks</b> can further <b>widen the deficit</b>, leading to higher adaptation costs and greater exposure to extreme weather events.</p> <p>As climate change <b>intensifies</b>, the adaptation deficit will continue to grow unless <b>proactive and well-planned adaptation programs</b> are implemented. This requires <b>integrating climate considerations into policy-making, investing in resilient infrastructure, and strengthening community preparedness</b> to effectively manage climate-related challenges.</p>
<b>Adaptation Fund</b>	<p>The <b>Adaptation Fund</b> is a financial mechanism established to <b>support concrete adaptation projects and programs</b> in <b>developing countries</b> that are particularly vulnerable to the <b>adverse effects of climate change</b>. It was created under the <b>Kyoto Protocol</b> to help these nations enhance <b>climate resilience, reduce risks, and protect communities and ecosystems</b> from climate-related impacts.</p> <p>The fund primarily finances <b>on-the-ground adaptation initiatives</b>, such as <b>coastal protection, sustainable agriculture, water resource management, and disaster risk reduction</b>. It is sourced through <b>donor contributions and a share of proceeds from carbon market mechanisms</b>, ensuring that vulnerable nations receive the necessary resources to implement <b>effective and sustainable climate adaptation strategies</b>.</p>
<b>Adaptation Measures</b>	<p><b>Adaptation Measures</b> refer to <b>specific actions or coordinated sets of interventions</b> designed to enhance resilience and reduce vulnerability to <b>climate change impacts</b>. These measures can be <b>standalone initiatives</b> or <b>integrated packages</b> that work together to support a broader <b>climate adaptation strategy</b>.</p> <p>Examples of adaptation measures include:</p> <ul style="list-style-type: none"> <li>● <b>Infrastructure projects</b>, such as developing irrigation systems to manage water scarcity.</li> <li>● <b>Information and capacity-building programs</b>, such as farmer advisory services and early warning systems for extreme weather events.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Policy-driven actions</b>, which set clear adaptation objectives and outline mechanisms for their implementation.</li> </ul> <p>Adaptation measures are typically <b>interconnected</b> and address climate challenges in <b>distinct but sometimes overlapping</b> ways. They form a crucial part of climate adaptation policies, ensuring that <b>practical solutions</b> are put in place to mitigate risks and support sustainable development.</p>
<b>Adaptation Method</b>	<p>An <b>Adaptation Method</b> refers to a structured approach consisting of a <b>defined sequence of steps or tasks</b> designed to achieve a specific adaptation goal within a <b>broader climate resilience framework</b>. These methods provide <b>systematic guidance</b> for implementing adaptation strategies and can be carried out using various <b>tools and techniques</b>.</p> <p>For example, adaptation methods may include processes for <b>developing and applying climate scenario data</b> in vulnerability assessments or evaluating the effectiveness of adaptation interventions. By following a well-defined method, policymakers, researchers, and practitioners can ensure that <b>adaptation planning is comprehensive, data-driven, and tailored to specific climate risks and regional contexts</b>.</p>
<b>Adaptation Policy Baseline</b>	<p>An <b>Adaptation Policy Baseline</b> refers to a <b>reference point or dataset</b> used to measure changes in adaptation efforts over time. It provides a <b>benchmark</b> for assessing progress in climate adaptation by documenting <b>existing policies, programs, and measures</b> that address current climate risks.</p> <p>This baseline includes <b>risk mitigation strategies, regulatory frameworks, and institutional initiatives</b> already in place to manage climate variability and extreme events. By establishing a clear adaptation policy baseline, decision-makers can <b>evaluate the effectiveness of current measures, identify gaps, and develop improved strategies</b> to enhance climate resilience.</p>
<b>Adaptation Framework (APF)</b>	<p><b>Policy</b></p> <p>The <b>Adaptation Policy Framework (APF)</b> is a <b>structured approach</b> for formulating <b>adaptation strategies, policies, and measures</b> aimed at enhancing <b>climate resilience</b> and ensuring <b>sustainable human development</b> in the face of <b>climate change and variability</b>. It is designed to <b>integrate climate adaptation into broader sustainable development goals</b>, addressing both <b>local and global environmental challenges</b>.</p> <p>The <b>APF</b> consists of five key components:</p> <ol style="list-style-type: none"> <li>1. <b>Scoping and designing an adaptation project</b> – Identifying objectives, stakeholders, and resources for adaptation planning.</li> <li>2. <b>Assessing current vulnerability</b> – Evaluating existing climate risks, exposure levels, and adaptive capacities.</li> <li>3. <b>Characterizing future climate risks</b> – Using climate projections and scenario analysis to anticipate potential impacts.</li> <li>4. <b>Developing an adaptation strategy</b> – Designing policy interventions, risk management strategies, and action plans to enhance resilience.</li> <li>5. <b>Continuing the adaptation process</b> – Ensuring long-term implementation, monitoring, and refinement of adaptation measures.</li> </ol>



	By following the APF, policymakers and practitioners can <b>systematically develop, implement, and refine adaptation strategies</b> , making them more effective in addressing <b>both present and future climate challenges</b> .
<b>Adaptation Strategies</b>	<p><b>Adaptation Strategies</b> refer to <b>long-term adjustments in behavior, practices, and systems</b> in response to <b>sustained environmental and climatic stresses</b>. These strategies are shaped by people's <b>perception of risk</b> and their ability to respond effectively.</p> <p>Communities may adapt to <b>climate change</b> by <b>modifying agricultural techniques, adopting new technologies, or implementing resource management practices</b> such as <b>rainwater harvesting</b>. Others may seek to <b>diversify their livelihoods</b>, shifting to industries or activities that are less vulnerable to environmental hazards. In some cases, families may opt for <b>migration</b> as a strategy to escape high-risk areas and access better opportunities elsewhere.</p> <p>The capacity to <b>successfully implement adaptation strategies</b> largely depends on people's <b>access to resources, knowledge, and assets</b>. In regions where these are limited, vulnerability remains high, making it crucial to enhance <b>adaptive capacity through policy support, financial investment, and community-driven initiatives</b>.</p>
<b>Adaptation Technologies</b>	<p><b>Adaptation Technologies</b> encompass both <b>scientific advancements and traditional knowledge</b> that aid in adapting to climate-related challenges. These technologies primarily focus on <b>local innovations, indigenous knowledge, and established practices</b> that have proven effective in mitigating climate risks.</p> <p>The application of <b>adaptation technologies</b> aims to <b>reduce vulnerability and enhance resilience</b> in both <b>natural and human systems</b> against the adverse effects of <b>climate change</b>. These technologies may include <b>early warning systems, climate-resilient agricultural practices, water conservation techniques, infrastructure modifications, and ecosystem-based solutions</b>. By integrating <b>modern science with traditional wisdom</b>, adaptation technologies help communities <b>cope with environmental changes</b> while fostering <b>sustainable development and climate resilience</b>.</p>
<b>Adaptive Capacity</b>	<p><b>Adaptive Capacity</b> refers to the <b>ability of a system—whether an individual, community, ecosystem, or institution—to adjust and respond to the challenges posed by climate change</b>, including climate variability and extreme weather events. This capacity determines how effectively a system can <b>mitigate potential damages, capitalize on emerging opportunities, or manage the adverse effects of environmental changes</b>.</p> <p>Adaptive capacity is influenced by <b>social, economic, institutional, and technological factors</b>. Communities with <b>robust infrastructure, strong governance, access to financial resources, scientific knowledge, and well-developed early warning systems</b> are better equipped to adapt to climate challenges. In contrast, regions with <b>limited resources, weak institutional frameworks, or high dependence on climate-sensitive sectors</b> (such as agriculture or fisheries) often struggle with adaptation.</p>

	<p>Enhancing adaptive capacity requires <b>investments in education, technological innovation, policy interventions, and community engagement</b>. This includes <b>improving climate-resilient infrastructure, strengthening disaster preparedness, diversifying livelihoods, promoting sustainable resource management, and fostering social cohesion</b>.</p> <p>Ultimately, <b>adaptive capacity is crucial for building long-term resilience</b> against climate change impacts, ensuring sustainable development, and safeguarding both human and ecological systems.</p>
<b>Additionality</b>	<p><b>Additionality</b> refers to the reduction of greenhouse gas (GHG) emissions or the enhancement of carbon removals that would not have occurred without a specific intervention, such as a <b>Joint Implementation (JI) or Clean Development Mechanism (CDM) project</b>, as outlined in the <b>Kyoto Protocol</b>. It ensures that emission reductions achieved through such projects are <b>truly supplementary</b> to what would have happened under a business-as-usual scenario.</p> <p>The concept of additionality is critical in carbon markets, as it helps determine whether a project <b>genuinely contributes to climate change mitigation</b> or merely shifts emissions reductions that would have happened anyway. Projects must demonstrate that their impact goes beyond regulatory requirements, existing policies, or natural market trends to qualify for carbon credits.</p> <p>Assessing additionality often involves <b>financial, technological, and policy-based evaluations</b> to confirm that without the project, emissions would have remained higher or removals lower. This principle helps maintain the <b>integrity and effectiveness of carbon offset mechanisms</b>, ensuring that climate finance is directed toward meaningful and measurable environmental benefits.</p>
<b>Adverse Effect</b>	<p><b>Adverse Effect</b> refers to the detrimental changes in the physical environment or biological systems caused by climate change, which negatively impact the <b>composition, resilience, or productivity</b> of both natural and managed ecosystems. These effects can also disrupt <b>socioeconomic systems</b>, hindering their stability and efficiency, or pose significant risks to <b>human health and well-being</b>.</p> <p>Such negative consequences may manifest as <b>biodiversity loss, reduced agricultural yields, increased frequency of extreme weather events, sea level rise, or health hazards</b> like heat stress and vector-borne diseases. The severity of these impacts depends on the <b>magnitude and pace of climate change</b>, as well as the <b>adaptive capacity</b> of ecosystems and human societies to mitigate or manage these effects.</p>
<b>Aerosols</b>	<p><b>Aerosols</b> are tiny <b>solid particles or liquid droplets</b> suspended in the atmosphere, capable of <b>absorbing, scattering, or reflecting sunlight</b> depending on their composition. These particles, typically ranging in size from <b>0.01 to 10 micrometres</b>, can remain in the air for several hours to weeks.</p> <p>Aerosols originate from both <b>natural</b> sources, such as volcanic eruptions, desert dust, sea spray, and wildfires, and <b>anthropogenic</b> activities like fossil fuel combustion, industrial emissions, and biomass burning. They influence the climate in two primary ways:</p> <ol style="list-style-type: none"> <li>1. <b>Directly</b> by interacting with radiation, either reflecting sunlight back into space (cooling effect) or absorbing heat (warming effect).</li> </ol>

	<p>2. <b>Indirectly</b> by serving as <b>cloud condensation nuclei</b>, affecting cloud formation, lifetime, and optical properties, which in turn impact precipitation patterns and the Earth's energy balance.</p> <p>Due to their complex role in climate systems, aerosols are a key factor in <b>climate modelling and atmospheric studies</b>, with ongoing research aimed at understanding their net impact on global and regional climates.</p>
<b>Afforestation</b>	<p><b>Afforestation</b> refers to the process of establishing forests on lands that have historically not been forested. It involves the <b>deliberate conversion of non-forested land</b> into forested areas through <b>planting, seeding, or encouraging natural seed sources</b>. According to international definitions, afforestation typically applies to land that has not been covered by forests for at least <b>50 years</b>.</p> <p>This process can be <b>human-induced</b>, involving direct intervention such as <b>tree planting programs</b>, or it can be facilitated through <b>natural regeneration</b> where favourable conditions support the growth of forests. Afforestation plays a crucial role in <b>carbon sequestration</b>, biodiversity conservation, soil protection, and combating desertification. It is widely used in <b>climate change mitigation efforts</b>, particularly under global initiatives like the <b>Kyoto Protocol and REDD+ programs</b>, which encourage sustainable land use and carbon offsetting through forest expansion.</p>
<b>Aggregate impacts</b>	<p><b>Aggregate Impacts</b> refer to the <b>total combined effects</b> of climate change or other environmental and socio-economic changes across multiple <b>sectors and regions</b>. These impacts are quantified by integrating various <b>measures of significance</b>, such as the <b>number of affected individuals, economic losses, shifts in net primary productivity, or systemic changes across ecosystems and infrastructure</b>.</p> <p>The process of aggregating impacts involves <b>assessing the relative importance</b> of effects in different contexts, requiring <b>scientific data, economic evaluations, and policy assumptions</b>. Since different sectors—such as agriculture, water resources, human health, and industry—experience varying degrees of climate-related disruptions, <b>weighing and summing up these impacts</b> is complex and often subject to <b>value judgments and methodological challenges</b>.</p> <p>Aggregate impact assessments are widely used in <b>climate policy and decision-making</b> to evaluate the <b>overall burden of climate change</b> and to help <b>prioritize adaptation and mitigation strategies</b>.</p>
<b>Agriculture, Forestry and Other Land Use (AFOLU)</b>	<p><b>Agriculture, Forestry, and Other Land Use (AFOLU)</b> encompasses a broad range of activities aimed at managing land sustainably while addressing climate change. These activities include <b>Afforestation, Reforestation, and Revegetation (ARR)</b>, which involve planting trees on previously non-forested or deforested land; <b>Agricultural Land Management (ALM)</b>, which focuses on improving soil health, crop productivity, and sustainable farming practices; <b>Improved Forest Management (IFM)</b>, which enhances forest conservation and carbon sequestration; and <b>Reduced Emissions from Deforestation and Degradation (REDD)</b>, which seeks to minimize deforestation and degradation to maintain carbon stocks and biodiversity.</p>

	The AFOLU sector plays a <b>crucial role in climate mitigation and adaptation</b> , as it influences greenhouse gas emissions, carbon sequestration, and ecosystem resilience. Effective management of these activities can contribute to <b>reducing emissions, enhancing biodiversity, and supporting sustainable livelihoods</b> .
<b>Agroclimatology</b>	<b>Agroclimatology</b> is the scientific study of climate and its impact on agricultural practices, particularly crop growth and productivity. It examines how various climatic factors—such as temperature, precipitation, humidity, and solar radiation—influence plant development, crop yields, and overall agricultural sustainability. By analysing these interactions, agroclimatology helps identify <b>optimal climatic conditions</b> for different crops and determines <b>climatic limitations</b> that may hinder agricultural production. This field is essential for developing <b>climate-resilient farming strategies</b> , improving <b>crop forecasting</b> , and enhancing <b>sustainable agricultural practices</b> in the face of changing climatic patterns.
<b>Agroecology</b>	<b>Agroecology</b> is the application of ecological principles to agricultural systems for the sustainable production of food, fuel, fibre, and pharmaceuticals. It integrates scientific knowledge with traditional farming practices, emphasizing biodiversity, ecosystem resilience, and resource efficiency. Agroecology is recognized as a <b>multidimensional approach</b> , encompassing not only a <b>scientific discipline</b> that studies the interactions between plants, animals, humans, and the environment but also a <b>set of farming practices</b> that promote sustainability. Additionally, it represents a <b>social movement</b> advocating for food sovereignty, ecological balance, and equitable agricultural systems.
<b>Agroforestry</b>	<b>Agroforestry</b> is a land management approach that integrates trees and shrubs into agricultural landscapes to enhance productivity, environmental sustainability, and climate resilience. By combining forestry with crop cultivation and livestock rearing, agroforestry provides multiple benefits, such as improving soil health, reducing erosion, enhancing biodiversity, and sequestering carbon. Trees in agroforestry systems serve as natural windbreaks, protect livestock from extreme weather conditions, and create habitats for essential pollinators. Additionally, they contribute to water conservation by slowing runoff and improving water quality. Agroforestry practices can take various forms, including intercropping, alley cropping, silvopasture (integrating trees with grazing lands), and windbreaks, all of which contribute to more resilient and sustainable agricultural systems.
<b>Air</b>	<b>Air</b> refers to the mixture of gases that make up Earth's atmosphere, which is held in place by the planet's gravitational pull. This essential component of life consists primarily of nitrogen (about 78%) and oxygen (about 21%), along with trace amounts of other gases such as carbon dioxide, argon, and water vapor. Air plays a crucial role in sustaining life, regulating climate, and enabling weather patterns. It serves as a medium for the exchange of gases in respiration and photosynthesis, supports cloud formation and precipitation, and acts as a protective shield against harmful solar radiation.
<b>Air Pollution</b>	<b>Air Pollution</b> refers to the release of harmful substances such as chemicals, particulate matter, or biological agents into the atmosphere, leading to adverse effects on human health, other living organisms, and the environment. These pollutants can originate from both natural sources, such as wildfires and volcanic eruptions, and human activities, including industrial processes, vehicle emissions, and agricultural

	practices. Air pollution can degrade air quality, contribute to respiratory diseases, damage ecosystems, and even accelerate climate change by altering atmospheric composition. It also affects the built environment by corroding buildings and infrastructure over time.
<b>Airborne Disease</b>	<b>Airborne Disease</b> refers to any illness caused by pathogenic microorganisms that are transmitted through the air. These diseases affect humans and are typically spread when infected individuals release pathogens into the environment through activities such as coughing, sneezing, laughing, or close personal contact. The infectious agents travel on tiny respiratory droplets or dust particles, remaining suspended in the air for extended periods or being carried over distances by air currents. Due to their mode of transmission, airborne diseases can spread rapidly in crowded or enclosed spaces, posing significant public health challenges.
<b>Albedo</b>	<b>Albedo</b> refers to the proportion of solar radiation that is reflected by a surface or object, typically expressed as a percentage. It indicates the reflectivity of a material, with higher albedo values representing greater reflectance and lower values indicating higher absorption of solar energy. Surfaces such as snow and ice have a high albedo, reflecting most of the sunlight, while darker surfaces like forests or oceans have a low albedo, absorbing more heat. Albedo plays a crucial role in regulating Earth's climate by influencing temperature and energy balance.
<b>Allowance (Carbon)</b>	<b>Allowance (Carbon)</b> refers to a permitted quantity of carbon emissions that an entity, such as a company or country, is allocated under a regulatory framework. This allowance is often distributed within emissions trading systems, where entities can buy, sell, or trade their allowances based on their carbon reduction strategies. It serves as an economic tool to incentivize lower emissions while providing flexibility in compliance with climate policies.
<b>Alternative Energy</b>	<p><b>Alternative Energy</b> refers to energy generated from non-conventional and renewable sources that serve as substitutes for traditional fossil fuels such as coal, oil, and natural gas. These sources are considered more sustainable and environmentally friendly, contributing to lower greenhouse gas emissions and reducing dependence on finite natural resources.</p> <p>Alternative energy includes a wide range of sources, such as:</p> <ul style="list-style-type: none"> <li>● <b>Solar Power:</b> Harnessing sunlight through photovoltaic (PV) cells or solar thermal systems.</li> <li>● <b>Wind Power:</b> Utilizing wind turbines to convert wind energy into electricity.</li> <li>● <b>Hydropower:</b> Generating electricity from flowing or falling water, including large dams and small-scale hydro projects.</li> <li>● <b>Geothermal Energy:</b> Extracting heat from the Earth's interior for power generation or direct heating.</li> <li>● <b>Tidal and Wave Energy:</b> Capturing the kinetic energy of ocean tides and waves.</li> <li>● <b>Biomass and Bioenergy:</b> Converting organic materials, such as agricultural waste or algae, into biofuels or direct combustion for energy production.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Compressed Natural Gas (CNG) and Hydrogen Fuel Cells:</b> Alternative fuels that offer cleaner combustion compared to conventional fossil fuels.</li> </ul> <p>The adoption of alternative energy plays a crucial role in achieving energy security, mitigating climate change, and promoting sustainable development. Technological advancements and policy support continue to enhance the feasibility and efficiency of these energy sources.</p>
<b>Alternative Technology</b>	<p><b>Alternative Technology</b> refers to environmentally sustainable innovations that serve as substitutes for conventional, resource-intensive technologies. These technologies aim to minimize ecological impact, reduce resource consumption, and promote efficiency while maintaining functionality comparable to mainstream practices.</p> <p>Alternative technology focuses on utilizing resources responsibly, minimizing waste generation, and ensuring affordability and accessibility. It is often designed to be energy-efficient, low-carbon, and adaptable to local needs. Examples include renewable energy systems (such as solar panels and wind turbines), eco-friendly construction materials, water conservation techniques, and sustainable agricultural methods.</p> <p>By prioritizing environmental and social well-being, alternative technology plays a vital role in reducing ecological footprints, supporting climate resilience, and fostering sustainable development.</p>
<b>Ancillary Benefits</b>	<p><b>Ancillary Benefits</b> refer to the additional or unintended effects of policies designed specifically for climate change mitigation. While the primary goal of such policies is to reduce greenhouse gas emissions, they also influence various other aspects, such as improving resource efficiency, reducing local and regional air pollution from fossil fuel use, and enhancing sustainability in sectors like transportation, agriculture, and land management.</p> <p>These benefits can extend to economic and social dimensions, including job creation, energy security, and improved public health. Sometimes referred to as “ancillary impacts,” these effects are typically positive but may, in some cases, have unintended negative consequences.</p>
<b>Annex B Countries/Parties</b>	<p><b>Annex B Countries/Parties</b> refer to the group of nations listed in <b>Annex B of the Kyoto Protocol</b>, which have committed to specific greenhouse gas (GHG) emission reduction targets. This list includes all <b>Annex I countries</b> (developed nations and economies in transition) as defined by the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b>, except <b>Turkey and Belarus</b>, which were excluded when Annex B was finalized in 1998.</p> <p>These countries are legally bound to reduce their emissions during the <b>first commitment period (2008–2012)</b> according to individual targets set in the Protocol. The reduction commitments vary among nations based on historical emissions and economic capabilities. These commitments were later extended under the <b>Doha Amendment</b> for a second commitment period (2013–2020), although not all countries ratified this extension.</p> <p>The Kyoto Protocol introduced <b>market-based mechanisms</b> such as <b>Emissions Trading, Joint Implementation (JI), and the Clean Development Mechanism (CDM)</b>, enabling Annex B countries to achieve their targets through flexible approaches. However, with the</p>

	<p>adoption of the <b>Paris Agreement (2015)</b>, the Kyoto Protocol's relevance declined, as the new agreement moved towards a broader and more inclusive framework for climate action, requiring contributions from all nations, not just developed ones.</p>
<b>Annex I Countries/Parties</b>	<p><b>Annex I Countries/Parties</b> refer to the group of nations listed in <b>Annex I of the United Nations Framework Convention on Climate Change (UNFCCC)</b>, as amended in 1998. This group comprises <b>developed countries</b> that are members of the <b>Organization for Economic Cooperation and Development (OECD)</b> and <b>economies in transition</b> (primarily from the former Soviet Union and Eastern Europe).</p> <p>Under <b>Articles 4.2(a) and 4.2(b)</b> of the UNFCCC, these countries committed to stabilizing their <b>greenhouse gas (GHG) emissions</b> at <b>1990 levels by the year 2000</b>, either individually or collectively. They were also expected to take the lead in adopting policies and measures to mitigate climate change.</p> <p>By default, all other nations that are not part of Annex I are referred to as <b>Non-Annex I countries</b>, which primarily include developing nations. While Annex I countries had specific obligations under the <b>Kyoto Protocol (1997)</b> to reduce emissions, the <b>Paris Agreement (2015)</b> introduced a more inclusive approach, requiring contributions from all countries based on their <b>nationally determined contributions (NDCs)</b> rather than fixed commitments.</p>
<b>Annex II Countries</b>	<p><b>Annex II Countries</b> refer to the group of nations listed in <b>Annex II of the United Nations Framework Convention on Climate Change (UNFCCC)</b>. This group comprises all <b>developed countries</b> that are members of the <b>Organization for Economic Cooperation and Development (OECD)</b> at the time the Convention was adopted.</p> <p>Under <b>Article 4.2(g)</b> of the UNFCCC, Annex II countries have a <b>specific responsibility</b> to support <b>developing nations</b> (Non-Annex I countries) in fulfilling their climate obligations. This includes:</p> <ul style="list-style-type: none"> <li>● <b>Providing financial assistance</b> to help developing countries implement climate-related actions, such as preparing national reports and implementing mitigation and adaptation strategies.</li> <li>● <b>Facilitating the transfer of environmentally sound technologies</b> to developing countries to promote sustainable development and reduce greenhouse gas emissions.</li> </ul> <p>These obligations distinguish <b>Annex II countries</b> from <b>Annex I countries</b>, as they have additional commitments beyond domestic emissions reductions, focusing on global cooperation and climate finance.</p>
<b>Antarctic sea ice</b>	<p>Antarctic sea ice is nearly a geographic opposite of its Arctic counterpart. <b>Antarctic Sea Ice</b> differs significantly from <b>Arctic Sea Ice</b> due to the contrasting geography of the two poles. While the <b>Arctic</b> consists of a frozen ocean surrounded by land, <b>Antarctica</b> is a landmass covered in ice, encircled by an ocean. This fundamental difference influences the formation, extent, and seasonal variability of sea ice in both regions.</p>
<b>Anthropogenic</b>	<p><b>Anthropogenic</b> refers to the impact of human activities on natural systems. This includes influences on the environment resulting from industrial processes, deforestation, agriculture, and the burning of fossil fuels. <b>Anthropogenic carbon dioxide</b> specifically denotes CO<sub>2</sub></p>

	emissions directly generated by human actions, such as combustion of coal, oil, and gas, as opposed to natural sources like respiration or decomposition. The effects of human activity on climate can be both direct—such as irrigation altering local humidity—and indirect, where the connection to environmental change is more complex.
<b>Anthropogenic emissions</b>	<b>Anthropogenic emissions</b> refer to the release of greenhouse gases, their precursors, and aerosols resulting from human activities. These emissions arise from processes such as fossil fuel combustion for energy production, deforestation, agricultural practices, industrial activities, and land-use changes. Such activities contribute to an overall increase in atmospheric greenhouse gas concentrations, influencing global climate patterns.
<b>Anticipatory Adaptation</b>	<b>Anticipatory Adaptation</b> refers to proactive measures taken in advance to mitigate the potential impacts of climate change before they are observed. Unlike reactive adaptation, which occurs in response to climate-related events, anticipatory adaptation involves strategic planning and implementation of policies, technologies, and behavioural changes to reduce future vulnerabilities. Examples include constructing flood-resistant infrastructure in anticipation of rising sea levels, implementing drought-resistant agricultural practices, developing early warning systems for extreme weather events, and integrating climate resilience into urban planning. This forward-looking approach enhances preparedness, minimizes risks, and ensures sustainable development in the face of evolving climate challenges.
<b>Appropriate Technology (AT)</b>	<b>Appropriate Technology (AT)</b> refers to technology that is specifically developed with consideration for the environmental, ethical, cultural, social, political, and economic needs of the community it serves. It is designed to be sustainable, resource-efficient, and accessible, often prioritizing ease of maintenance and minimal environmental impact. Proponents of appropriate technology emphasize its ability to function effectively with locally available materials, requiring fewer resources and producing less waste compared to conventional technologies, which are often seen as resource-intensive and environmentally harmful. Examples include renewable energy solutions, water purification systems, and small-scale farming innovations tailored to local conditions.
<b>Aquaculture</b>	<b>Aquaculture</b> is the practice of cultivating aquatic plants and animals in various water bodies, including ponds, lakes, rivers, and oceans. It involves breeding, rearing, and harvesting aquatic species for food, commercial, and conservation purposes. Unlike agriculture, which takes place on land, aquaculture focuses on sustaining and enhancing aquatic ecosystems to support fish, shellfish, seaweed, and other marine organisms. This practice plays a crucial role in global food security, biodiversity conservation, and economic development, providing a sustainable alternative to overfishing in natural water bodies.
<b>Aquifer</b>	An <b>aquifer</b> is a geological formation of permeable rock or sediment that stores and transmits groundwater, allowing water to be extracted through wells or natural springs.
<b>Arctic sea ice</b>	<b>Arctic sea ice</b> is a crucial component of the Arctic Ocean, serving as a key indicator of climate change. It expands to cover most of the Arctic Ocean during the dark winter months and plays a vital role in regulating global temperatures and marine ecosystems.



<b>Assigned Amounts</b>	<b>Assigned Amounts</b> refer to the total allowable greenhouse gas emissions for each Annex B country under the Kyoto Protocol during the first commitment period (2008–2012). This limit is determined by multiplying the country's 1990 emissions by five and adjusting it according to the reduction targets specified in Annex B (e.g., 92% for the European Union and 93% for the USA). These assigned amounts define the maximum emissions a country can produce while remaining compliant with its Kyoto Protocol commitments.
<b>Atmosphere</b>	<b>Atmosphere</b> refers to the layer of gases surrounding the Earth, playing a crucial role in sustaining life and regulating climate. The dry atmosphere is primarily composed of nitrogen (78.1%) and oxygen (20.9%), along with trace gases such as argon (0.93%), helium, and greenhouse gases like carbon dioxide (0.035%) and ozone. Additionally, it contains variable amounts of water vapor, typically around 1%, as well as clouds and aerosols, which influence weather patterns and atmospheric processes.
<b>Atmospheric Lifetime</b>	<b>Atmospheric Lifetime</b> refers to the average duration a molecule remains in the atmosphere before being removed through chemical reactions or deposition. Typically, if a specific amount of a compound is released into the atmosphere, about 35% of it will persist at the end of its atmospheric lifetime, decreasing exponentially over time. After two lifetimes, roughly 15% will remain, and so forth. However, certain compounds, like carbon dioxide, follow more complex removal processes that do not adhere strictly to exponential decay. The atmospheric lifetimes of greenhouse gases can vary significantly, ranging from a few years to several thousand years.
<b>Autonomous Adaptation</b>	<b>Autonomous Adaptation</b> refers to adaptation that occurs naturally without deliberate planning or conscious response to climate stimuli. In natural systems, it is driven by ecological changes, while in human systems, it results from shifts in markets or welfare conditions.
<b>Autumn</b>	<b>Autumn</b> , also known as <b>fall</b> in American English, is one of the four temperate seasons, signifying the transition from summer to winter. It typically occurs in <b>September</b> in the <b>Northern Hemisphere</b> and <b>March</b> in the <b>Southern Hemisphere</b> , marked by progressively shorter daylight hours and cooler temperatures.
<b>Bali Action Plan</b>	The <b>Bali Action Plan</b> refers to the decision adopted by <b>1/CP.13</b> during <b>COP-13</b> , outlining a roadmap for global climate action. It includes the <b>Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol (AWG-KP)</b> , with a <b>2009 deadline</b> for negotiations, the <b>launch of the Adaptation Fund</b> , and provisions for reviewing the Kyoto Protocol under <b>Article 9</b> . Additionally, it covers <b>technology transfer</b> and measures for <b>reducing emissions from deforestation</b> . The <b>Conference of Parties (COP)</b> initiated this comprehensive process to enhance the implementation of the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> through <b>long-term cooperative action</b> beyond <b>2012</b> .
<b>Base year</b>	<b>Base Year</b> refers to a reference year used for comparing greenhouse gas (GHG) emissions over time. The <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> and the <b>Kyoto Protocol</b> primarily use <b>1990</b> as the base year for most emission reduction commitments. However, countries classified as <b>economies in transition</b> were allowed to select an alternative base year under a decision made at <b>COP2</b> . Additionally, <b>Annex I Parties</b> have the option to use <b>1995</b> as the base year for emissions of three industrial gases:

	<b>hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>)</b> . The term is also applied in <b>voluntary emissions reporting</b> , usually referring to the first year in which a <b>GHG inventory</b> is established.
<b>Baseline</b>	<p><b>Baseline</b> refers to a benchmark condition used for measuring change. It can be classified as:</p> <ul style="list-style-type: none"> <li>• <b>Current Baseline</b> – representing observable, present-day conditions.</li> <li>• <b>Future Baseline</b> – a projected set of future conditions, assuming no influence from the specific factor under study.</li> </ul> <p>Different interpretations of reference conditions may lead to multiple baselines, depending on the context and analytical approach.</p>
<b>Belowground Biomass</b>	<b>Belowground Biomass</b> refers to the total living biomass of roots beneath the soil surface. In some cases, fine roots (typically less than ~2mm in diameter) are excluded, as they are difficult to differentiate from soil organic matter or litter.
<b>Bio-Carbon</b>	<b>Bio-Carbon</b> refers to the carbon that is naturally sequestered and stored in trees, plants, soils, and oceans. It is termed "bio-carbon" because it is captured through biological processes. However, activities such as deforestation and land degradation are rapidly releasing this stored carbon into the atmosphere, making bio-carbon both a significant contributor to anthropogenic greenhouse gas emissions and a cost-effective opportunity for climate change mitigation.
<b>Bio-Carbon Fund</b>	<b>Bio-Carbon Fund</b> is a financial mechanism that supports projects aimed at sequestering or conserving greenhouse gases in forests, agricultural systems, and other ecosystems. By focusing on bio-carbon or carbon 'sinks,' the fund provides carbon finance to developing nations with limited opportunities under the Clean Development Mechanism (CDM) and to transition economies through Joint Implementation (JI). It plays a crucial role in testing and demonstrating how Land Use, Land-Use Change, and Forestry (LULUCF) activities can generate high-quality Emission Reductions (ERs) while delivering measurable environmental and socio-economic benefits that are durable, certifiable, and verifiable over time.
<b>Biochar</b>	<b>Biochar</b> is a carbon-rich substance produced through the thermal decomposition of organic biomass, such as wood chips, plant residues, and manure, at high temperatures in a low-oxygen environment. It is a type of charcoal primarily intended for carbon sequestration, helping to lock carbon in a stable form and reduce greenhouse gas emissions. Additionally, biochar serves as a soil amendment, enhancing soil fertility, water retention, and microbial activity. However, if used as a fuel, it would release stored carbon back into the atmosphere, counteracting its primary climate mitigation purpose.
<b>Bioclimatology</b>	<b>Bioclimatology</b> is an interdisciplinary scientific field that examines the interactions between the biosphere and the Earth's atmosphere over extended periods, typically spanning seasons or longer. It explores how climatic factors influence living organisms and ecosystems, as well as how biological processes can, in turn, affect climate patterns.
<b>Biodiversity</b>	<b>Biodiversity</b> refers to the vast variety of life on Earth, encompassing the diversity of genes, species, and ecosystems. It includes genetic diversity (the variation of genes within a species), species diversity (the variety of species within an ecosystem), and ecosystem diversity

	<p>(the range of ecosystems, from forests and grasslands to wetlands and oceans). Biodiversity plays a fundamental role in maintaining ecological balance, ensuring resilience against environmental changes, and supporting essential ecosystem services such as food production, air and water purification, climate regulation, and disease control.</p> <p>However, biodiversity is increasingly under threat due to human activities, including deforestation, habitat destruction, pollution, overexploitation of natural resources, invasive species, and climate change. The accelerating loss of biodiversity has far-reaching consequences, not only for wildlife but also for human societies, as it disrupts food systems, water cycles, and climate stability. Scientists estimate that up to one million species are currently at risk of extinction, making biodiversity conservation a critical global priority. Protecting and restoring biodiversity is essential for sustaining ecosystems, ensuring food security, and maintaining the overall health of our planet.</p>
<b>Bioenergy</b>	<p><b>Bioenergy</b> refers to renewable energy derived from biological sources, commonly known as biomass, which includes plant materials, agricultural residues, forestry waste, and organic waste. This form of energy can be used for generating heat, electricity, and transportation fuels, making it a versatile and sustainable alternative to fossil fuels.</p> <p>Bioenergy encompasses a wide range of technologies and applications. Solid biomass, such as wood pellets and crop residues, is often burned directly for heat or electricity generation. Liquid biofuels, such as ethanol and biodiesel, are derived from crops like sugarcane, corn, and oilseeds and are used to power vehicles. Additionally, biogas, produced through the anaerobic digestion of organic waste, serves as a renewable substitute for natural gas.</p> <p>Among the rapidly expanding renewable energy technologies, biofuels derived from plant materials play a significant role in reducing greenhouse gas emissions and promoting energy security. However, the sustainability of bioenergy depends on responsible land use, efficient production methods, and avoiding competition with food production. Advancements in second-generation biofuels, which utilize non-food biomass like agricultural waste and algae, offer promising solutions to enhance the environmental and economic benefits of bioenergy while minimizing its ecological footprint.</p>
<b>Bioenergy with carbon capture and storage (BECCS)</b>	<p><b>Bioenergy with Carbon Capture and Storage (BECCS)</b> refers to a process in which carbon emissions generated during bioenergy production are captured and stored, preventing them from being released into the atmosphere. This approach is considered a form of negative emissions technology, as it has the potential to remove more carbon dioxide from the atmosphere than it emits, effectively reducing overall greenhouse gas concentrations.</p> <p>In theory, BECCS can produce energy with a net-negative carbon footprint by utilizing biomass—such as crops, forestry residues, or organic waste—as a renewable energy source while simultaneously capturing and sequestering the resulting carbon emissions underground or in long-term storage facilities.</p> <p>Despite its potential benefits, BECCS is still in the early stages of deployment, with only a limited number of operational projects worldwide. Critics raise concerns about the economic feasibility of large-scale implementation, the high costs associated with carbon capture and</p>

	storage (CCS) infrastructure, and the impact of dedicating vast land areas to bioenergy production, which could otherwise support food security or biodiversity conservation. Balancing these trade-offs remains a key challenge in realizing the full potential of BECCS as a climate mitigation strategy.
<b>Bio-engineering</b>	<b>Bioengineering</b> is the interdisciplinary application of principles from physics, chemistry, and mathematics to address challenges in life sciences. It utilizes engineering's analytical and synthetic methodologies to develop innovative solutions for biological and medical problems, bridging the gap between engineering and the biological sciences.
<b>Biofuel</b>	<p><b>Biofuel</b> refers to solid, liquid, or gaseous fuels derived from biological materials, including plant matter and animal waste. Common sources include sugarcane, corn, soybeans, and algae. Biofuels can take various forms, such as ethanol (produced from fermented sugars), biodiesel (derived from vegetable oils and animal fats), and biogas (generated from organic waste decomposition).</p> <p>Biofuels are often considered a renewable alternative to fossil fuels, as they can be replenished through agricultural and organic waste cycles. However, concerns exist regarding land use for biofuel production, which could compete with food crops and impact biodiversity. Additionally, while biofuels are marketed as a lower-carbon alternative to fossil fuels, critics argue that their overall carbon footprint may be underestimated when factoring in emissions from land-use changes, cultivation, and processing.</p> <p>Despite these concerns, global demand for biofuels is expected to rise significantly, with an estimated 22% increase between 2022 and 2027, driven by efforts to transition toward cleaner energy sources.</p>
<b>Biogas</b>	<p><b>Biogas</b> is a renewable fuel generated through the biological decomposition of organic matter in an oxygen-free environment, a process known as anaerobic digestion. It primarily consists of methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>), with small traces of other gases. As a type of biofuel, biogas is derived from various organic sources, including agricultural waste, food scraps, manure, and sewage sludge.</p> <p>Biogas can be used for electricity generation, heating, and as a fuel for vehicles when purified into biomethane. Its production not only provides a sustainable energy source but also helps manage waste and reduce greenhouse gas emissions by capturing methane that would otherwise be released into the atmosphere.</p>
<b>Biogenic emissions</b>	<p><b>Biogenic Emissions</b> refer to emissions produced by natural biological processes in living organisms. These emissions can originate from plants, animals, microorganisms, and natural ecosystems. Unlike anthropogenic emissions, which result from human activities such as industrial processes and fossil fuel combustion, biogenic emissions occur naturally as part of Earth's ecological cycles.</p> <p><b>Examples of Biogenic Emissions:</b></p> <ul style="list-style-type: none"> <li>● <b>Methane (CH<sub>4</sub>) from Wetlands and Livestock:</b> Microbial activity in wetlands and the digestive processes of ruminant animals (such as cows and sheep) release methane into the atmosphere.</li> <li>● <b>Carbon Dioxide (CO<sub>2</sub>) from Plant Respiration:</b> Plants release CO<sub>2</sub> as part of cellular respiration, although they also absorb CO<sub>2</sub> during photosynthesis.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Volatile Organic Compounds (VOCs) from Vegetation:</b> Trees and plants emit VOCs, such as isoprene and terpenes, which can contribute to atmospheric reactions forming aerosols and ozone.</li> <li>● <b>Nitrous Oxide (N<sub>2</sub>O) from Soil Microbes:</b> Certain bacteria in soils produce nitrous oxide, a potent greenhouse gas, through natural nitrogen cycling processes.</li> <li>● <b>Oceanic Emissions:</b> Marine phytoplankton release gases such as dimethyl sulfide (DMS), which influence cloud formation and climate regulation.</li> </ul> <p>While biogenic emissions are part of natural cycles, changes in land use, deforestation, and climate change can influence their levels and impact on the environment.</p>
<b>Biogeochemical Cycle</b>	<p><b>Biogeochemical Cycle</b> refers to the natural movement and exchange of essential chemical elements—such as carbon, nitrogen, oxygen, and phosphorus—through different components of the Earth’s system, including the atmosphere, biosphere, hydrosphere, and lithosphere. These cycles regulate the availability of nutrients necessary for life and play a crucial role in maintaining ecological balance. Examples include the carbon cycle, nitrogen cycle, and phosphorus cycle, each of which involves complex interactions between living organisms and the environment.</p>
<b>Biological Community</b>	<p>A <b>biological community</b> refers to the collection of plants, animals, and other organisms that coexist and interact within a specific area. These species form complex relationships, influencing each other’s survival and contributing to the overall functioning of the ecosystem.</p>
<b>Biological Hazard</b>	<p>A <b>biological hazard</b> refers to a process or phenomenon of organic origin or transmitted through biological vectors, including exposure to pathogenic microorganisms, toxins, and bioactive substances. In the context of <b>climate change</b>, a <b>biological hazard</b> refers to threats arising from changes in ecosystems due to shifting climate conditions. Rising temperatures, altered precipitation patterns, and extreme weather events can exacerbate the spread of infectious diseases, increase pest infestations, and disrupt food and water security. Examples include the expansion of vector-borne diseases like malaria and dengue due to warmer climates, the spread of invasive species disrupting local ecosystems, and increased risks of zoonotic diseases as changing habitats bring humans and wildlife into closer contact.</p>
<b>Biological productivity</b>	<p>Biological productivity is a measure of the amount of plant and animal growth in a defined region and time. In the context of <b>climate change</b>, <b>biological productivity</b> refers to the rate at which ecosystems generate biomass through plant and animal growth within a specific region and time frame. Climate change can significantly impact biological productivity by altering temperature, precipitation patterns, and the availability of nutrients, potentially leading to shifts in agricultural yields, forest growth, and marine ecosystem dynamics.</p>
<b>Biomass</b>	<p>Materials that are biological in origin, including organic material (both living and dead) from above and below ground. In the context of <b>climate change</b>, <b>biomass</b> refers to organic materials derived from plants, animals, and microorganisms, including agricultural and forestry residues, crop waste, and animal by-products. Biomass plays a dual role in climate action—it can serve as a renewable energy source, reducing dependence on fossil fuels, but its unsustainable use, such as large-scale deforestation for biofuel production, can contribute to</p>

	carbon emissions and biodiversity loss. The carbon neutrality of biomass depends on how it is sourced, managed, and utilized, as its combustion or decomposition releases carbon dioxide, which must be offset by new plant growth to maintain a balance in the carbon cycle.
<b>Biomass Energy</b>	<b>Biomass Energy</b> refers to a renewable energy source derived from organic materials originating from living or recently living organisms, such as wood, agricultural residues, organic waste, biogas, and biofuels like ethanol and biodiesel. It is primarily used for generating electricity, producing heat, or as a fuel alternative to fossil fuels. While some biomass energy systems involve direct combustion, more advanced methods convert biomass into biogas or liquid biofuels, improving efficiency and reducing emissions. Sustainable biomass energy production requires careful management to balance carbon emissions and ensure it does not contribute to deforestation or biodiversity loss.
<b>Biome</b>	<p><b>Biome</b> refers to a large-scale ecological region within the biosphere that is defined by distinct climatic conditions, vegetation, wildlife, and microbial communities. Each biome consists of multiple interconnected ecosystems, such as forests, wetlands, rivers, and grasslands, that share similar environmental characteristics. Biomes play a crucial role in regulating Earth's climate, carbon cycles, and biodiversity.</p> <p>In the context of <b>climate change</b>, biomes are experiencing significant shifts due to rising temperatures, altered precipitation patterns, and increased frequency of extreme weather events. For example, warming temperatures are causing boreal forests to expand into tundra regions, while desertification is reducing the extent of grasslands. Changes in biomes impact species distributions, ecosystem services (such as carbon sequestration and water regulation), and human livelihoods. Protecting and restoring biomes is essential for mitigating climate change and preserving biodiversity.</p>
<b>Biosphere</b>	<p>The <b>biosphere</b> refers to the interconnected system of all living organisms and ecosystems on Earth, encompassing life in the atmosphere, on land (terrestrial biosphere), and in the oceans (marine biosphere). It includes not only living organisms but also organic matter derived from them, such as decomposing plant material, soil organic matter, and oceanic detritus.</p> <p>In the context of <b>climate change</b>, the biosphere plays a critical role in regulating the planet's climate by cycling carbon, oxygen, and other essential elements. However, rising global temperatures, deforestation, ocean acidification, and habitat destruction are disrupting these natural processes, leading to biodiversity loss, ecosystem degradation, and reduced carbon sequestration capacity. Protecting the biosphere is vital for maintaining ecological balance and mitigating the effects of climate change.</p>
<b>Biostabilizer</b>	A <b>biostabilizer</b> is a machine designed to process solid waste by grinding and aerating it, facilitating its conversion into compost. This technology accelerates the decomposition of organic materials, promoting waste stabilization and reducing landfill burden. By enhancing composting efficiency, biostabilizers contribute to sustainable waste management and help mitigate greenhouse gas emissions associated with organic waste decomposition.

<b>Biota</b>	<b>Biota</b> refers to the collective living organisms within a specific region, encompassing both flora (plants) and fauna (animals) as an ecological unit. It represents the biological community of an area, interacting with the physical environment and contributing to ecosystem functions.
<b>Black Carbon</b>	<b>Black Carbon (BC)</b> is a highly light-absorbing component of particulate matter (PM), produced through the incomplete combustion of fossil fuels, biofuels, and biomass. Emitted as fine particles (PM2.5), it is a significant climate forcer and the second-largest contributor to global warming after carbon dioxide. Black carbon absorbs sunlight, leading to atmospheric heating, and reduces the Earth's albedo when deposited on snow and ice, accelerating their melting. It consists of pure carbon in various linked structures and is primarily released from diesel engines, cookstoves, wood burning, and wildfires. Unlike long-lived greenhouse gases, BC remains in the atmosphere for only a few weeks but has a disproportionately large impact on climate change.
<b>Blue carbon</b>	<b>Blue Carbon</b> refers to carbon dioxide absorbed from the atmosphere and stored in marine and coastal ecosystems. While much of this carbon dissolves directly into the ocean, it is also sequestered in sediments, vegetation, soil, organic matter, and marine organisms, from microscopic phytoplankton to large whales. Coastal habitats such as mangroves, seagrasses, and salt marshes play a crucial role in capturing and storing blue carbon, making them vital for mitigating climate change and maintaining ecosystem balance.
<b>Blue Planet</b>	<b>Blue Planet</b> is a BBC nature documentary series, narrated by David Attenborough, that first aired in the UK on September 12, 2001. The series explores the mysteries of the world's oceans, showcasing marine life, underwater ecosystems, and the impact of human activities on the marine environment.
<b>Borehole</b>	<b>Borehole</b> refers to a drilled hole in the Earth's surface or ice, typically used for extracting geophysical data. In climate research, boreholes are often used to obtain ice core samples, which help scientists analyze past atmospheric compositions and climate conditions.
<b>Canopy Area</b>	<b>Canopy Area</b> refers to the layer of leaves, branches, and stems of trees and vegetation that form a natural cover over the ground surface. Acting like an umbrella, the canopy plays a crucial role in regulating temperature, reducing soil erosion, and providing habitat for various species. It influences local microclimates by moderating sunlight, wind, and rainfall distribution. In forest ecosystems, a dense canopy can significantly impact biodiversity, carbon sequestration, and overall ecological health.
<b>Capacity (Climate)</b>	<b>Capacity (Climate)</b> refers to the collective strengths, resources, and capabilities of a community, society, or organization that enable it to respond effectively to climate challenges and achieve sustainability goals. This includes technical knowledge, institutional frameworks, financial resources, and social cohesion, all of which contribute to climate adaptation, mitigation, and resilience-building efforts.
<b>Capacity building (Climate Change)</b>	<b>Capacity Building (Climate Change)</b> refers to the process of enhancing technical skills, institutional frameworks, and overall capabilities in countries and economies to enable effective participation in climate adaptation, mitigation, and research. It involves strengthening human resources, governance structures, and financial mechanisms to implement climate policies, including international frameworks like the

	Kyoto Protocol and other global climate agreements. Capacity building is crucial for developing nations and economies in transition to effectively respond to climate challenges and integrate sustainable solutions.
<b>Capacity Development</b>	<b>Capacity Development</b> is a continuous process through which individuals, organizations, and societies enhance their abilities to achieve social, economic, and environmental goals. It extends beyond training and education to include strengthening institutions, improving governance structures, mobilizing financial resources, advancing technology systems, and fostering a supportive social and cultural environment. Unlike capacity building, which often focuses on initial skill development, capacity development emphasizes long-term growth and sustainability, ensuring that capabilities are systematically nurtured and expanded over time.
<b>Carbon</b>	<b>Carbon</b> is a fundamental chemical element and a key building block of life, forming the basis of all organic molecules found in living organisms on Earth. It plays a crucial role in biological, geological, and atmospheric processes, including the carbon cycle, which regulates Earth's climate and ecosystems.
<b>Carbon Accounting System</b>	<b>Carbon Accounting System</b> refers to the process of measuring and tracking carbon dioxide equivalents that are prevented from being released into the atmosphere through various climate mitigation projects. Under the Kyoto Protocol's Flexible Mechanisms, such projects include renewable energy initiatives, biomass utilization, and afforestation efforts. This system helps assess the effectiveness of climate actions in reducing greenhouse gas emissions and supports compliance with international climate commitments.
<b>Carbon Capture, Utilisation and Storage (CCS and CCUS)</b>	<p><b>Carbon Capture, Utilization, and Storage (CCS &amp; CCUS)</b> refers to a suite of technologies designed to reduce carbon dioxide (CO<sub>2</sub>) emissions from industrial and energy-related sources. The process involves three key steps: capturing CO<sub>2</sub> emissions from power plants or industrial facilities, transporting the compressed CO<sub>2</sub> (typically via pipelines), and securely storing it underground in geological formations to prevent its release into the atmosphere.</p> <p><b>Carbon Capture and Storage (CCS)</b> focuses solely on capturing and permanently sequestering CO<sub>2</sub>, while <b>Carbon Capture, Utilization, and Storage (CCUS)</b> goes a step further by repurposing captured carbon for industrial applications, such as producing biofuels, chemicals, plastics, or building materials like concrete.</p> <p>Proponents argue that CCS and CCUS play a crucial role in mitigating climate change by reducing emissions from industries that are difficult to decarbonize. The <b>Intergovernmental Panel on Climate Change (IPCC)</b> has suggested that these technologies could be essential in achieving the goal of limiting global warming to 2°C. However, critics warn that CCS and CCUS could prolong dependence on fossil fuels and question their economic viability and scalability. In July 2023, the <b>European Union</b>, along with 17 countries including Germany, France, and New Zealand, stated that reliance on carbon capture should be limited, as it is not a substitute for phasing out fossil fuel use.</p>
<b>Carbon Credits</b>	Carbon credits are market-based instruments designed to reduce greenhouse gas (GHG) emissions by placing a price on carbon. They function as tradable permits that allow companies, organizations, or individuals to emit a specific amount of carbon dioxide (CO <sub>2</sub> ) or its equivalent in other greenhouse gases.



	<p>Each <b>carbon credit</b> typically represents <b>one metric ton of CO<sub>2</sub></b> that a company is permitted to emit. Governments or regulatory bodies set emission limits, and companies that produce fewer emissions than their allotted quota can <b>sell</b> their surplus credits to others that exceed their limits. This system is intended to create a financial incentive for companies to <b>invest in cleaner technologies</b> and adopt more sustainable practices.</p> <p><b>Types of Carbon Credits:</b></p> <ol style="list-style-type: none"><li>1. <b>Compliance Carbon Credits:</b> Issued under <b>cap-and-trade</b> systems regulated by governments, such as the <b>EU Emissions Trading System (ETS)</b> or <b>California's Cap-and-Trade Program</b>.</li><li>2. <b>Voluntary Carbon Credits:</b> Generated through carbon offset projects, such as <b>reforestation, renewable energy investments, and methane capture</b>, allowing companies or individuals to compensate for their emissions.</li></ol> <p><b>Challenges and Criticisms:</b></p> <ul style="list-style-type: none"><li>• Some critics argue that carbon markets <b>do not always lead to real emission reductions</b> and may allow heavy polluters to continue business as usual by simply purchasing credits.</li><li>• The <b>pricing of carbon credits varies widely</b>, and the effectiveness of the system depends on stringent regulations and proper verification of offset projects.</li><li>• There is concern that some carbon offsets, like tree-planting projects, <b>do not always deliver long-term carbon sequestration</b> benefits.</li></ul> <p>Despite these challenges, carbon credits remain a key tool in <b>global climate policy</b>, helping industries transition towards <b>net-zero emissions</b> by encouraging emission reductions and investments in <b>low-carbon technologies</b>.</p>
<b>Carbon Cycle</b>	<p>The <b>carbon cycle</b> refers to the continuous movement of carbon through various natural reservoirs, including the <b>atmosphere, terrestrial biosphere (plants, soil, and freshwater systems), oceans, and geological formations such as sediments and fossil fuels</b>. This cycle plays a crucial role in regulating Earth's climate and sustaining life by <b>exchanging carbon among these reservoirs through chemical, physical, geological, and biological processes</b>.</p> <p><b>Key Components of the Carbon Cycle:</b></p> <ol style="list-style-type: none"><li>1. <b>Atmospheric Carbon:</b> Carbon exists in the atmosphere primarily as <b>carbon dioxide (CO<sub>2</sub>)</b> and <b>methane (CH<sub>4</sub>)</b>, both of which are greenhouse gases influencing global temperatures.</li><li>2. <b>Terrestrial Biosphere:</b> Plants absorb atmospheric CO<sub>2</sub> through <b>photosynthesis</b>, converting it into organic matter, which then moves through the food chain. Carbon is returned to the atmosphere via <b>respiration, decomposition, and combustion</b> (e.g., wildfires or fossil fuel burning).</li></ol>

	<p>3. <b>Oceans:</b> The <b>largest active carbon reservoir</b> near Earth's surface, oceans absorb CO<sub>2</sub> from the atmosphere. Some of this carbon is used by marine organisms, while the rest is stored in deep-sea sediments.</p> <p>4. <b>Geological Carbon Storage:</b> Over long timescales, carbon is locked away in <b>sedimentary rocks, fossil fuels, and limestone deposits</b>, eventually returning to the cycle through <b>volcanic activity, weathering, or human extraction and combustion of fossil fuels</b>.</p> <p><b>Carbon Cycle and Climate Change:</b></p> <ul style="list-style-type: none"> <li>• <b>Anthropogenic activities</b>, such as burning fossil fuels and deforestation, <b>disrupt the natural carbon balance</b>, leading to an excess of CO<sub>2</sub> in the atmosphere.</li> <li>• Increased CO<sub>2</sub> levels contribute to <b>global warming</b> and <b>ocean acidification</b>, affecting ecosystems and climate patterns.</li> <li>• Restoring balance requires <b>carbon sequestration efforts</b>, such as afforestation, soil conservation, and carbon capture technologies.</li> </ul> <p>The <b>carbon cycle</b> is fundamental to Earth's climate system, and understanding its processes is essential for <b>mitigating climate change</b> and ensuring a sustainable future.</p>
<b>Carbon Dioxide</b>	<p><b>Carbon dioxide (CO<sub>2</sub>)</b> is a naturally occurring gas that plays a crucial role in Earth's <b>carbon cycle and climate system</b>. It is produced through <b>natural processes</b> such as <b>respiration, volcanic eruptions, and organic decomposition</b>. However, human activities, particularly the <b>burning of fossil fuels (coal, oil, and natural gas), deforestation, land-use changes, and industrial processes</b>, have significantly increased its concentration in the atmosphere.</p> <p><b>Role in Climate Change:</b></p> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> is the <b>primary anthropogenic greenhouse gas (GHG)</b> responsible for <b>global warming</b>, as it <b>traps heat</b> within Earth's atmosphere, disrupting the planet's radiative balance.</li> <li>• It serves as the <b>benchmark</b> for comparing the warming impact of other greenhouse gases and has a <b>Global Warming Potential (GWP) of 1</b>.</li> <li>• The rise in atmospheric CO<sub>2</sub> levels, mainly due to <b>energy consumption, transportation, and industrial activities</b>, is a key driver of <b>climate change</b>.</li> </ul> <p><b>Sources of Carbon Dioxide Emissions:</b></p> <ul style="list-style-type: none"> <li>• <b>Fossil Fuel Combustion:</b> The largest source, accounting for <b>over 75% of global GHG emissions</b>, from both <b>stationary (power plants, factories) and mobile (vehicles, airplanes) sources</b>.</li> <li>• <b>Deforestation &amp; Land-Use Changes:</b> Reduces the ability of ecosystems to absorb CO<sub>2</sub>, contributing to increased atmospheric levels.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Industrial &amp; Agricultural Processes:</b> Includes <b>cement production, chemical manufacturing, and biomass burning.</b></li> </ul> <p>As CO<sub>2</sub> levels continue to rise, urgent <b>climate action</b> is necessary to <b>limit global temperature increases</b> and ensure a sustainable future.</p>
<b>Carbon Dioxide Equivalent (CO<sub>2</sub>e)</b>	<p><b>Carbon Dioxide Equivalent (CO<sub>2</sub>e)</b> is a <b>standardized metric</b> used to compare the warming impact of different <b>greenhouse gases (GHGs)</b> by expressing them in terms of <b>carbon dioxide (CO<sub>2</sub>)</b>. Since various GHGs—such as <b>methane (CH<sub>4</sub>)</b>, <b>nitrous oxide (N<sub>2</sub>O)</b>, and <b>fluorinated gases</b>—have different <b>Global Warming Potentials (GWP)</b>, CO<sub>2</sub>e provides a <b>common unit</b> to quantify their contribution to climate change.</p> <p><b>How CO<sub>2</sub>e is Calculated:</b></p> <p>The <b>CO<sub>2</sub>e value</b> of a greenhouse gas is determined by multiplying the <b>amount of the gas emitted</b> by its <b>GWP</b>, which measures how much heat a gas traps in the atmosphere relative to CO<sub>2</sub> over a specific time frame (typically 100 years).</p> <p>CO<sub>2</sub>e = (Mass of Greenhouse Gas) × (GWP of the Gas)  CO<sub>2</sub>e = (Mass of Greenhouse Gas) \times (GWP of the Gas)  CO<sub>2</sub>e= (Mass of Greenhouse Gas) × (GWP of the Gas)</p> <p>For example:</p> <ul style="list-style-type: none"> <li>● <b>Methane (CH<sub>4</sub>)</b> has a <b>GWP of ~28-30</b>, meaning 1 ton of CH<sub>4</sub> has the same warming effect as <b>28-30 tons of CO<sub>2</sub></b>.</li> <li>● <b>Nitrous Oxide (N<sub>2</sub>O)</b> has a <b>GWP of ~265-298</b>, making it far more potent than CO<sub>2</sub>.</li> </ul> <p><b>Significance of CO<sub>2</sub>e in Climate Policy:</b></p> <ul style="list-style-type: none"> <li>● Used in <b>climate reporting, carbon accounting, and emissions trading</b> to <b>standardize emissions calculations</b> across industries.</li> <li>● Helps set <b>emission reduction targets</b> under agreements like the <b>Paris Agreement and Kyoto Protocol</b>.</li> <li>● Facilitates <b>carbon pricing mechanisms</b>, including <b>carbon taxes and cap-and-trade systems</b>, by ensuring fair comparisons across different pollutants.</li> </ul> <p>By using CO<sub>2</sub>e as a unified metric, policymakers and businesses can <b>assess the true climate impact</b> of different emissions sources and take informed steps toward <b>reducing global warming</b>.</p>
<b>Carbon Dioxide Fertilization</b>	<p>Carbon dioxide fertilization refers to the <b>stimulated growth of plants</b> caused by an increase in atmospheric CO<sub>2</sub> levels. Different types of plants respond to higher CO<sub>2</sub> concentrations based on their <b>photosynthesis mechanisms</b>, with some being more sensitive to changes in CO<sub>2</sub> than others.</p>
<b>Carbon dioxide removal (CDR) and sequestration</b>	<p><b>Carbon dioxide removal (CDR)</b> refers to processes that capture carbon dioxide directly from the atmosphere to prevent it from contributing to the greenhouse effect. When this captured carbon is stored for the long term, it is called carbon sequestration. Carbon sequestration can occur naturally, as biological processes store large amounts of carbon dioxide in ecosystems like soil, oceans, forests, and grasslands. It can also be achieved through human-made methods, such as carbon capture and storage (CCS) technologies. Both CDR and sequestration are critical tools in mitigating climate change. The IPCC emphasizes that CDR is essential for limiting global warming to</p>

	<p>1.5°C, particularly in sectors that are challenging to decarbonize, such as industry, long-distance transportation, and agriculture. CDR also plays a central role in many national net-zero strategies.</p>
<b>Carbon Finance</b>	<p>Carbon finance is a rapidly evolving field within environmental finance that focuses on the economic and financial dimensions of reducing greenhouse gas (GHG) emissions. As global efforts to combat climate change intensify, carbon finance plays a crucial role in shaping financial strategies for a world that increasingly imposes constraints on carbon emissions.</p> <p>At its core, carbon finance addresses the financial mechanisms and market-based approaches that facilitate the reduction of carbon dioxide (CO<sub>2</sub>) and other GHG emissions. This includes investment in emission reduction projects, such as renewable energy initiatives, energy efficiency programs, reforestation efforts, and carbon capture technologies. These projects generate carbon credits or offsets, which can be bought, sold, and traded in regulated and voluntary carbon markets.</p> <p>Additionally, carbon finance involves the development and trading of financial instruments tied to carbon emissions, such as carbon allowances, carbon credits, and emission reduction certificates. These instruments enable businesses, governments, and investors to participate in carbon trading schemes, helping them comply with environmental regulations or achieve sustainability goals while fostering a transition to a low-carbon economy.</p> <p>Overall, carbon finance is an essential tool for leveraging financial resources to support climate action, incentivizing businesses to adopt cleaner technologies, and promoting sustainable economic growth in a carbon-conscious world.</p>
<b>Carbon Footprint</b>	<p>A carbon footprint refers to the total volume of greenhouse gases (GHGs) released into the atmosphere as a result of the activities of an individual, household, building, organization, or company over a specific period, typically a year. It encompasses both direct and indirect emissions, offering a comprehensive measure of the environmental impact of human actions.</p> <p>Direct emissions stem from the combustion of fossil fuels for transportation, heating, and other personal or business activities, such as driving a car or using gas-powered appliances. Indirect emissions, on the other hand, arise from the production and supply chain of goods and services consumed, including the generation of electricity, manufacturing of products, waste disposal in landfills, and agricultural activities.</p> <p>An individual's carbon footprint is influenced by factors such as diet, travel choices, purchasing habits, and energy consumption. Similarly, the carbon footprint of an organization, event, or product represents the total greenhouse gas emissions generated throughout its lifecycle, from production and distribution to use and disposal.</p> <p>By understanding and measuring carbon footprints, individuals and businesses can take informed steps to reduce their environmental impact through sustainable practices such as energy efficiency, renewable energy adoption, and responsible consumption.</p>
<b>Carbon Intensity</b>	<p>Carbon intensity refers to the quantity of carbon dioxide (CO<sub>2</sub>) emissions produced per unit of Gross Domestic Product (GDP). It serves as a key indicator of an economy's environmental efficiency, measuring how much carbon is emitted relative to economic output. Lower</p>

	carbon intensity signifies a more sustainable and energy-efficient economy, while higher carbon intensity indicates greater reliance on carbon-intensive processes. Reducing carbon intensity is essential for achieving climate goals and transitioning to a low-carbon economy.
<b>Carbon Leakage</b>	<p><b>Carbon leakage</b> refers to the situation where efforts to reduce greenhouse gas (GHG) emissions in countries with strict climate policies (<b>Annex B countries</b>) are counteracted by an increase in emissions in countries with less stringent or no emissions constraints. This phenomenon undermines global climate efforts by shifting emissions rather than reducing them.</p> <p>Carbon leakage can occur in several ways:</p> <ol style="list-style-type: none"> <li>1. <b>Relocation of energy-intensive industries</b> – Companies may move production to countries with weaker environmental regulations to avoid higher carbon costs.</li> <li>2. <b>Increased fossil fuel consumption</b> – A decline in demand for oil and gas in regulated regions can lead to lower global prices, making fossil fuels more affordable and increasing their use in unregulated regions.</li> <li>3. <b>Economic shifts affecting energy demand</b> – Improved trade conditions for non-constrained countries can boost income levels, leading to higher energy consumption and emissions.</li> </ol> <p>Addressing carbon leakage is crucial for ensuring that climate policies effectively reduce global emissions rather than merely redistributing them.</p>
<b>Carbon market</b>	<p>The <b>carbon market</b>, also known as an <b>emissions trading system (ETS)</b>, is a market-based mechanism that allows countries, businesses, and organizations to buy and sell permits for carbon dioxide (CO<sub>2</sub>) emissions, commonly referred to as <b>carbon credits</b> or <b>pollution allowances</b>.</p> <p>Under a carbon trading system, a government or regulatory body sets a cap on the total allowable emissions. Entities that emit less than their allocated limit can sell their surplus carbon allowances to those exceeding their emission limits. This creates a financial incentive for companies to adopt cleaner technologies and reduce emissions, as selling unused allowances can generate revenue.</p> <p>Carbon markets function in two main forms:</p> <ol style="list-style-type: none"> <li>1. <b>Compliance Markets</b> – Mandated by regulations, where companies must participate to meet government-imposed emissions limits.</li> <li>2. <b>Voluntary Markets</b> – Where businesses and individuals buy carbon offsets to reduce their carbon footprint voluntarily.</li> </ol> <p>By setting a <b>cap-and-trade</b> system, carbon markets encourage cost-effective emission reductions and play a crucial role in combating climate change.</p>
<b>Carbon Monoxide (CO)</b>	<b>Carbon monoxide (CO)</b> , also known as <b>carbonous oxide</b> , is a <b>colourless, odourless, and tasteless gas</b> that is slightly lighter than air. While it is highly toxic to humans and animals in high concentrations, it is also naturally produced in small amounts during normal metabolic

	<p>processes in the body and is believed to have certain biological functions. However, excessive exposure to carbon monoxide can be dangerous, as it interferes with oxygen transport in the bloodstream, leading to severe health risks.</p>
<b>Carbon Offset</b>	<p>A <b>carbon offset</b> is a mechanism that allows individuals and businesses to <b>compensate for their greenhouse gas (GHG) emissions</b> by purchasing credits linked to emission reduction projects. Instead of directly reducing their own emissions, they <b>offset</b> them by funding activities that remove or prevent carbon dioxide (CO<sub>2</sub>) from entering the atmosphere.</p> <p><b>How Carbon Offsets Work:</b></p> <ul style="list-style-type: none"> <li>• Companies or organizations that engage in carbon reduction activities—such as <b>planting trees, investing in renewable energy, or improving energy efficiency</b>—can generate carbon offset credits.</li> <li>• These credits can then be <b>sold or traded</b> to businesses or individuals looking to "neutralize" their carbon footprint from high-emission activities, such as air travel or industrial production.</li> <li>• Individuals can also participate by <b>donating to carbon removal projects</b>, such as reforestation or sustainable energy initiatives.</li> </ul> <p><b>Controversy Surrounding Carbon Offsets:</b> While carbon offsets are intended to support climate action, they are <b>highly debated</b>. Critics argue that they allow wealthy countries, companies, and individuals to <b>continue polluting</b> rather than making real emissions reductions. Additionally, concerns have been raised about the <b>transparency, effectiveness, and actual climate impact</b> of some offset projects, with some claiming their environmental benefits are overstated.</p> <p>Despite these challenges, carbon offsets remain a widely used tool in global climate strategies, especially when paired with meaningful emission reduction efforts.</p>
<b>Carbon Pools</b>	<p>A <b>carbon pool</b> refers to a <b>natural reservoir that stores and regulates carbon</b> over time, with the ability to either <b>accumulate or release carbon</b> depending on environmental conditions. In the context of <b>Agriculture, Forestry, and Other Land Use (AFOLU)</b>, carbon pools include:</p> <ul style="list-style-type: none"> <li>• <b>Aboveground biomass</b> – Carbon stored in trees, plants, and vegetation.</li> <li>• <b>Belowground biomass</b> – Carbon contained in roots and underground plant material.</li> <li>• <b>Litter</b> – Organic matter, such as fallen leaves and decomposing plant material.</li> <li>• <b>Dead wood</b> – Carbon held in decaying branches and tree trunks.</li> <li>• <b>Soil organic carbon</b> – Carbon stored within soil, derived from decomposed plant and animal matter.</li> </ul> <p>These carbon pools play a crucial role in the global <b>carbon cycle</b>, influencing climate change by either <b>sequestering carbon (absorbing CO<sub>2</sub> from the atmosphere)</b> or <b>releasing it through decomposition, land-use changes, and deforestation</b>.</p>

<b>Carbon Rights</b>	<p><b>Carbon rights</b> refer to a <b>legal entitlement</b> that grants the holder the <b>exclusive benefit of carbon sequestration</b> on a specific piece of forested land. This emerging concept in environmental law allows individuals, organizations, or governments to <b>own, trade, or profit</b> from the carbon absorption capacity of forests and other ecosystems. These rights play a crucial role in <b>carbon trading markets</b> and climate mitigation strategies, as they define who can claim and sell carbon credits generated from forest conservation and reforestation efforts.</p>
<b>Carbon Sequestration</b>	<p><b>Carbon sequestration</b> is the process of <b>capturing and storing carbon dioxide (CO<sub>2</sub>)</b> to reduce its atmospheric concentration and mitigate climate change. This process can occur through <b>natural or engineered methods</b> and is essential for managing greenhouse gas emissions.</p> <p><b>Types of Carbon Sequestration:</b></p> <ol style="list-style-type: none"> <li>1. <b>Terrestrial (Biological) Sequestration</b> <ul style="list-style-type: none"> <li>○ Trees, plants, and vegetation <b>absorb CO<sub>2</sub></b> from the atmosphere through photosynthesis, <b>release oxygen</b>, and store carbon in their biomass and soil.</li> <li>○ Forests, wetlands, and grasslands act as <b>carbon sinks</b>, helping to naturally regulate atmospheric CO<sub>2</sub> levels.</li> <li>○ Soils store both <b>inorganic carbon</b> (calcium carbonate) and <b>organic carbon</b> (humus), and their ability to act as a <b>carbon sink or source</b> depends on land management practices.</li> </ul> </li> <li>2. <b>Geological Sequestration</b> <ul style="list-style-type: none"> <li>○ A key component of <b>carbon capture and storage (CCS)</b>, this method involves <b>injecting CO<sub>2</sub> deep underground</b> into rock formations or depleted oil and gas reservoirs, where it is permanently stored.</li> <li>○ This approach prevents CO<sub>2</sub> from re-entering the atmosphere and is considered a long-term solution for industrial emissions.</li> </ul> </li> <li>3. <b>Oceanic Sequestration</b> <ul style="list-style-type: none"> <li>○ The <b>oceans naturally absorb CO<sub>2</sub></b>, storing it in water and marine organisms.</li> <li>○ Large marine species, such as whales, contribute to carbon sequestration—when they die, their bodies sink to the ocean floor, storing carbon for centuries.</li> <li>○ Some proposed methods involve <b>injecting CO<sub>2</sub> into deep-sea waters</b>, where it would be trapped under high pressure.</li> </ul> </li> </ol> <p><b>The Role of Carbon Sinks</b></p> <ul style="list-style-type: none"> <li>● A <b>carbon sink</b> is any system that <b>absorbs more carbon</b> than it releases, such as forests, soils, and oceans.</li> <li>● A <b>carbon source</b> is anything that <b>emits more carbon</b> than it absorbs, such as burning fossil fuels or deforestation.</li> </ul>

	<p>Since <b>even small changes in carbon storage</b>—particularly in soil and oceans—can have significant impacts on atmospheric CO<sub>2</sub> levels, <b>protecting and enhancing natural carbon sinks</b> is a critical part of climate mitigation strategies.</p>
<b>Carbon Sink</b>	<p>A <b>carbon sink</b> is a <b>carbon reservoir that absorbs more carbon dioxide (CO<sub>2</sub>) than it releases</b>, leading to an overall increase in stored carbon. This process helps regulate greenhouse gas levels in the atmosphere, playing a vital role in mitigating climate change.</p> <p><b>Types of Carbon Sinks:</b></p> <ul style="list-style-type: none"> <li>• <b>Natural Carbon Sinks</b> – Forests, oceans, soil, peatlands, and wetlands naturally <b>absorb and store CO<sub>2</sub></b>, helping to balance atmospheric carbon levels.</li> <li>• <b>Artificial Carbon Sinks – Carbon Capture and Storage (CCS)</b> technologies can <b>trap and store CO<sub>2</sub> emissions</b> from industrial processes, preventing them from entering the atmosphere.</li> </ul> <p>A carbon pool functions as a <b>carbon sink</b> when, over a given period, it absorbs more carbon than it emits. Protecting and enhancing these sinks is crucial for <b>reducing global CO<sub>2</sub> levels</b> and combating climate change.</p>
<b>Carbon stock</b>	<p><b>Carbon stock</b> refers to the <b>amount of carbon stored in a reservoir or pool</b> that has the potential to either accumulate or release carbon over time. It represents the total carbon content held within a system, such as forests, soils, oceans, or biomass.</p> <p>Carbon stock is typically <b>measured in metric tons of CO<sub>2</sub></b> and serves as an important indicator for assessing carbon sequestration potential and monitoring climate change impacts. Maintaining or increasing carbon stocks in natural ecosystems helps reduce atmospheric CO<sub>2</sub> levels and supports global climate mitigation efforts.</p>
<b>Carbon Substitution</b>	<p><b>Carbon substitution</b> refers to the <b>replacement of carbon-intensive materials or fossil fuels</b> with more sustainable, low-carbon alternatives. This can involve:</p> <ul style="list-style-type: none"> <li>• <b>Using harvested sustainable wood products</b> instead of materials like concrete or steel, which have higher carbon footprints.</li> <li>• <b>Replacing fossil fuels with biofuels</b> or other renewable energy sources to reduce greenhouse gas emissions.</li> </ul> <p>Carbon substitution is a key strategy for <b>reducing carbon emissions</b> and promoting a transition to a more sustainable, low-carbon economy.</p>
<b>Carbonaceous Aerosol</b>	<p>A <b>carbonaceous aerosol</b> is a type of <b>airborne particulate matter</b> composed mainly of <b>organic compounds and different forms of black carbon</b>. These aerosols originate from sources such as biomass burning, fossil fuel combustion, and natural processes. They play a significant role in <b>atmospheric chemistry, air pollution, and climate change</b> by affecting cloud formation, air quality, and solar radiation absorption.</p>



<b>Carrying Capacity</b>	<b>Carrying capacity</b> refers to the <b>maximum population size of a biological species</b> that an environment can support indefinitely. This is determined by the <b>availability of essential resources</b> such as food, water, habitat, and other ecological factors. When a population exceeds its carrying capacity, resource depletion and environmental stress can lead to population decline or ecosystem imbalance.
<b>Catastrophic Event</b>	A <b>catastrophic event</b> is a <b>sudden, large-scale climate-related occurrence</b> that has <b>widespread and severe impacts</b> on human or natural systems. These events may include <b>rapid sea-level rise</b> or <b>abrupt shifts in atmospheric or oceanic circulation patterns</b> occurring within a decade or less. Such events have historically taken place due to natural causes and can lead to significant environmental and societal disruptions.
<b>Catchment</b>	A <b>catchment</b> is an area of land where <b>rainwater collects and drains into a common water body</b> , such as a river, lake, or reservoir. It plays a crucial role in managing water flow, supporting ecosystems, and replenishing groundwater resources.
<b>Certified Emission Reductions (CERs)</b>	<p><b>Certified Emission Reductions (CERs)</b> are <b>carbon credits</b> issued by the <b>Clean Development Mechanism (CDM) Executive Board</b> under the <b>Kyoto Protocol</b> for verified greenhouse gas (GHG) reductions achieved through CDM projects. These credits are categorized as either <b>long-term (lCER)</b> or <b>temporary (tCER)</b> based on the expected duration of their climate benefits.</p> <p>CERs can be traded in two markets:</p> <ul style="list-style-type: none"> <li>• <b>Primary Market</b> – Purchased directly from the entity responsible for the emission reduction.</li> <li>• <b>Secondary Market</b> – Resold through a marketplace or exchange.</li> </ul> <p>CERs enable countries and businesses to meet emission reduction targets while supporting sustainable development initiatives.</p>
<b>CFCs (chlorofluorocarbons)</b>	<p><b>Chlorofluorocarbons (CFCs)</b> are <b>synthetic gases composed of carbon, chlorine, and fluorine</b>, historically used in <b>refrigeration, air conditioning, insulation, solvents, and aerosol propellants</b>. Due to their <b>stability in the lower atmosphere</b>, CFCs gradually drift into the upper atmosphere, where they <b>break down the ozone layer</b>, reducing Earth's natural protection against harmful ultraviolet (UV) radiation.</p> <p>Recognizing their environmental impact, the <b>Montreal Protocol of 1987</b> mandated a <b>global phase-out of CFCs</b>, leading to their replacement with alternative compounds:</p> <ul style="list-style-type: none"> <li>• <b>Hydrochlorofluorocarbons (HCFCs)</b> – Transitional replacements for CFCs, also regulated under the Montreal Protocol.</li> <li>• <b>Hydrofluorocarbons (HFCs)</b> – Alternative compounds regulated under the <b>Kyoto Protocol</b>, though they still contribute to global warming as greenhouse gases.</li> </ul> <p>While CFCs have been largely phased out, their long-lasting effects on the ozone layer and climate remain a significant concern.</p>
<b>Circular economy</b>	A <b>circular economy</b> is an economic system designed to <b>minimize waste, maximize resource efficiency, and promote sustainability</b> by keeping materials and products in use for as long as possible. Unlike the <b>linear economy</b> , which follows a " <b>take, make, dispose</b> " model—

	<p>where resources are extracted, used, and discarded—a circular economy focuses on <b>reducing, reusing, repairing, refurbishing, and recycling</b> materials to create a <b>closed-loop system</b>.</p> <p><b>Key Principles of a Circular Economy:</b></p> <ol style="list-style-type: none"> <li>1. <b>Design for Longevity &amp; Reuse</b> – Products are designed to last longer, be repairable, and be reused instead of discarded.</li> <li>2. <b>Waste as a Resource</b> – Waste materials are repurposed, recycled, or transformed into new products, reducing environmental impact.</li> <li>3. <b>Regenerative Practices</b> – Natural ecosystems are restored and enhanced rather than degraded.</li> <li>4. <b>Renewable Energy Use</b> – Reliance on fossil fuels is reduced by integrating sustainable energy sources into production systems.</li> <li>5. <b>Resource Efficiency</b> – Optimizing the use of raw materials, water, and energy to minimize unnecessary consumption.</li> </ol> <p>By shifting toward a <b>circular economy</b>, societies can move away from excessive resource depletion and environmental harm, fostering a <b>more sustainable and regenerative</b> future.</p>
<b>City Climate</b>	<p><b>City climate</b> refers to the <b>distinct climatic characteristics of inland areas within large landmasses</b>, typically exhibiting:</p> <ul style="list-style-type: none"> <li>• <b>Wide temperature variations</b> – Significant fluctuations in temperature on an annual, daily, and even hourly basis.</li> <li>• <b>Low relative humidity</b> – Drier air conditions compared to coastal regions.</li> <li>• <b>Moderate to irregular rainfall</b> – Precipitation patterns that may be inconsistent or sporadic.</li> <li>• <b>Extreme seasonal temperatures</b> – High summer heat and cold winter temperatures, with extremes occurring soon after the solstices.</li> </ul> <p>This climate type is influenced by the <b>distance from large water bodies</b>, resulting in <b>greater thermal contrast</b> between seasons and less temperature moderation compared to coastal regions.</p>
<b>Clean Development Mechanism (CDM)</b>	<p>The <b>Clean Development Mechanism (CDM)</b> is a program established under the <b>Kyoto Protocol</b> of the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> that enables <b>greenhouse gas (GHG) reduction projects</b> to be carried out in <b>developing countries</b> that do not have binding emission targets. These projects generate <b>Certified Emission Reductions (CERs)</b>, which can be credited to <b>industrialized nations</b> with emission reduction commitments, helping them meet their targets while promoting <b>sustainable development</b> in the host country.</p> <p><b>Objectives of the CDM (Article 12 of the Kyoto Protocol):</b></p> <ol style="list-style-type: none"> <li>1. <b>Support Sustainable Development</b> – Assist <b>Non-Annex I countries</b> (developing nations) in achieving economic and environmental sustainability.</li> </ol>

	<p>2. <b>Help Industrialized Countries Meet Emission Targets</b> – Enable <b>Annex I countries</b> (developed nations) to fulfil their <b>quantified emission limitation and reduction commitments</b> through CDM projects.</p> <p><b>How CDM Works:</b></p> <ul style="list-style-type: none"> <li>• <b>Developed countries (Annex I nations)</b> invest in <b>GHG reduction or removal projects</b> in <b>developing countries (Non-Annex I nations)</b>.</li> <li>• These projects, once certified by designated operational entities, generate <b>CERs</b> (Certified Emission Reduction Units).</li> <li>• The <b>investing country</b> (government or industry) can use these <b>CERs to offset their own emissions</b> and comply with their mandatory emission reduction targets.</li> <li>• A <b>portion of the proceeds</b> from CDM projects is allocated to supporting climate adaptation efforts in <b>vulnerable developing countries</b>.</li> </ul> <p>The <b>CDM</b> serves as a <b>market-based mechanism</b> that encourages international cooperation, promotes <b>clean energy solutions</b>, and supports <b>climate change mitigation efforts</b> globally.</p>
<b>Climate</b>	<p>In a <b>narrow sense</b>, <b>climate</b> is defined as the "<b>average weather</b>" over a long period, typically measured in terms of <b>mean values and variability</b> of key atmospheric conditions such as <b>temperature, precipitation, and wind</b>. According to the <b>World Meteorological Organization (WMO)</b>, the standard reference period for climate studies is <b>30 years</b>, though climate patterns can be analyzed over timescales ranging from <b>months to thousands or even millions of years</b>.</p> <p>In a <b>broader sense</b>, climate encompasses not only <b>long-term weather patterns</b> but also a <b>statistical description of the entire climate system</b>, including interactions between the <b>atmosphere, oceans, land surfaces, and ice masses</b>. Understanding climate is essential for assessing <b>long-term environmental changes, predicting future trends, and formulating climate adaptation and mitigation strategies</b>.</p>
<b>Climate Change</b>	<p><b>Climate change</b> refers to <b>long-term alterations in global or regional climate patterns</b>, including <b>changes in temperature, precipitation, and wind patterns</b> that persist for <b>decades or longer</b>. While natural factors such as <b>volcanic activity and solar radiation</b> can influence climate variability, modern climate change is largely driven by <b>human activities</b>, particularly the <b>burning of fossil fuels (coal, oil, and gas)</b>, deforestation, and industrial emissions.</p> <p><b>Causes of Climate Change:</b></p> <ol style="list-style-type: none"> <li>1. <b>Greenhouse Gas Emissions</b> – The excessive release of <b>carbon dioxide (CO<sub>2</sub>)</b>, <b>methane (CH<sub>4</sub>)</b>, and <b>nitrous oxide (N<sub>2</sub>O)</b> traps heat in the Earth's atmosphere, intensifying the <b>greenhouse effect</b>.</li> <li>2. <b>Deforestation</b> – The large-scale clearing of forests reduces the planet's ability to absorb CO<sub>2</sub>, further accelerating warming.</li> </ol>

	<p>3. <b>Industrial and Agricultural Activities</b> – The expansion of industries, transportation, and agriculture contributes significantly to rising greenhouse gas levels.</p> <p><b>Impacts of Climate Change:</b></p> <ul style="list-style-type: none"> <li>● <b>Rising global temperatures</b> leading to heatwaves and altered weather patterns.</li> <li>● <b>Increased frequency and intensity of extreme weather events</b> such as hurricanes, droughts, and wildfires.</li> <li>● <b>Melting polar ice caps and glaciers</b>, contributing to <b>rising sea levels</b> and coastal erosion.</li> <li>● <b>Disruptions in ecosystems and biodiversity loss</b>, affecting wildlife and food security.</li> <li>● <b>Shifts in rainfall patterns</b>, causing floods in some regions and prolonged droughts in others.</li> </ul> <p><b>Climate Change vs. Climate Variability:</b></p> <p>The <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> distinguishes between:</p> <ul style="list-style-type: none"> <li>● <b>Climate Change</b> – Refers specifically to <b>human-induced changes</b> in the climate system.</li> <li>● <b>Climate Variability</b> – Covers <b>natural fluctuations</b> in climate over shorter timeframes.</li> </ul> <p>Addressing climate change requires <b>global cooperation, policy interventions, and sustainable practices</b> to mitigate its impacts and adapt to an evolving environment.</p>
<b>Climate change adaptation</b>	<p><b>Climate change adaptation</b> refers to the <b>adjustments made by societies, ecosystems, and economies to minimize the negative impacts</b> of climate change or <b>leverage new opportunities</b> arising from changing climatic conditions. These adaptations can be <b>proactive or reactive</b>, helping communities and ecosystems <b>cope with current and future climate risks</b>.</p> <p><b>Examples of Climate Change Adaptation:</b></p> <ul style="list-style-type: none"> <li>● <b>Agricultural Adaptation:</b> Farmers adopting <b>drought-resistant crops</b>, improving irrigation techniques, and diversifying crops to withstand extreme weather.</li> <li>● <b>Coastal Protection:</b> Communities implementing <b>sea walls, mangrove restoration, and flood management systems</b> to combat rising sea levels.</li> <li>● <b>Urban Planning:</b> Designing <b>heat-resistant infrastructure, green spaces, and improved drainage systems</b> to manage extreme weather events.</li> <li>● <b>Water Resource Management:</b> Developing <b>efficient water conservation policies</b> and enhancing reservoir systems to handle changing precipitation patterns.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Ecosystem-Based Adaptation:</b> Preserving and restoring <b>forests, wetlands, and coral reefs</b> to enhance <b>natural climate resilience</b>.</li> </ul> <p><b>Why is Climate Change Adaptation Important?</b></p> <ul style="list-style-type: none"> <li>● <b>Reduces climate-related risks</b> such as extreme heat, storms, and rising sea levels.</li> <li>● <b>Protects vulnerable communities and economies</b> from climate disruptions.</li> <li>● <b>Enhances food and water security</b> by improving resource management.</li> <li>● <b>Supports biodiversity and ecosystem health</b>, ensuring natural resilience.</li> </ul> <p>Climate change adaptation is <b>an essential strategy alongside mitigation efforts</b>, ensuring that societies can <b>withstand and thrive</b> in a rapidly changing climate.</p>
<b>Climate Change Adaptation Strategy</b>	<p>A <b>Climate Change Adaptation Strategy</b> is a <b>framework or action plan</b> developed by a country to address the <b>impacts of climate change</b>, including <b>climate variability and extreme weather events</b>. It outlines <b>policies, measures, and initiatives</b> aimed at <b>reducing vulnerability</b> and enhancing <b>resilience</b> across different sectors, regions, and populations.</p> <p><b>Key Features of an Adaptation Strategy:</b></p> <ul style="list-style-type: none"> <li>● <b>Comprehensive or Sector-Specific Approach</b> – Can be a <b>nationwide strategy</b> covering multiple sectors (e.g., agriculture, water resources, infrastructure) or <b>targeted at specific regions or industries</b> most affected by climate change.</li> <li>● <b>Policy and Institutional Framework</b> – Incorporates <b>legislative actions, funding mechanisms, and governance structures</b> to support adaptation efforts.</li> <li>● <b>Risk Assessment and Planning</b> – Identifies <b>climate risks</b> and develops <b>proactive solutions</b> to mitigate them.</li> <li>● <b>Integration with Sustainable Development</b> – Ensures adaptation measures align with broader <b>economic, environmental, and social goals</b>.</li> </ul> <p><b>Examples of Adaptation Strategies:</b></p> <ul style="list-style-type: none"> <li>● <b>Developing resilient infrastructure</b> to withstand extreme weather events.</li> <li>● <b>Implementing early warning systems</b> for floods, storms, and droughts.</li> <li>● <b>Promoting climate-smart agriculture</b> and sustainable water management.</li> <li>● <b>Strengthening coastal defenses</b> against rising sea levels.</li> <li>● <b>Enhancing community awareness and disaster preparedness</b>.</li> </ul>

	<p>A well-designed <b>Climate Change Adaptation Strategy</b> helps nations <b>build resilience, protect livelihoods, and safeguard ecosystems</b> in the face of a changing climate.</p>
<p><b>Climate Change Impact Assessment</b></p>	<p>A <b>Climate Change Impact Assessment</b> is the <b>systematic evaluation of the positive and negative effects</b> of climate change on <b>natural ecosystems and human societies</b>, considering both <b>adaptation and non-adaptation scenarios</b>. It examines how changing climate patterns—such as rising temperatures, altered precipitation, and extreme weather events—<b>affect biodiversity, human health, economies, and infrastructure</b>, even in areas not directly linked to market transactions (e.g., increased risk of disease or premature death).</p> <p><b>Key Aspects of Climate Change Impact Assessment:</b></p> <ul style="list-style-type: none"> <li>● <b>Environmental Impacts:</b> Effects on <b>ecosystems, biodiversity, water resources, and agricultural productivity</b>.</li> <li>● <b>Human Health and Welfare:</b> Increased risks of <b>heat-related illnesses, disease outbreaks, and food and water insecurity</b>.</li> <li>● <b>Economic Consequences:</b> Disruptions to <b>agriculture, industries, and supply chains</b> due to climate-related changes.</li> <li>● <b>Infrastructure and Urban Systems:</b> Damage to <b>buildings, roads, and energy systems</b> from rising sea levels, storms, and extreme weather.</li> <li>● <b>Social and Cultural Impacts:</b> Displacement of <b>communities, loss of cultural heritage, and climate-induced migration</b>.</li> </ul> <p>A <b>Climate Change Impact Assessment</b> helps policymakers, businesses, and communities <b>understand vulnerabilities, develop adaptation strategies, and build resilience</b> against future climate challenges.</p>
<p><b>Climate change Impacts</b></p>	<p><b>Climate change impacts</b> refer to the <b>effects of climate change on natural ecosystems and human societies</b>, including environmental, economic, and social consequences. These impacts can be categorized based on their scope, severity, and whether adaptation measures are considered.</p> <p><b>Types of Climate Change Impacts:</b></p> <ul style="list-style-type: none"> <li>● <b>Potential Impacts:</b> All possible effects of climate change <b>without considering adaptation measures</b>. These include shifts in temperature, altered precipitation patterns, extreme weather events, and disruptions to ecosystems and human livelihoods.</li> <li>● <b>Residual Impacts:</b> The effects that <b>persist even after adaptation efforts</b> have been implemented. Despite mitigation strategies, some damage—such as biodiversity loss, rising sea levels, and ecosystem degradation—may remain.</li> <li>● <b>Aggregate Impacts:</b> The <b>total combined effects</b> of climate change across different sectors and regions. These can be measured in terms of affected populations, economic losses, or changes in ecosystem productivity.</li> <li>● <b>Market Impacts:</b> Climate change consequences that are <b>directly tied to economic activities and market transactions</b>, such as fluctuations in agricultural production, shifts in energy demand, and changes in commodity prices that influence <b>gross domestic product (GDP)</b>.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Non-Market Impacts:</b> Effects that <b>do not directly involve market transactions</b> but significantly affect <b>human well-being and ecosystems</b>, such as increased health risks, loss of biodiversity, and environmental degradation.</li> </ul> <p><b>Key Consequences of Climate Change Impacts:</b></p> <ul style="list-style-type: none"> <li>● <b>Environmental Changes:</b> Rising temperatures, more frequent droughts, extreme weather, and habitat loss.</li> <li>● <b>Economic Disruptions:</b> Reduced agricultural yields, supply chain disruptions, and increased disaster recovery costs.</li> <li>● <b>Social and Health Risks:</b> Climate-induced migration, rising disease burdens, and increased mortality rates.</li> </ul> <p>Understanding <b>climate change impacts</b> is essential for <b>effective policy-making, risk management, and long-term sustainability planning</b> to safeguard communities and ecosystems.</p>
<b>Climate change Mainstreaming</b>	<p><b>Climate change mainstreaming</b> refers to the process of <b>incorporating climate change considerations and adaptation measures</b> into <b>existing policies, programs, and development planning</b> as a standard practice. This ensures that <b>climate risks and opportunities</b> are systematically addressed across various sectors, rather than being treated as separate or additional efforts. By <b>mainstreaming climate change</b>, governments, businesses, and communities can <b>enhance resilience, reduce vulnerability</b>, and ensure that development efforts are <b>climate-smart and future-proof</b>.</p>
<b>Climate change Mitigation</b>	<p><b>Climate change mitigation</b> refers to <b>human interventions aimed at reducing or preventing the emission of greenhouse gases (GHGs) into the atmosphere</b> and enhancing natural systems that absorb and store carbon. The goal of mitigation is to <b>slow down global warming</b> and <b>minimize the long-term effects of climate change</b> by tackling its root causes.</p> <p><b>Key Approaches to Climate Change Mitigation:</b></p> <p><b>1. Reducing Greenhouse Gas Emissions:</b></p> <ul style="list-style-type: none"> <li>● <b>Transitioning to Renewable Energy</b> – Replacing fossil fuels with <b>solar, wind, hydro, and geothermal energy</b> to generate electricity with minimal emissions.</li> <li>● <b>Enhancing Energy Efficiency</b> – Using <b>energy-efficient appliances, buildings, and industrial processes</b> to reduce overall energy consumption.</li> <li>● <b>Sustainable Transportation</b> – Promoting <b>electric vehicles (EVs), public transit, and non-motorized transport</b> to cut down emissions from fossil-fuel-based vehicles.</li> <li>● <b>Decarbonizing Industries</b> – Reducing emissions from manufacturing, construction, and heavy industries through <b>carbon capture technologies, hydrogen fuel, and cleaner production methods</b>.</li> <li>● <b>Reducing Methane and Other GHG Emissions</b> – Managing emissions from <b>agriculture (livestock, rice paddies), landfills, and oil and gas extraction</b> through improved waste management and cleaner agricultural practices.</li> </ul>

	<p><b>2. Enhancing Carbon Sequestration:</b></p> <ul style="list-style-type: none"> <li>● <b>Reforestation and Afforestation</b> – Planting trees and restoring forests to <b>absorb carbon dioxide (CO<sub>2</sub>) from the atmosphere</b>.</li> <li>● <b>Soil and Land Management</b> – Implementing <b>sustainable agriculture practices</b> like cover cropping, no-till farming, and biochar use to increase <b>carbon storage in soils</b>.</li> <li>● <b>Blue Carbon Ecosystems</b> – Protecting and restoring <b>mangroves, seagrasses, and wetlands</b>, which are highly effective in storing carbon.</li> <li>● <b>Carbon Capture and Storage (CCS)</b> – Technological solutions that <b>capture CO<sub>2</sub> emissions from power plants and industries</b> and store them underground to prevent atmospheric release.</li> </ul> <p><b>3. Policy and Economic Measures:</b></p> <ul style="list-style-type: none"> <li>● <b>Carbon Pricing and Emission Trading Schemes (ETS)</b> – Governments and organizations implement <b>carbon taxes or cap-and-trade systems</b> to financially incentivize emission reductions.</li> <li>● <b>Green Investments and Subsidies</b> – Providing financial support for <b>clean energy projects, sustainable infrastructure, and climate-friendly innovations</b>.</li> <li>● <b>Regulations and International Agreements</b> – Strengthening <b>climate policies</b> through international accords like the <b>Paris Agreement</b>, which sets emissions reduction targets for countries.</li> </ul> <p><b>Importance of Climate Change Mitigation:</b></p> <ul style="list-style-type: none"> <li>● <b>Reduces Global Temperature Rise</b> – Helps limit warming to <b>below 1.5°C–2°C</b>, preventing severe climate consequences.</li> <li>● <b>Minimizes Extreme Weather Events</b> – Decreases the frequency and intensity of <b>droughts, hurricanes, wildfires, and heatwaves</b>.</li> <li>● <b>Protects Biodiversity and Ecosystems</b> – Reduces stress on <b>forests, oceans, and wildlife</b> by stabilizing climatic conditions.</li> <li>● <b>Improves Public Health</b> – Lowers air pollution, reducing cases of <b>respiratory diseases and heat-related illnesses</b>.</li> <li>● <b>Strengthens Economic Resilience</b> – Encourages <b>green jobs, sustainable industries, and energy security</b> while reducing economic losses from climate disasters.</li> </ul> <p>By <b>prioritizing climate change mitigation</b>, countries, businesses, and individuals can <b>contribute to a more sustainable and climate-resilient future</b> while ensuring economic growth and environmental protection.</p>
<b>Climate Change Scenario</b>	<p>A <b>climate change scenario</b> is a <b>scientifically modelled projection</b> of how the climate may evolve in the future based on <b>specific assumptions</b> about greenhouse gas (GHG) emissions, socio-economic trends, and other influencing factors. These scenarios provide a <b>coherent and internally consistent representation</b> of potential climate changes and are used to assess the possible <b>impacts, risks, and adaptation strategies</b> associated with climate change.</p>



### Key Aspects of Climate Change Scenarios:

- **Projected Climate Changes:** Climate change scenarios illustrate expected variations in **temperature, precipitation patterns, sea level rise, and extreme weather events** based on different levels of GHG emissions.
- **Comparison with Present Climate:** A climate change scenario **compares future climate conditions to the current climate**, highlighting the magnitude of change expected under different circumstances.
- **Use in Climate Impact Studies:** These scenarios serve as essential inputs for **impact assessments, adaptation planning, and policy decision-making**, helping governments and organizations prepare for potential climate shifts.
- **Derived from Climate Models:** Climate projections generated from **Global Climate Models (GCMs)** or **Regional Climate Models (RCMs)** form the basis of climate change scenarios, incorporating **historical climate data and future emission pathways**.

### Types of Climate Change Scenarios:

1. **Emission-Based Scenarios (Representative Concentration Pathways - RCPs & Shared Socioeconomic Pathways - SSPs)**
  - **Low Emission Scenarios (e.g., RCP2.6, SSP1-1.9):** Represent rapid decarbonization and strong climate policies leading to limited warming.
  - **Intermediate Scenarios (e.g., RCP4.5, SSP2-4.5):** Assume moderate emission reductions and global climate action.
  - **High Emission Scenarios (e.g., RCP8.5, SSP5-8.5):** Depict a world with continued reliance on fossil fuels, leading to extreme warming.
2. **Physical Climate Scenarios**
  - **Temperature and Precipitation Changes:** Projections of **global and regional temperature rises, shifts in precipitation patterns, and changing seasonality**.
  - **Sea Level Rise:** Anticipates future **ocean expansion and ice sheet melting**, affecting coastal communities.
  - **Extreme Weather Scenarios:** Models increases in **heatwaves, storms, floods, and droughts** due to climate shifts.

### Importance of Climate Change Scenarios:

- **Supports Decision-Making:** Helps policymakers, businesses, and communities **plan for future climate risks** and develop adaptation strategies.
- **Guides Mitigation Efforts:** Provides insights into **emission reduction targets** needed to limit global warming.
- **Enhances Climate Resilience:** Allows for **infrastructure planning, resource management, and disaster preparedness** based on projected climate impacts.

	Climate change scenarios play a <b>critical role</b> in understanding <b>potential futures</b> and ensuring societies are well-equipped to respond to <b>climate challenges</b> proactively.
<b>Climate Change Vulnerability Assessment</b>	<p>A <b>Climate Change Vulnerability Assessment (CCVA)</b> is a systematic process used to <b>identify, analyze, and evaluate</b> the degree to which a system—whether a community, ecosystem, or sector—is <b>susceptible to, and unable to cope with, the adverse impacts of climate change</b>. It helps in understanding <b>potential hazards, exposure levels, and adaptive capacity</b>, enabling informed decision-making for <b>risk reduction and resilience building</b>.</p> <p><b>Key Components of a Climate Change Vulnerability Assessment:</b></p> <ol style="list-style-type: none"> <li><b>Exposure:</b> <ul style="list-style-type: none"> <li>Identifies the <b>climate-related hazards</b> affecting a particular region or system, such as <b>rising temperatures, changing precipitation patterns, sea level rise, extreme weather events, and ecosystem shifts</b>.</li> <li>Examples: A coastal city may be highly exposed to <b>storm surges and flooding</b>, while an agricultural community may face <b>drought and heatwaves</b>.</li> </ul> </li> <li><b>Sensitivity:</b> <ul style="list-style-type: none"> <li>Assesses the <b>degree to which a system or population is affected</b> by climate hazards.</li> <li>Examples: <ul style="list-style-type: none"> <li>■ <b>Coral reefs</b> are highly sensitive to ocean warming and acidification.</li> <li>■ <b>Elderly populations</b> in urban areas may be more sensitive to <b>heat stress</b> due to underlying health conditions.</li> </ul> </li> </ul> </li> <li><b>Adaptive Capacity:</b> <ul style="list-style-type: none"> <li>Evaluates the <b>ability of a system, community, or sector to cope with or adapt to climate impacts</b>.</li> <li>Factors influencing adaptive capacity include <b>infrastructure, financial resources, governance, technology, and social networks</b>.</li> <li>Example: A country with <b>strong disaster management policies and resilient infrastructure</b> will have higher adaptive capacity than one with limited resources.</li> </ul> </li> </ol> <p><b>Importance of Climate Change Vulnerability Assessments:</b></p> <ul style="list-style-type: none"> <li>● <b>Informs Adaptation Planning:</b> <ul style="list-style-type: none"> <li>Helps governments, businesses, and communities <b>prioritize adaptation measures</b> by identifying the most vulnerable sectors and populations.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ Example: Cities can use CCVA results to <b>strengthen flood defenses, improve water resource management, or implement heatwave action plans.</b></li> <li>● <b>Enhances Disaster Risk Reduction (DRR):</b> <ul style="list-style-type: none"> <li>○ Identifies <b>high-risk zones</b> and guides the development of <b>early warning systems and emergency preparedness plans.</b></li> <li>○ Example: Communities in wildfire-prone regions can use CCVA findings to improve <b>fire-resistant infrastructure and evacuation plans.</b></li> </ul> </li> <li>● <b>Supports Sustainable Development Goals (SDGs):</b> <ul style="list-style-type: none"> <li>○ Aligns with global efforts to <b>reduce inequalities (SDG 10), build resilient infrastructure (SDG 9), and combat climate change (SDG 13).</b></li> </ul> </li> <li>● <b>Guides Policy and Investment Decisions:</b> <ul style="list-style-type: none"> <li>○ Helps governments <b>allocate resources efficiently</b> for climate resilience projects.</li> <li>○ Encourages businesses to <b>assess climate risks</b> in their supply chains and operations.</li> </ul> </li> </ul> <p><b>Methods and Tools for Conducting a CCVA:</b></p> <ol style="list-style-type: none"> <li><b>Qualitative Assessments:</b> <ul style="list-style-type: none"> <li>○ Stakeholder consultations, expert opinions, and community surveys to understand <b>local climate risks.</b></li> </ul> </li> <li><b>Quantitative Models:</b> <ul style="list-style-type: none"> <li>○ Use of <b>climate projections, Geographic Information System (GIS) mapping, and risk analysis tools</b> to assess vulnerability.</li> </ul> </li> <li><b>Integrated Approaches:</b> <ul style="list-style-type: none"> <li>○ Combining <b>socioeconomic data with climate models</b> to provide a <b>holistic understanding of vulnerability.</b></li> </ul> </li> </ol> <p>A <b>Climate Change Vulnerability Assessment</b> is an essential tool for <b>proactive climate action</b>, helping societies prepare for and adapt to future challenges. By identifying <b>who or what is most vulnerable</b>, decision-makers can develop <b>targeted strategies</b> to <b>minimize risks and enhance resilience</b> in the face of a changing climate.</p>
<b>Climate Feedback</b>	<p><b>Climate feedback</b> is a process that either <b>enhances (positive feedback) or diminishes (negative feedback) the effects of climate change</b>, influencing the rate and magnitude of warming or cooling. These feedback mechanisms play a critical role in determining the Earth's climate sensitivity to external forces, such as greenhouse gas emissions.</p> <p><b>Types of Climate Feedback:</b></p> <ol style="list-style-type: none"> <li><b>Positive Feedback (Amplifying Effect):</b></li> </ol>

	<ul style="list-style-type: none"><li>○ <b>Accelerates climate change</b> by reinforcing the initial warming or cooling.</li><li>○ <b>Examples:</b><ul style="list-style-type: none"><li>■ <b>Ice-Albedo Effect:</b> As ice melts due to rising temperatures, the darker ocean or land beneath absorbs more sunlight, causing further warming and more ice loss.</li><li>■ <b>Water Vapor Feedback:</b> Warmer temperatures increase evaporation, leading to more water vapor in the atmosphere, which is a potent greenhouse gas that further intensifies warming.</li></ul></li></ul> <p>2. <b>Negative Feedback (Stabilizing Effect):</b></p> <ul style="list-style-type: none"><li>○ <b>Counteracts climate change</b> by moderating the initial warming or cooling.</li><li>○ <b>Examples:</b><ul style="list-style-type: none"><li>■ <b>Cloud Formation:</b> Increased evaporation can lead to more cloud cover, which reflects sunlight away from Earth, potentially reducing warming.</li><li>■ <b>Carbon Sink Effect:</b> Higher CO<sub>2</sub> levels can stimulate plant growth (carbon sequestration), helping to absorb excess CO<sub>2</sub> from the atmosphere.</li></ul></li></ul> <p><b>Importance of Climate Feedback:</b></p> <ul style="list-style-type: none"><li>● <b>Determines Climate Sensitivity:</b> Influences how much Earth's temperature will rise in response to greenhouse gas emissions.</li><li>● <b>Shapes Long-Term Climate Projections:</b> Helps climate scientists refine models and predict future climate conditions.</li><li>● <b>Guides Climate Policy and Adaptation Measures:</b> Understanding feedback effects is essential for developing effective strategies to mitigate and adapt to climate change.</li></ul> <p>Climate feedbacks are complex interactions that can either <b>intensify or mitigate</b> climate change, making them a crucial factor in understanding Earth's evolving climate system.</p>
<b>Climate forcing</b>	<p><b>Climate forcing</b> refers to external or internal factors that influence the Earth's climate system by altering its energy balance. These forces can affect the <b>physical, chemical, and biological characteristics</b> of a region, leading to changes in temperature, weather patterns, and ecosystem dynamics.</p> <p><b>Types of Climate Forcing:</b></p> <ol style="list-style-type: none"><li>1. <b>Natural Climate Forcing:</b><ul style="list-style-type: none"><li>○ <b>Solar Radiation Variations:</b> Changes in the Sun's energy output can influence global temperatures.</li></ul></li></ol>

	<ul style="list-style-type: none"> <li>○ <b>Volcanic Activity:</b> Large volcanic eruptions release aerosols and gases, which can temporarily cool the planet by reflecting sunlight away.</li> <li>○ <b>Orbital Changes (Milankovitch Cycles):</b> Variations in Earth's orbit and tilt affect long-term climate patterns, contributing to ice ages and warming periods.</li> </ul> <p><b>2. Anthropogenic (Human-Induced) Climate Forcing:</b></p> <ul style="list-style-type: none"> <li>○ <b>Greenhouse Gas Emissions:</b> The release of CO<sub>2</sub>, methane, and other gases traps heat in the atmosphere, leading to global warming.</li> <li>○ <b>Deforestation and Land-Use Changes:</b> Altering landscapes affects local and global climate by reducing carbon sequestration and changing surface albedo (reflectivity).</li> <li>○ <b>Aerosol Pollution:</b> Industrial emissions can influence cloud formation and atmospheric temperatures, either cooling or warming the climate.</li> </ul> <p><b>Importance of Climate Forcing:</b></p> <ul style="list-style-type: none"> <li>● Determines how the Earth's <b>climate system evolves over time</b>.</li> <li>● Helps scientists in <b>modelling and predicting climate trends</b>.</li> <li>● Guides policies aimed at <b>mitigating human-driven climate change</b>.</li> </ul> <p>Climate forcing drives long-term climate shifts and is a crucial factor in understanding both <b>natural and human-induced climate variations</b>.</p>
<b>Climate Hazard</b>	<p>A <b>climate hazard</b> refers to the <b>adverse impacts of climate change</b> on ecosystems, human livelihoods, and infrastructure. These hazards arise from both <b>gradual climate shifts</b> and <b>extreme weather events</b>, posing risks to communities and natural systems.</p> <p><b>Types of Climate Hazards:</b></p> <p><b>1. Slow-Onset Hazards:</b></p> <ul style="list-style-type: none"> <li>○ Develop <b>gradually</b> over time, affecting long-term environmental and socio-economic stability.</li> <li>○ <b>Examples:</b> <ul style="list-style-type: none"> <li>■ Rising global temperatures</li> <li>■ Changing rainfall patterns and prolonged droughts</li> <li>■ Sea-level rise leading to coastal erosion</li> <li>■ Ocean acidification affecting marine ecosystems</li> </ul> </li> </ul>

	<p>2. <b>Sudden-Onset Hazards:</b></p> <ul style="list-style-type: none"> <li>○ Occur as <b>intense, short-term events</b>, often causing immediate damage.</li> <li>○ <b>Examples:</b> <ul style="list-style-type: none"> <li>■ Heatwaves</li> <li>■ Floods and flash floods</li> <li>■ Hurricanes and typhoons</li> <li>■ Wildfires</li> <li>■ Extreme cold spells</li> </ul> </li> </ul> <p><b>Why Climate Hazards Matter:</b></p> <ul style="list-style-type: none"> <li>● <b>Threaten food and water security</b>, impacting agriculture and freshwater availability.</li> <li>● <b>Increase the frequency of disasters</b>, leading to displacement and economic loss.</li> <li>● <b>Disrupt ecosystems</b>, affecting biodiversity and natural resources.</li> <li>● <b>Highlight the urgency of climate adaptation and resilience-building efforts.</b></li> </ul> <p>Understanding and addressing climate hazards is essential for <b>protecting vulnerable populations, strengthening disaster preparedness, and mitigating climate change impacts.</b></p>
<b>Climate justice</b>	<p><b>Climate justice</b> highlights the unequal distribution of climate change impacts, emphasizing that the <b>communities and nations that have contributed the least to global emissions often face the greatest risks</b> while having the fewest resources to adapt.</p> <p>The <b>climate justice movement</b> argues that those who have historically benefited the most from carbon-intensive economic growth—<b>wealthy nations, corporations, and high-emitting industries</b>—bear the greatest <b>responsibility</b> for addressing climate change. This includes:</p> <ul style="list-style-type: none"> <li>● <b>Reducing emissions more aggressively</b></li> <li>● <b>Providing financial and technological support</b> to vulnerable communities</li> <li>● <b>Ensuring equitable policies</b> that protect those most affected</li> </ul> <p><b>Key Principles of Climate Justice:</b></p> <ol style="list-style-type: none"> <li>1. <b>Fairness &amp; Responsibility</b> – Recognizing that high-emission countries and industries have a duty to support climate mitigation and adaptation efforts in vulnerable regions.</li> </ol>

	<ol style="list-style-type: none"> <li>2. <b>Human Rights &amp; Equity</b> – Prioritizing the needs of marginalized communities that suffer the worst consequences, including indigenous groups, low-income populations, and small island nations.</li> <li>3. <b>Sustainable Development</b> – Ensuring that climate solutions promote economic and social well-being without deepening inequalities.</li> <li>4. <b>Inclusive Decision-Making</b> – Giving affected communities a voice in climate policies and adaptation strategies.</li> </ol> <p><b>Why Climate Justice Matters:</b></p> <ul style="list-style-type: none"> <li>• Climate change <b>exacerbates existing social and economic inequalities</b>.</li> <li>• Vulnerable communities <b>face higher risks of displacement, food insecurity, and health crises</b>.</li> <li>• Fair and just climate policies <b>ensure a sustainable and inclusive future for all</b>.</li> </ul> <p>Climate justice calls for <b>bold action, accountability, and global cooperation</b> to create a more equitable and sustainable world.</p>
<b>Climate Lag</b>	<p><b>Climate lag</b> refers to the <b>delay between a change in climate-driving factors and the full manifestation of its effects</b>. This occurs because certain components of the Earth's climate system—such as <b>oceans, ice sheets, and atmospheric processes</b>—respond <b>gradually</b> to changes in greenhouse gas concentrations, temperature, and radiation.</p> <p><b>Example of Climate Lag:</b></p> <ul style="list-style-type: none"> <li>• When <b>carbon dioxide (CO<sub>2</sub>) emissions increase</b>, global temperatures <b>do not rise instantly</b>. Instead, the <b>oceans absorb and store heat slowly</b>, leading to a <b>gradual warming process</b> that unfolds over decades or even centuries.</li> </ul> <p><b>Causes of Climate Lag:</b></p> <ol style="list-style-type: none"> <li>1. <b>Ocean Heat Absorption:</b> <ul style="list-style-type: none"> <li>○ The deep ocean takes <b>centuries</b> to fully absorb and distribute excess heat.</li> </ul> </li> <li>2. <b>Ice Sheet Melting:</b> <ul style="list-style-type: none"> <li>○ Large ice masses like <b>Greenland and Antarctica</b> respond slowly to warming, delaying sea level rise.</li> </ul> </li> <li>3. <b>Carbon Cycle Delays:</b> <ul style="list-style-type: none"> <li>○ Natural processes like <b>forest regrowth and soil carbon storage</b> take time to adjust to atmospheric changes.</li> </ul> </li> </ol> <p><b>Why Climate Lag Matters:</b></p> <ul style="list-style-type: none"> <li>• Even if emissions were <b>halted today, warming would continue</b> due to past emissions.</li> <li>• Policies aimed at <b>mitigation and adaptation</b> must account for <b>delayed climate responses</b>.</li> </ul>

	<ul style="list-style-type: none"><li>● Understanding climate lag <b>highlights the urgency</b> of reducing emissions now to prevent severe long-term consequences.</li></ul> <p>In essence, <b>climate lag underscores the importance of immediate action</b>, as today's emissions will continue shaping our planet's future for generations.</p>
<b>Climate Model</b>	<p>A <b>climate model</b> is a <b>mathematical representation</b> of Earth's climate system, simulating the complex interactions between the <b>atmosphere, oceans, land surface, and ice</b>. These models help scientists understand past, present, and future climate conditions by incorporating <b>physical, chemical, and biological processes</b> that influence climate patterns.</p> <p><b>Types of Climate Models:</b></p> <ol style="list-style-type: none"><li>1. <b>Simple Climate Models:</b><ul style="list-style-type: none"><li>○ Basic equations that provide rough estimates of climate responses.</li></ul></li><li>2. <b>General Circulation Models (GCMs):</b><ul style="list-style-type: none"><li>○ Simulate large-scale atmospheric and oceanic movements.</li></ul></li><li>3. <b>Coupled Atmosphere-Ocean General Circulation Models (AOGCMs):</b><ul style="list-style-type: none"><li>○ Offer a more <b>comprehensive</b> representation by integrating interactions between air, sea, and ice.</li></ul></li><li>4. <b>Earth System Models (ESMs):</b><ul style="list-style-type: none"><li>○ Include active <b>chemistry, biology, and carbon cycles</b> to study long-term climate changes.</li></ul></li></ol> <p><b>Applications of Climate Models:</b></p> <ul style="list-style-type: none"><li>● <b>Understanding Climate Change:</b> Models project how temperature, precipitation, and sea levels might change in different emission scenarios.</li><li>● <b>Weather and Climate Prediction:</b> Used for <b>seasonal forecasting</b>, extreme weather event simulations, and <b>long-term climate trends</b>.</li><li>● <b>Policy and Decision-Making:</b> Governments and organizations use climate models to develop <b>mitigation and adaptation strategies</b>.</li></ul> <p><b>Why Climate Models Matter:</b></p> <ul style="list-style-type: none"><li>● They provide <b>scientific evidence</b> for climate change discussions.</li><li>● They help predict the <b>impacts of human activities</b> on climate.</li><li>● They guide <b>international agreements</b> like the <b>Paris Agreement</b> by estimating future temperature rises under different policies.</li></ul>



	By continuously improving climate models with <b>higher-resolution data and advanced computing</b> , scientists can enhance their accuracy and refine predictions to address <b>global climate challenges</b> effectively.
<b>Climate prediction</b>	<p>A <b>climate prediction</b>, also known as a <b>climate forecast</b>, is an <b>estimate of future climate conditions</b> over a specific period, ranging from <b>seasonal and interannual</b> to <b>long-term projections</b>. It is based on <b>observed data, climate models, and statistical techniques</b> to anticipate changes in <b>temperature, precipitation, wind patterns, and other climate variables</b>.</p> <p><b>Types of Climate Predictions:</b></p> <ol style="list-style-type: none"> <li><b>Short-Term Predictions:</b> <ul style="list-style-type: none"> <li>Seasonal or annual forecasts (e.g., predicting <b>El Niño or La Niña events</b>).</li> </ul> </li> <li><b>Medium-Term Predictions:</b> <ul style="list-style-type: none"> <li>Climate trends over several years or decades.</li> </ul> </li> <li><b>Long-Term Predictions:</b> <ul style="list-style-type: none"> <li>Projections of climate evolution over <b>centuries</b>, often linked to greenhouse gas emissions and human activities.</li> </ul> </li> </ol> <p><b>Importance of Climate Predictions:</b></p> <ul style="list-style-type: none"> <li>Helps in <b>disaster preparedness</b> by forecasting <b>droughts, hurricanes, and extreme weather events</b>.</li> <li>Assists <b>farmers, policymakers, and industries</b> in making <b>climate-informed decisions</b>.</li> <li>Supports <b>global climate policy</b>, including efforts to mitigate and adapt to climate change.</li> </ul> <p>By combining <b>historical data, real-time monitoring, and advanced climate models</b>, scientists work to improve <b>prediction accuracy</b>, helping societies better prepare for climate-related challenges.</p>
<b>Climate Profile</b>	<p>A <b>climate profile</b> is a <b>detailed analysis</b>, often presented graphically, that illustrates the <b>climatic characteristics</b> of a specific region over a defined period. It includes key variables such as <b>temperature, precipitation, humidity, wind patterns, and seasonal variations</b> to provide insights into long-term climate trends and conditions.</p> <p><b>Key Features of a Climate Profile:</b></p> <ul style="list-style-type: none"> <li><b>Temperature Trends:</b> Average, maximum, and minimum temperatures over time.</li> <li><b>Precipitation Patterns:</b> Rainfall distribution and seasonal variations.</li> <li><b>Wind &amp; Atmospheric Conditions:</b> Wind speed, direction, and pressure changes.</li> <li><b>Extreme Weather Events:</b> Frequency of droughts, storms, or heatwaves.</li> </ul>

	<p><b>Importance of Climate Profiles:</b></p> <ul style="list-style-type: none"> <li>• Helps in <b>climate research and environmental planning</b>.</li> <li>• Supports <b>policymakers, urban planners, and industries</b> in decision-making.</li> <li>• Provides a basis for <b>climate adaptation and mitigation strategies</b>.</li> </ul> <p>A <b>climate profile</b> serves as a <b>valuable tool</b> for understanding historical climate trends and predicting future climatic shifts, aiding in <b>sustainable development and resilience planning</b>.</p>
<b>Climate projection</b>	<p>A <b>climate projection</b> refers to the <b>modelled response of the climate system</b> to various scenarios of <b>greenhouse gas emissions, aerosol concentrations, or radiative forcing</b>. These projections are generated using <b>climate models</b> and help estimate potential future climate conditions based on different socio-economic and technological development pathways.</p> <p><b>Key Aspects of Climate Projections:</b></p> <ul style="list-style-type: none"> <li>• <b>Scenario-Dependent:</b> Unlike climate predictions, climate projections rely on <b>assumed future emission scenarios</b>, making them subject to uncertainty.</li> <li>• <b>Model-Based Estimates:</b> Derived from <b>advanced climate models</b>, incorporating physical, chemical, and biological interactions.</li> <li>• <b>Long-Term Climate Outlook:</b> Helps anticipate <b>temperature changes, sea-level rise, and shifts in weather patterns</b>.</li> </ul> <p><b>Importance of Climate Projections:</b></p> <ul style="list-style-type: none"> <li>• Supports <b>policymakers and researchers</b> in planning for <b>climate adaptation and mitigation</b>.</li> <li>• Aids in assessing the potential <b>risks and impacts</b> of climate change on <b>ecosystems, economies, and societies</b>.</li> <li>• Provides insights for <b>sustainable development strategies and carbon reduction policies</b>.</li> </ul> <p>While <b>climate projections</b> offer valuable insights into possible future climate conditions, they depend on <b>uncertain assumptions about human activities, policy decisions, and technological advancements</b>, making them <b>probabilistic rather than definitive forecasts</b>.</p>
<b>Climate refugees</b>	<p>The term <b>climate refugees</b> are often used to describe individuals or communities who are <b>forced to leave their homes due to the impacts of climate change</b>, such as <b>rising sea levels, extreme weather events, prolonged droughts, or environmental degradation</b>. These displacements occur when climate-related changes make living conditions <b>unsafe or unsustainable</b>.</p> <p><b>Key Considerations:</b></p> <ul style="list-style-type: none"> <li>• <b>No Official Recognition:</b> The term "climate refugee" lacks a <b>formal legal definition</b> under international law. The <b>United Nations Refugee Convention</b> defines refugees as individuals fleeing <b>war, violence, conflict, or persecution</b>, which does not include those displaced by climate-related disasters.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Internal vs. Cross-Border Migration:</b> Many <b>climate-displaced individuals remain within their own countries</b>, making them <b>internally displaced persons (IDPs)</b> rather than refugees under existing legal frameworks.</li> <li>● <b>Humanitarian and Policy Challenges:</b> The absence of <b>legal protection</b> for climate-displaced populations raises concerns about <b>human rights, resettlement, and international responsibility</b>.</li> </ul> <p><b>Why It Matters:</b></p> <ul style="list-style-type: none"> <li>● Climate-driven displacement is increasing, particularly in <b>vulnerable regions like coastal areas, small island nations, and arid lands</b>.</li> <li>● The lack of legal recognition limits the <b>rights and protections</b> available to those forced to migrate due to environmental changes.</li> <li>● Addressing climate displacement requires <b>global cooperation, adaptation policies, and long-term resilience planning</b>.</li> </ul> <p>While the term <b>climate refugee</b> is widely used in advocacy and media discussions, efforts are ongoing to establish a <b>formal legal framework</b> that recognizes and protects <b>climate-induced displacement</b> on a global scale.</p>
<b>Climate resilience</b>	<p>Climate resilience refers to the <b>ability of landscapes, communities, and individual livelihoods to anticipate, adapt to, and recover from the impacts of climate change</b>. This includes <b>coping with rising temperatures, shifting weather patterns, prolonged droughts, and extreme climate events</b> while maintaining essential functions and well-being.</p> <p><b>Key Aspects of Climate Resilience:</b></p> <ul style="list-style-type: none"> <li>● <b>Adaptability:</b> The <b>capacity to adjust to changing conditions by implementing sustainable practices, such as climate-smart agriculture, resilient infrastructure, and disaster preparedness strategies</b>.</li> <li>● <b>Recovery and Transformation:</b> The <b>ability to bounce back from climate-related disruptions while making long-term improvements to reduce future vulnerabilities</b>.</li> <li>● <b>Community and Ecosystem Stability:</b> Ensuring that <b>social, economic, and environmental systems remain functional despite climate stressors</b>.</li> </ul> <p><b>Why It Matters:</b></p> <ul style="list-style-type: none"> <li>● Climate resilience helps <b>reduce risks associated with climate-related disasters</b>.</li> <li>● It <b>protects ecosystems and biodiversity</b>, ensuring long-term sustainability.</li> <li>● Strengthening resilience is key to achieving <b>climate adaptation goals</b> and safeguarding <b>livelihoods, food security, and water resources</b>.</li> </ul> <p>By building climate resilience, societies can <b>better withstand and respond to the challenges posed by a changing climate</b>, ensuring a <b>sustainable and secure future</b> for both people and the planet.</p>

<b>Climate Risk</b>	<p>Climate risk refers to the <b>likelihood and potential impact of climate-related hazards on life, property, and the environment</b>. It is a measure of <b>both the probability of an event occurring and the severity of its consequences</b>.</p> <p><b>Key Components of Climate Risk:</b></p> <ul style="list-style-type: none"> <li>● <b>Hazard:</b> A climate-related event such as <b>storms, heatwaves, floods, wildfires, or rising sea levels</b>.</li> <li>● <b>Exposure:</b> The presence of people, infrastructure, or ecosystems <b>in areas vulnerable to climate hazards</b>.</li> <li>● <b>Vulnerability:</b> The degree to which a system (natural or human) is <b>susceptible to damage</b> due to factors such as <b>poverty, weak infrastructure, or lack of preparedness</b>.</li> </ul> <p><b>Formula for Climate Risk:</b></p> <p><b>Climate Risk = Probability of a Climate Hazard × Vulnerability of the System</b></p> <p><b>Why It Matters:</b></p> <ul style="list-style-type: none"> <li>● Helps in <b>assessing potential threats</b> to communities, economies, and ecosystems.</li> <li>● Supports <b>decision-making in climate adaptation and disaster risk reduction</b>.</li> <li>● Encourages <b>proactive strategies</b> such as resilient urban planning, insurance mechanisms, and sustainable resource management.</li> </ul> <p>Understanding and managing climate risk is <b>essential for minimizing losses and building a more resilient future</b> in the face of climate change.</p>
<b>Climate scenario</b>	<p>A <b>climate scenario</b> is a <b>plausible representation of future climate conditions</b>, developed based on a set of <b>internally consistent climatological relationships and assumptions about radiative forcing</b>. These scenarios are typically used as <b>input for climate change impact models</b> to assess potential environmental, social, and economic consequences.</p> <p>Climate scenarios help scientists, policymakers, and planners <b>anticipate and prepare for future climate variations</b> by exploring different possible pathways based on greenhouse gas emissions, technological advancements, and policy choices.</p>
<b>Climate science</b>	<p><b>Climate science</b> is the study of <b>how changes in climate impact the Earth's natural systems on a global scale</b>. It examines factors such as <b>rising global temperatures, shifts in precipitation patterns, sea level rise, and alterations in local climate conditions</b>. By analysing these changes, climate science helps predict future environmental trends and informs strategies for adaptation and mitigation.</p>
<b>Climate Sensitivity</b>	<p><b>Climate sensitivity</b> refers to the degree to which the Earth's temperature responds to changes in radiative forcing, particularly due to increased greenhouse gas concentrations. In <b>Intergovernmental Panel on Climate Change (IPCC) reports</b>, <b>equilibrium climate sensitivity</b> is defined as the long-term global temperature increase resulting from a doubling of atmospheric <b>carbon dioxide (CO<sub>2</sub>)</b> levels. More broadly, it represents the change in <b>surface air temperature per unit of radiative forcing</b> (measured in °C per W/m<sup>2</sup>).</p>

	<p>There are two primary ways to measure climate sensitivity:</p> <ol style="list-style-type: none"> <li>1. <b>Equilibrium Climate Sensitivity (ECS)</b> – This metric requires long-term simulations using <b>Coupled General Circulation Models (GCMs)</b> to determine the stabilized temperature response.</li> <li>2. <b>Effective Climate Sensitivity</b> – A more immediate estimate derived from non-equilibrium conditions in climate models, which considers <b>feedback mechanisms</b> that may vary over time based on historical climate trends.</li> </ol> <p>Understanding climate sensitivity is crucial for predicting <b>future global warming</b> and assessing the potential impacts of greenhouse gas emissions on Earth's climate system.</p>
<b>Climate Shift</b>	<p>A <b>climate shift</b> refers to a sudden and significant change in the average climate conditions, indicating a transition to a new climate regime. This term is commonly associated with abrupt variations in <b>temperature, precipitation patterns, or atmospheric circulation</b>. One of the most well-known examples is the <b>1976/1977 climate shift</b>, which marked a noticeable change in the behavior of the <b>El Niño-Southern Oscillation (ENSO)</b> and had lasting impacts on global climate patterns.</p>
<b>Climate system</b>	<p>The <b>climate system</b> is a complex, interconnected system composed of five major components: the <b>atmosphere, hydrosphere, cryosphere, land surface, and biosphere</b>. These components interact dynamically, influencing global and regional climate patterns. The system evolves over time due to both <b>internal dynamics</b> and <b>external forcings</b>, such as <b>volcanic eruptions, solar variations, and human activities</b> like greenhouse gas emissions and land-use changes. These factors alter the Earth's radiative balance, driving long-term shifts in climate conditions.</p>
<b>Climate threshold</b>	<p>A <b>climate threshold</b> refers to a critical tipping point in the climate system, where external forces—such as rising greenhouse gas concentrations—trigger significant and often irreversible climatic or environmental changes. Once crossed, these thresholds can lead to dramatic consequences, such as <b>widespread coral bleaching, ice sheet collapse, or disruptions in oceanic circulation systems</b>, which may take centuries or longer to recover from, if at all.</p>
<b>Climate Trend</b>	<p>A <b>climate trend</b> refers to the long-term pattern or direction of change in climate variables, such as average temperature or precipitation, observed over an extended period. These trends indicate shifts in climatic conditions, often driven by natural variability or human-induced factors like greenhouse gas emissions.</p>
<b>Climate variability</b>	<p><b>Climate variability</b> refers to the natural fluctuations in climate patterns over different spatial and temporal scales, beyond individual weather events. It encompasses variations in the average state of climate elements such as temperature, precipitation, wind patterns, and extreme weather events over weeks, months, years, or even decades. Climate variability can occur due to internal processes within the climate system or as a result of external forces influencing climate patterns.</p> <p><b>Types of Climate Variability:</b></p>

	<div><div><div>1. Internal Climate Variability</div><div><div>○ Arises from natural interactions within the Earth's climate system, such as oceanic and atmospheric circulation patterns.</div><div>○ Examples:<div><div>■ El Niño-Southern Oscillation (ENSO): A periodic warming (El Niño) or cooling (La Niña) of ocean waters in the Pacific Ocean, which influences global weather patterns.</div><div>■ Pacific Decadal Oscillation (PDO): A long-term fluctuation in Pacific Ocean temperatures, affecting regional climate trends over decades.</div></div></div></div><div><div>2. External Climate Variability</div><div><div>○ Driven by factors outside the natural climate system, including both natural and human-induced forces.</div><div>○ Examples:<div><div>■ Volcanic Eruptions: Large eruptions can inject ash and sulfur dioxide into the atmosphere, temporarily cooling the climate by reflecting solar radiation.</div><div>■ Solar Variability: Changes in the Sun’s energy output can lead to fluctuations in global temperatures.</div><div>■ Anthropogenic Factors: Human activities such as deforestation, urbanization, and greenhouse gas emissions influence climate patterns and contribute to climate variability.</div></div></div></div><div><div>Climate Variability vs. Climate Change:</div><div>While climate variability describes short- to medium-term fluctuations in climate conditions, <b>climate change</b> refers to long-term trends and shifts in climate patterns, typically observed over decades to centuries.</div><div><div>● Example of Climate Variability: A few unusually hot summers in a decade.</div><div>● Example of Climate Change: A consistent increase in global temperatures over the last century due to rising greenhouse gas emissions.</div></div><div>Understanding climate variability is crucial for improving climate predictions, managing natural resources, and developing strategies for climate adaptation and resilience.</div></div></div></div></div>
<div>Climatology (Climate Science)</div>	<div>Climatology is the scientific study of climate, which involves analysing weather patterns and atmospheric conditions averaged over extended periods. It examines long-term trends in temperature, precipitation, wind, and other climatic factors to understand past, present, and future climate behavior.</div>

<b>Cloud Albedo Effect (Twomey Effect)</b>	<p>The <b>Cloud Albedo Effect</b>, also known as the <b>Twomey Effect</b>, refers to a climate phenomenon where an increase in anthropogenic (human-made) aerosols leads to changes in cloud properties. When aerosols—tiny particles from sources like pollution, industrial emissions, and wildfires—enter the atmosphere, they act as cloud condensation nuclei. This results in clouds forming with a higher number of smaller water droplets, assuming the overall water content remains the same.</p> <p>Because smaller droplets scatter sunlight more efficiently than larger ones, this process increases the cloud's reflectivity, or <b>albedo</b>. As a result, more incoming solar radiation is reflected back into space, leading to a localized cooling effect. This effect is an example of <b>radiative forcing</b>, which influences Earth's energy balance.</p> <p>The Cloud Albedo Effect plays a crucial role in climate science as it can partially offset global warming caused by greenhouse gas emissions. However, the overall impact on climate remains complex due to interactions with other atmospheric processes, such as cloud lifespan, precipitation patterns, and regional weather dynamics.</p>
<b>Cloud Lifetime Effect or Albrecht Effect</b>	A radiative forcing induced by an increase in anthropogenic aerosols which cause a decrease in droplet size, reducing the precipitation efficiency, thereby modifying the liquid water content, cloud thickness and cloud lifetime is known as “cloud lifetime effect” or “Albrecht affect.”
<b>Coal Mine Methane</b>	Coal Mine Methane (CMM) refers to methane gas that is released from coal seams during the mining process. It is a subset of coalbed methane, which is naturally stored within coal deposits. When coal is mined, the extraction process disturbs the coal seams, causing the trapped methane to be released into the atmosphere. Managing and capturing this methane is crucial, as it is a potent greenhouse gas with a significantly higher warming potential than carbon dioxide.
<b>Coalbed Methane</b>	Coalbed Methane (CBM), also known as coal seam gas or virgin coalbed methane, is methane that is naturally stored within coal seams. This gas is formed during the coalification process and is held within the coal by water pressure. CBM can be extracted for use as an energy source, providing a cleaner-burning alternative to conventional fossil fuels.
<b>Coalition of Rainforest Nations</b>	The <b>Coalition for Rainforest Nations (CfRN)</b> is an organization formed by <b>tropical forested countries</b> to collaboratively balance <b>forest conservation</b> with <b>economic development</b> . The <b>Rainforest Coalition</b> seeks to unite both <b>developing and industrialized nations</b> to promote <b>community-driven, environmentally sustainable economic growth</b> .
<b>Coastal Wetlands</b>	<b>Coastal wetlands</b> consist of both <b>saltwater and freshwater wetlands</b> found within <b>coastal watersheds</b> . These wetlands are located in <b>USGS 8-digit hydrologic unit watersheds</b> , which flow into the <b>Atlantic Ocean, Pacific Ocean, or Gulf of Mexico</b> .
<b>Co-Benefit</b>	A <b>co-benefit</b> refers to the <b>positive effects</b> of policies implemented for multiple purposes, including <b>climate change mitigation</b> . Many policies aimed at <b>reducing greenhouse gas emissions</b> also contribute to broader objectives such as <b>development, sustainability, and equity</b> , making them equally significant beyond just their environmental impact, and vice-versa.

<b>Cold Waves</b>	A <b>cold wave</b> is a <b>weather phenomenon</b> characterized by a <b>sudden and significant drop in temperature</b> , leading to an extended period of <b>unusually cold air</b> in a region.
<b>Common Property Resources</b>	<p>In the context of <b>environment and climate change</b>, <b>common property resources</b> refer to <b>natural resources</b> that are <b>shared and collectively managed</b> by a community, group, or society. These resources are <b>not privately owned</b> but are accessible to multiple users, often under <b>traditional or regulatory management systems</b>. Examples include <b>forests, fisheries, grazing lands, freshwater bodies, and the atmosphere</b>.</p> <p>The sustainable management of CPRs is <b>crucial for climate adaptation and mitigation</b>, as overuse or mismanagement can lead to <b>deforestation, depletion of fisheries, land degradation, and increased greenhouse gas emissions</b>. Effective governance and community participation are essential to ensuring these resources contribute to <b>climate resilience and environmental sustainability</b>.</p>
<b>Communicable Disease</b>	<p><b>Communicable diseases</b> are <b>illnesses caused by microorganisms</b> that are <b>transmitted through people, animals, contaminated surfaces, food, water, or air</b>. These diseases <b>spread through fluid exchange, direct contact, or exposure to infectious agents</b>.</p> <p><b>Climate change influences the spread of communicable diseases</b> by altering <b>temperature, humidity, and precipitation patterns</b>, which affect <b>vector-borne diseases (e.g., malaria, dengue), waterborne infections (e.g., cholera), and respiratory illnesses</b>. <b>Extreme weather events, deforestation, and pollution</b> can further disrupt ecosystems, increasing human exposure to pathogens. Effective <b>public health strategies, climate adaptation measures, and environmental management</b> are crucial to reducing disease transmission and protecting vulnerable populations.</p>
<b>Community</b>	A <b>community</b> , in the context of <b>vulnerability assessment</b> , refers to a group of people residing in a shared geographical area who <b>face common hazards</b> due to their location. These individuals may have <b>collective experiences in responding to disasters and environmental risks</b> , yet their <b>perceptions of risk and levels of exposure</b> can vary. Within the community, different groups may hold <b>diverse perspectives on risk reduction measures</b> , with some supporting and others opposing specific interventions. Understanding these <b>social dynamics</b> is essential for <b>effective disaster preparedness, climate adaptation, and resilience-building efforts</b> .
<b>Community and/or Environmental Impacts</b>	<b>Community and environmental impacts</b> refer to the <b>effects that project activities may have on the socio-economic and ecological landscape</b> . These impacts can include changes to <b>local livelihoods, biodiversity, natural resources, and overall environmental health</b> . Under the <b>Voluntary Carbon Standards (VCS) General Approval Process</b> , projects must ensure that their activities <b>do not result in negative consequences</b> or create <b>perverse incentives</b> —such as land clearing <b>solely for the purpose of generating carbon credits</b> . Sustainable project design is essential to <b>maximize benefits for both communities and the environment</b> while mitigating potential risks.
<b>Community Based Adaptation</b>	Community-based adaptation focuses on actively reducing vulnerability to climate change by engaging local communities in the process.



<b>Community Based Adaptation Planning</b>	<b>Community-Based Adaptation (CBA)</b> can be understood as an <b>extension of community-driven development</b> , incorporating strategies that specifically address climate change challenges. It builds upon <b>existing local development activities, practices, research, and policies</b> , ensuring that communities are not only developing sustainably but also adapting to climate-related risks. CBA emphasizes <b>locally-led solutions, participatory decision-making, and the integration of traditional knowledge with modern adaptation strategies</b> to enhance resilience.
<b>Community Based Vulnerability Assessment</b>	A <b>Community-Based Vulnerability Assessment (CBVA)</b> is a <b>policy-driven and action-oriented evaluation</b> conducted within communities to identify and address vulnerabilities to disasters. Utilizing a variety of <b>participatory tools and methods</b> , CBVA actively involves community members in the process. The primary goal is to <b>reduce the negative impacts of disasters</b> by assessing risks, strengthening local capacities, and developing effective adaptation strategies through <b>full community participation</b> .
<b>Community Development (CD)</b>	<b>Community Development (CD)</b> refers to both the <b>practical efforts and academic study</b> focused on improving various aspects of local communities. It involves <b>civic leaders, activists, engaged citizens, and professionals</b> working together to drive positive change. The core objective of CD is to <b>empower individuals and groups</b> by equipping them with the necessary skills to initiate and sustain transformation within their own communities. These skills often revolve around <b>organizing collective action, strengthening social networks, and building political influence</b> through the formation of large groups advocating for a shared agenda.
<b>Conference of Parties (COP)</b>	<p>The <b>Conference of Parties (COP)</b> is the <b>governing body of the United Nations Framework Convention on Climate Change (UNFCCC)</b>, composed of nations that have ratified or acceded to the convention. It serves as the <b>primary platform for international climate negotiations</b>, where countries convene annually to assess progress, establish climate policies, and strengthen global commitments to combat climate change.</p> <p><b>Purpose and Role of COP:</b></p> <ul style="list-style-type: none"> <li>● <b>Oversees the implementation of the UNFCCC</b> by reviewing national climate action plans and strategies.</li> <li>● <b>Evaluates and updates commitments</b> based on new scientific findings, global climate trends, and policy effectiveness.</li> <li>● <b>Facilitates international cooperation</b> by enabling discussions on mitigation, adaptation, financing, and technology transfer.</li> <li>● <b>Sets legally binding agreements</b> like the <b>Kyoto Protocol (COP-3, 1997)</b> and the <b>Paris Agreement (COP-21, 2015)</b>.</li> </ul> <p>With <b>over 190 participating nations</b>, COP continues to play a <b>crucial role in shaping global climate policy</b>, ensuring that governments remain accountable for their climate commitments while responding to emerging environmental challenges. Till date, a total of 29 COPs has been held.</p>
<b>Conservation Area</b>	A <b>conservation area</b> is a designated <b>protected land</b> aimed at preserving its <b>natural features, cultural heritage, and biodiversity</b> . These areas are established to safeguard ecosystems, wildlife, and historical sites from degradation. Conservation areas can take various forms,

	including <b>nature reserves, national parks, land reclamation projects, or other protected landscapes</b> , ensuring long-term environmental and cultural sustainability.
<b>Conservation of Natural Resources</b>	<b>Conservation of natural resources</b> refers to the <b>responsible and sustainable use of the Earth's resources</b> to ensure their long-term availability for future generations. The concept, which emerged in the <b>late 19th century</b> , initially focused on the <b>economic management</b> of valuable resources such as <b>timber, fish, minerals, topsoil, and pastureland</b> . Over time, conservation has expanded to include the <b>preservation of forests, wildlife, parklands, wilderness, and watersheds</b> . Today, it is widely understood as part of a broader effort to <b>protect the planet's ecological balance</b> , ensuring that natural systems maintain their <b>capacity for self-renewal</b> .
<b>Contingency Planning</b>	<p><b>Contingency planning</b> is a <b>proactive management process</b> that identifies potential threats—such as <b>emerging crises or environmental hazards</b>—and establishes <b>pre-arranged response strategies</b> to ensure timely and effective action. This process results in <b>organized and coordinated response plans</b>, clearly defining <b>institutional roles, resource allocation, information flow, and operational procedures</b> for key stakeholders during emergencies.</p> <p>By developing <b>scenario-based strategies</b>, contingency planning enables <b>governments, organizations, and communities</b> to <b>anticipate challenges, mitigate risks, and implement solutions</b> before a crisis escalates. As a <b>critical component of emergency preparedness</b>, contingency plans must be <b>regularly updated, tested, and refined</b> to remain effective in rapidly changing conditions.</p>
<b>Convention</b>	<p>In the context of <b>environment and climate change</b>, a <b>convention</b> refers to a <b>formal international agreement or assembly</b> where representatives from various nations and organizations convene to discuss, negotiate, and establish policies addressing environmental challenges. These conventions play a crucial role in shaping <b>global climate action, biodiversity conservation, and sustainable development</b>.</p> <p>Notable environmental conventions include <b>United Nations Framework Convention on Climate Change (UNFCCC)</b>, <b>Convention on Biological Diversity (CBD)</b>, <b>United Nations Convention to Combat Desertification (UNCCD)</b>, <b>Stockholm Convention on Persistent Organic Pollutants</b>, etc.</p> <p>Such conventions serve as <b>platforms for cooperation, policy development, and legally binding commitments</b> to protect the environment and combat climate change on a global scale.</p>
<b>Copenhagen Accord</b>	<p>The <b>Copenhagen Accord</b> is a political agreement acknowledged by delegates at the <b>15th Conference of Parties (COP 15)</b> to the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> on <b>December 18, 2009</b>. While the accord was <b>not legally binding</b>, it marked a significant step in global climate negotiations by emphasizing the <b>urgent need for climate action</b> and endorsing the <b>continuation of the Kyoto Protocol</b>.</p> <p><b>Key Highlights of the Copenhagen Accord:</b></p>

	<ul style="list-style-type: none"> <li>● Recognizes that <b>climate change is one of the greatest global challenges</b> and underscores the need for a <b>strong political commitment</b> to address it.</li> <li>● Affirms the principle of <b>common but differentiated responsibilities and respective capabilities (CBDR-RC)</b>, ensuring that countries take action based on their economic and developmental status.</li> <li>● Calls for <b>enhanced international cooperation on climate adaptation</b>, particularly for <b>Least Developed Countries (LDCs), Small Island Developing States (SIDS), and African nations</b>, which are most vulnerable to climate change impacts.</li> <li>● States that <b>developed countries should provide financial, technological, and capacity-building support</b> to help developing nations implement climate adaptation strategies.</li> <li>● Though it was <b>drafted by the United States and the BASIC countries (Brazil, South Africa, India, and China)</b>, it <b>did not set binding emission reduction targets</b> or establish a legally binding successor to the <b>Kyoto Protocol</b>, which was set to expire in 2012.</li> </ul> <p>Despite its limitations, the <b>Copenhagen Accord</b> paved the way for subsequent climate negotiations, influencing later agreements such as the <b>Cancún Agreements (COP 16, 2010)</b> and the landmark <b>Paris Agreement (COP 21, 2015)</b>.</p>
<b>Coping</b>	<p><b>Coping</b> refers to the <b>utilization of available resources and strategies</b> to manage and respond to the impacts of a <b>climate-induced hazard</b>, both during and immediately after the event. It involves <b>short-term actions</b> aimed at minimizing damage, maintaining stability, and ensuring recovery in the face of environmental stresses.</p>
<b>Coping capacity</b>	<p><b>Coping capacity</b> refers to the <b>ability of individuals, organizations, and systems</b> to <b>effectively utilize available resources and skills</b> to manage and respond to <b>adverse conditions, emergencies, or disasters</b>. This includes both <b>preparedness during normal times</b> and <b>adaptive responses during crises</b> to minimize harm and sustain livelihoods.</p> <p><b>Key Aspects of Coping Capacity:</b></p> <ul style="list-style-type: none"> <li>● <b>Resource Management:</b> Efficient use of financial, social, and natural resources before, during, and after a disaster.</li> <li>● <b>Risk Awareness:</b> Continuous monitoring and preparedness to anticipate and respond to potential hazards.</li> <li>● <b>Resilience Building:</b> Strengthening coping mechanisms enhances a community's ability to <b>withstand and recover</b> from both natural and human-induced hazards.</li> <li>● <b>Disaster Risk Reduction (DRR):</b> Effective coping capacities contribute to <b>mitigating disaster risks</b>, reducing vulnerabilities, and promoting long-term sustainability.</li> </ul> <p>Investing in <b>coping capacity development</b> helps communities and organizations become <b>more resilient, adaptive, and prepared</b> for future challenges.</p>

<b>Coping Mechanism</b>	A <b>coping mechanism</b> refers to the <b>strategies and actions</b> that communities use <b>independently, without external assistance</b> , to <b>manage relief, recovery, and adaptation</b> in response to disasters. These mechanisms enable societies to <b>withstand, adjust to, and prepare for future risks</b> , ensuring resilience and self-sufficiency in the face of environmental and climate-related challenges.
<b>Coping range</b>	The <b>coping range</b> refers to the <b>extent of climate variability that a system, community, or society can withstand</b> without experiencing significant or intolerable impacts. Within this range, climate conditions may have <b>both beneficial and adverse effects</b> , but they remain <b>manageable and tolerable</b> . However, when climate stressors exceed this threshold, the resulting <b>damages or losses become severe</b> , rendering the system <b>vulnerable and unable to cope effectively</b> .
<b>Coping Strategies</b>	<b>Coping strategies</b> are <b>short-term adaptive responses</b> that households adopt to <b>manage and mitigate the impacts of unexpected shocks or crises</b> . These strategies serve as <b>temporary measures</b> to navigate difficult situations, with the expectation that households can eventually <b>resume their normal livelihoods and daily activities</b> once conditions improve.
<b>Coral Bleaching</b>	<b>Coral bleaching</b> is a phenomenon that occurs when <b>coral colonies experience environmental stress</b> , causing them to <b>expel the symbiotic microscopic algae (zooxanthellae)</b> that reside within their tissues. As a result, the coral loses its colour and appears <b>whitened</b> , making it more vulnerable to disease and environmental damage.
<b>Corrective Management</b>	<b>Disaster</b> <b>Corrective disaster management</b> refers to <b>strategies and actions aimed at addressing and reducing existing disaster risks</b> . It focuses on <b>mitigating hazards, strengthening resilience, and implementing corrective measures</b> to minimize the impact of disasters that are already present within a system or community.
<b>Cropland</b>	<b>Cropland</b> refers to <b>arable and cultivated land</b> , including <b>tillage areas and agroforestry systems</b> where vegetation cover is <b>insufficient to meet the criteria for classification as forest land</b> . It is primarily used for <b>growing crops</b> for food, feed, and other agricultural purposes.
<b>Cryosphere</b>	The <b>cryosphere</b> is a vital component of the Earth's system, consisting of <b>frozen water in various forms</b> , including <b>snow, glaciers, ice caps, permafrost, and floating ice</b> . It is primarily found in the <b>polar regions and high-altitude mountain ranges</b> , such as the <b>Hindu Kush Himalayas</b> , where ice exists on <b>glaciers, rivers, lakes, and permanently frozen ground</b> .  Changes in the <b>cryosphere's volume</b> can significantly impact global systems, contributing to <b>sea level fluctuations, altering atmospheric conditions, and affecting ecosystems</b> . As a critical element of the <b>climate system</b> , its stability is essential for regulating Earth's <b>temperature, water cycles, and weather patterns</b> .
<b>Cultural Services</b>	<b>Cultural services</b> refer to the <b>non-material benefits</b> that ecosystems provide, including <b>recreational, spiritual, religious, aesthetic, and cultural experiences</b> . These services contribute to <b>human well-being, cultural identity, and social cohesion</b> , enriching lives through <b>nature-based inspiration, heritage, and outdoor activities</b> .

<b>Customary Rights</b>	<b>Customary rights</b> are <b>traditional entitlements</b> established through long-standing <b>local practices and usage</b> , granting <b>communities or individuals specific rights</b> within a particular region or district. These rights are often <b>inherited, recognized by local customs, and integral to cultural and social traditions</b> .
<b>Deadwood</b>	<p><b>Deadwood</b> refers to <b>non-living woody biomass</b> found in <b>forests and ecosystems</b>, including <b>standing dead trees, fallen logs, branches, stumps, and decaying roots</b>. Deadwood plays a <b>crucial ecological role</b> by:</p> <ul style="list-style-type: none"> <li>● <b>Enhancing biodiversity</b> – providing habitat for fungi, insects, birds, and other wildlife.</li> <li>● <b>Contributing to carbon storage</b> – gradually releasing carbon as it decomposes, influencing the <b>carbon cycle</b>.</li> <li>● <b>Improving soil health</b> – enriching the soil with nutrients essential for plant growth.</li> </ul> <p>While deadwood is a <b>natural part of forest ecosystems</b>, its excessive accumulation due to <b>climate change-driven droughts, wildfires, and pest outbreaks</b> can increase <b>fire risks and disrupt ecosystem balance</b>. Sustainable forest management aims to <b>maintain deadwood levels</b> that support biodiversity while mitigating fire hazards and carbon emissions.</p>
<b>Declaration</b>	A <b>declaration</b> is a <b>non-binding political statement</b> issued by ministers or representatives during a <b>major international meeting or conference</b> . It typically expresses <b>shared commitments, principles, or intentions</b> on key issues, such as <b>climate change and sustainable development</b> (e.g., the <b>Delhi Ministerial Declaration at COP-8</b> ). While <b>not legally enforceable</b> , declarations serve as <b>guiding frameworks</b> for future policies and cooperation.
<b>Deforestation</b>	<p><b>Deforestation</b> refers to the <b>permanent removal of forests</b>, resulting in the <b>conversion of forested land into non-forest uses</b> such as <b>agriculture, urban development, or mining</b>. This process has severe environmental consequences, including:</p> <ul style="list-style-type: none"> <li>● <b>Increased carbon dioxide emissions</b> – Due to the <b>burning and decomposition</b> of trees, which release stored carbon into the atmosphere.</li> <li>● <b>Loss of carbon absorption</b> – As trees are removed, the ability to <b>capture and store CO<sub>2</sub> through photosynthesis</b> is diminished.</li> <li>● <b>Threats to biodiversity</b> – Destroying habitats for countless species, leading to ecosystem imbalances.</li> </ul> <p><b>Deforestation is a major driver of climate change</b>, significantly contributing to <b>greenhouse gas emissions</b> and the disruption of <b>global climate patterns</b>.</p>
<b>Degradation</b>	<b>Degradation</b> refers to <b>deterioration in the structure or function of an ecosystem or site</b> , reducing its <b>ability to provide essential goods and services</b> . This decline can result from <b>human activities or natural processes</b> , leading to <b>loss of biodiversity, diminished soil fertility, reduced water quality, and weakened ecosystem resilience</b> .

<b>Demography</b>	<b>Demography</b> is the <b>scientific study of human populations</b> , focusing on their <b>size, structure, distribution, and dynamics</b> . It examines key factors such as <b>population growth, density, birth and death rates, migration patterns, and socio-economic influences</b> to understand trends and changes over time.
<b>Desertification</b>	<p><b>Desertification</b> is the <b>process of land degradation</b> in <b>arid, semi-arid, and dry sub-humid regions</b>, where once <b>fertile and biodiverse land loses its productivity</b>, often leading to desert-like conditions. It is driven by a combination of <b>human activities</b> and <b>climatic factors</b>, including:</p> <ul style="list-style-type: none"> <li>● <b>Deforestation</b> – Removing trees and vegetation, reducing soil stability.</li> <li>● <b>Overgrazing</b> – Excessive livestock grazing, depleting plant cover and accelerating erosion.</li> <li>● <b>Soil Erosion</b> – Wind and water erosion stripping away fertile topsoil.</li> <li>● <b>Climate Change</b> – Rising temperatures and prolonged droughts worsening land degradation.</li> </ul> <p>As recognized by the <b>United Nations Convention to Combat Desertification (UNCCD)</b>, desertification significantly reduces the <b>biological and economic productivity</b> of croplands, rangelands, forests, and woodlands, posing a severe threat to <b>food security, biodiversity, and livelihoods</b> worldwide.</p>
<b>Designated Authority</b>	<p><b>National</b></p> <p>A <b>Designated National Authority (DNA)</b> is the <b>official body appointed by a country</b> under the <b>Kyoto Protocol</b> to <b>authorize and oversee participation</b> in <b>Clean Development Mechanism (CDM) projects</b>. Establishing a DNA is a <b>prerequisite</b> for a country to engage in the CDM.</p> <p>The primary responsibilities of a DNA include:</p> <ul style="list-style-type: none"> <li>● <b>Evaluating potential CDM projects</b> to ensure they align with the host country's <b>sustainable development goals</b>.</li> <li>● <b>Providing official approval</b> through a <b>Letter of Approval (LoA)</b> to project participants.</li> <li>● <b>Facilitating compliance with CDM regulations</b> and ensuring projects contribute to <b>climate change mitigation</b>.</li> </ul> <p>A DNA may be structured as a <b>government office, ministry, or another authorized entity</b>, ensuring that CDM projects support <b>national and global climate action efforts</b>.</p>
<b>Detection and attribution</b>	<p><b>Detection</b> refers to the process of identifying <b>statistically significant changes</b> in a system, whether <b>natural or human-made</b>, without immediately determining the cause.</p> <p><b>Attribution</b> is the next step, where observed changes are <b>linked to specific causes</b>, particularly <b>anthropogenic (human-induced) climate change</b>. This process typically involves two stages:</p> <ol style="list-style-type: none"> <li>1. <b>Establishing a connection</b> between the observed change in a system and <b>regional climate variations</b>, with a specified level of confidence.</li> </ol>

	<p>2. <b>Determining the extent</b> to which human activities, such as <b>greenhouse gas emissions</b>, are responsible for these regional climate changes or their impacts on the system.</p> <p>Since attribution involves <b>two separate statistical assessments</b>, the confidence in linking climate change effects directly to human influence is generally <b>lower</b> than in each individual assessment.</p>
<b>Developing Countries</b>	<p><b>Developing countries</b> are nations characterized by <b>low to moderate levels of economic development</b>, often measured by <b>income levels, industrialization, and human development indicators</b>. These countries typically experience <b>lower standards of living, limited access to healthcare and education</b>, and <b>higher poverty rates</b> compared to developed nations. However, many developing countries are undergoing <b>rapid economic growth and social progress</b>, working toward <b>improving infrastructure, governance, and overall well-being</b>.</p>
<b>Development</b>	<p><b>Development</b> refers to the <b>process of growth, progress, and advancement</b> across various dimensions, including <b>biological, physical, cognitive, social, and economic aspects</b>. It extends beyond mere physical expansion to encompass <b>improvements in quality of life, education, healthcare, and social well-being</b>.</p> <p>According to the <b>United Nations Development Programme (UNDP)</b>, development is about enabling people to:</p> <ul style="list-style-type: none"> <li>• <b>Live long and healthy lives</b></li> <li>• <b>Gain knowledge and education</b></li> <li>• <b>Access resources for a decent standard of living</b></li> <li>• <b>Actively participate in society and decision-making</b></li> </ul> <p>In a broader sense, development focuses on <b>sustainable progress</b>, ensuring that economic growth aligns with <b>social equity and environmental protection</b>.</p>
<b>Development scenario</b>	<p>A <b>development scenario</b> represents a <b>set of possible future pathways</b> that outline <b>potential growth opportunities</b> and their <b>economic, social, and environmental impacts</b>. These scenarios help policymakers, planners, and stakeholders <b>analyze trends, assess risks, and make informed decisions</b> about sustainable development. By exploring different trajectories, development scenarios provide a <b>strategic perspective</b> on how various factors may shape the future.</p>
<b>Dimethylsulfide (DMS)</b>	<p><b>Dimethylsulfide (DMS)</b> is the most <b>abundant biologically produced sulfur compound</b> released into the atmosphere, primarily by <b>phytoplankton in the ocean</b>. It plays a significant role in <b>atmospheric chemistry</b> by contributing to <b>cloud formation</b>, which can influence climate by affecting temperature regulation and weather patterns.</p>
<b>Disaster</b>	<p>A <b>disaster</b> is a <b>severe disruption</b> in the functioning of a <b>community or society</b>, leading to <b>widespread human, material, economic, or environmental losses</b> that exceed the affected population's ability to cope using its own resources.</p>

	<p>Disasters typically result from a <b>combination of factors</b>, including:</p> <ul style="list-style-type: none"> <li>● <b>Exposure to hazards</b> (e.g., natural disasters, technological failures, or human-induced crises)</li> <li>● <b>Existing vulnerabilities</b> that increase the impact of hazards</li> <li>● <b>Insufficient capacity or preparedness</b> to mitigate or respond to adverse effects</li> </ul> <p>The consequences of disasters can include <b>loss of life, injuries, disease outbreaks, mental and social distress, property destruction, economic instability, and environmental degradation</b>. Effective disaster management focuses on <b>risk reduction, preparedness, response, and recovery</b> to build resilience against future crises.</p>
<b>Disaster Preparedness</b>	<p><b>Disaster preparedness</b> refers to the <b>knowledge, skills, and resources</b> developed by <b>governments, emergency response organizations, communities, and individuals</b> to effectively <b>anticipate, respond to, and recover from</b> potential or ongoing hazard events.</p> <p>Key aspects of disaster preparedness include:</p> <ul style="list-style-type: none"> <li>● <b>Risk assessment</b> to identify vulnerabilities and potential hazards</li> <li>● <b>Emergency planning</b> to ensure coordinated response efforts</li> <li>● <b>Capacity building</b> through training, education, and resource allocation</li> <li>● <b>Early warning systems</b> for timely alerts and action</li> <li>● <b>Community engagement</b> to enhance resilience and self-sufficiency</li> </ul> <p>By strengthening preparedness efforts, societies can <b>minimize disaster impacts</b>, protect lives and livelihoods, and ensure a faster, more effective recovery.</p>
<b>Disaster risk</b>	<p><b>Disaster risk</b> refers to the <b>potential losses</b> that a community or society may experience over a specific time period due to hazards. These losses may include:</p> <ul style="list-style-type: none"> <li>● <b>Loss of life</b></li> <li>● <b>Deterioration of health</b></li> <li>● <b>Disruption of livelihoods</b></li> <li>● <b>Damage to assets and infrastructure</b></li> <li>● <b>Interruption of essential services</b></li> </ul>



	<p>Disaster risk is shaped by the <b>interaction between hazards, exposure, and vulnerability</b>. Since it encompasses a wide range of possible impacts, it can be <b>challenging to quantify</b>. However, by understanding existing hazards, population distribution, and socio-economic conditions, <b>disaster risks can be assessed and mapped</b>, allowing for better planning and risk reduction strategies.</p>
<b>Disaster risk management</b>	<p><b>Disaster risk management (DRM)</b> is a <b>systematic approach</b> that involves using <b>policies, strategies, and institutional capacities</b> to reduce the <b>adverse impacts of hazards</b> and the likelihood of disasters. It extends the broader concept of <b>risk management</b> to specifically address disaster-related risks.</p> <p>The core objectives of <b>DRM</b> include:</p> <ul style="list-style-type: none"> <li>● <b>Preventing disasters</b> through proactive measures</li> <li>● <b>Mitigating risks</b> by reducing vulnerabilities</li> <li>● <b>Enhancing preparedness</b> to respond effectively</li> <li>● <b>Transferring risk</b> through mechanisms such as insurance</li> </ul> <p>By integrating <b>administrative, organizational, and operational capacities</b>, DRM helps communities and governments build <b>resilience</b> and minimize potential losses in lives, livelihoods, and infrastructure.</p>
<b>Disaster Risk Reduction (DRR)</b>	<p><b>Disaster Risk Reduction (DRR)</b> refers to the <b>systematic approach</b> of minimizing disaster risks by addressing their root causes. This involves analysing and managing factors that contribute to disasters, such as <b>hazard exposure, societal vulnerabilities, and environmental mismanagement</b>.</p> <p>Key elements of <b>DRR</b> include:</p> <ul style="list-style-type: none"> <li>● <b>Reducing exposure</b> to natural and human-induced hazards</li> <li>● <b>Decreasing vulnerability</b> of people, infrastructure, and ecosystems</li> <li>● <b>Sustainable management</b> of land, water, and natural resources</li> <li>● <b>Enhancing preparedness</b> to respond effectively to disasters</li> </ul> <p>By implementing <b>preventive and mitigation strategies</b>, DRR helps communities build <b>resilience</b> and minimize the impact of disasters, ultimately contributing to <b>sustainable development and climate adaptation</b>.</p>
<b>Disaster Risk Reduction Plans</b>	<p>A <b>Disaster Risk Reduction (DRR) Plan</b> is a strategic document developed by <b>authorities, sectors, organizations, or enterprises</b> to outline <b>goals, objectives, and actions</b> aimed at minimizing disaster risks. These plans are aligned with broader <b>development strategies</b>, resource allocations, and program activities to ensure <b>effective implementation</b>.</p> <p>Key aspects of a <b>DRR Plan</b> include:</p>

	<ul style="list-style-type: none"> <li>● <b>Clearly defined objectives</b> for risk reduction</li> <li>● <b>Actionable strategies</b> to achieve these objectives</li> <li>● <b>Consideration of social and geographical contexts</b></li> <li>● <b>Alignment with national policies and international frameworks</b> (e.g., the Hyogo Framework)</li> <li>● <b>Timeframes, responsibilities, and funding sources</b></li> <li>● <b>Integration with Climate Change Adaptation Plans</b> where applicable</li> </ul> <p>By establishing a <b>structured approach</b> to disaster risk management, these plans <b>enhance resilience</b> and contribute to <b>sustainable and risk-informed development</b>.</p>
<b>Disturbance Regime</b>	A <b>disturbance regime</b> refers to the <b>pattern, frequency, intensity, and types of natural or human-induced disturbances</b> affecting an ecosystem over time. These disturbances may include <b>wildfires, pest or insect outbreaks, floods, droughts, storms, and other environmental disruptions</b> . The characteristics of a disturbance regime play a crucial role in shaping <b>ecosystem dynamics, resilience, and biodiversity</b> .
<b>Diurnal Temperature Range</b>	The <b>diurnal temperature range (DTR)</b> refers to the <b>variation between the highest and lowest temperature recorded within a single day</b> . It represents the <b>difference between daytime maximum and night-time minimum temperatures</b> , influencing local climate conditions, weather patterns, and ecological processes.
<b>Dominant Species</b>	A <b>dominant species</b> is one that <b>prevails within an ecological community</b> , either due to its <b>high population, significant biomass, or strong influence on ecosystem structure and function</b> . These species play a crucial role in shaping habitat conditions and interactions within the ecosystem.
<b>Downscaling</b>	Downscaling is a technique used to generate <b>local- to regional-scale (10 to 100 km) climate information</b> from broader global or large-scale models. There are two primary approaches: <b>dynamical downscaling</b> , which utilizes high-resolution climate models, and <b>statistical downscaling</b> , which relies on observed data and statistical relationships. The accuracy of downscaled projections depends on the quality of the original large-scale model.
<b>Drivers of Deforestation and Forest Degradation</b>	As defined by <b>REDD</b> , the causes of deforestation and forest degradation are categorized into two levels: <ul style="list-style-type: none"> <li>● <b>National Drivers:</b> These include actions by <b>military personnel, government officials, and economic land concessions</b> that contribute to forest loss.</li> <li>● <b>Sub-National Drivers:</b> These consist of <b>forest fires, migrant encroachment, land speculation, agricultural expansion, illegal logging, and firewood consumption</b>, all of which accelerate the degradation of forested areas.</li> </ul>

<b>Drought</b>	Drought is a <b>prolonged period of significantly below-average precipitation</b> , leading to severe hydrological imbalances that negatively impact land resources, ecosystems, and production systems. It occurs when a region experiences a persistent deficiency in water supply, often resulting in adverse effects on agriculture, biodiversity, and local economies. While droughts can last for months or even years, even short-term droughts can cause substantial environmental and economic damage.
<b>Dryland Farming</b>	A farming technique that <b>maximizes crop production in arid or semi-arid regions</b> by conserving soil moisture and using drought-resistant seeds.
<b>Dynamical Downscaling</b>	A downscaling method that utilizes output from regional climate models, global models with variable spatial resolution, or high-resolution global models to generate detailed local or regional climate information.
<b>Early Warning System</b>	<b>A system comprising the necessary capabilities to produce and distribute timely and relevant warning information</b> , allowing individuals, communities, and organizations at risk from a hazard to take appropriate action in advance, minimizing potential harm or losses.
<b>Earth Summit</b>	The <b>Earth Summit</b> was a <b>global conference</b> held in <b>Rio de Janeiro from June 3-14, 1992</b> , aimed at <b>balancing economic development with environmental protection</b> . It was the <b>largest gathering of world leaders in history</b> , bringing together <b>117 heads of state and representatives from 178 countries</b> to address sustainable development challenges.
<b>Eccentricity</b>	Eccentricity refers to the <b>degree of deviation</b> in the <b>Earth's orbit around the Sun</b> from a <b>perfect circular shape</b> .
<b>Eco Tax</b>	An <b>eco-tax</b> is a levy designed to <b>encourage environmentally friendly behavior</b> by influencing <b>economic decisions</b> toward <b>sustainable and ecologically responsible practices</b> .
<b>Ecological Community</b>	An <b>ecological community</b> refers to a <b>group of interacting species</b> that coexist in the same habitat. These species are <b>connected through various ecological interactions</b> , forming a <b>network of relationships</b> that influence each other's survival and ecosystem dynamics.
<b>Ecological Footprint</b>	The <b>ecological footprint</b> is a measure of <b>human impact on the environment</b> , assessing the <b>demand for natural resources</b> against the Earth's ability to <b>regenerate them</b> . It quantifies the amount of <b>land and water</b> required to sustain human consumption and absorb generated waste.
<b>Ecological Resilience</b>	<b>Ecological resilience</b> refers to the <b>capacity of an ecosystem to withstand disturbances</b> while maintaining its essential structure and functions. It allows the system to <b>absorb impacts</b> without crossing a threshold that would lead to a <b>fundamental change in its state</b> .
<b>Ecophysiological process</b>	<b>Ecophysiological processes</b> are the continuous biological mechanisms through which <b>individual organisms respond to environmental variability</b> , including <b>climate change</b> . These processes generally occur at a <b>microscopic or sub-organismal level</b> and are crucial for an organism's <b>tolerance to environmental stress</b> . They encompass a wide range of <b>adaptive responses</b> that define an organism's <b>absolute</b>

	<p><b>tolerance limits</b> to changing environmental conditions. Additionally, <b>Ecophysiological responses can influence species' geographic distribution</b> by determining their ability to survive in different habitats.</p>
<b>Ecosystem</b>	<p>An <b>ecosystem</b> is a <b>dynamic system</b> formed by the interaction between <b>living organisms</b> (such as plants, animals, and microorganisms) and <b>their physical environment</b> (including air, water, and soil). These interactions create a <b>stable, self-sustaining system</b> through the <b>cyclic exchange of materials and energy flow</b>.</p> <p>Ecosystems <b>vary in size</b>, ranging from <b>small-scale habitats</b> (like a pond or a patch of soil) to <b>large-scale systems</b> (such as forests, oceans, or even the entire biosphere). The boundaries of an ecosystem are <b>flexible</b>, depending on the <b>focus of study</b> or <b>level of ecological organization</b> being considered.</p>
<b>Ecosystem approach</b>	<p>The <b>ecosystem approach</b> is a <b>comprehensive strategy</b> for the <b>integrated management</b> of <b>land, water, and living resources</b> that promotes <b>conservation and sustainable use</b> in a <b>fair and balanced way</b>.</p> <p>This approach applies <b>scientific methodologies</b> focused on <b>biological organization levels</b>, considering the <b>structure, processes, functions, and interactions</b> within ecosystems. It acknowledges that <b>humans and their cultural diversity</b> are an <b>integral part</b> of many ecosystems.</p> <p>Given the <b>complex and dynamic nature</b> of ecosystems, the ecosystem approach emphasizes <b>adaptive management</b> to account for uncertainties and evolving environmental conditions. <b>Biodiversity conservation</b> and <b>ecosystem structure and function preservation</b> are key priorities to ensure the <b>continued provision of ecosystem services</b>.</p>
<b>Ecosystem-Based Adaptation (EbA)</b>	<p><b>Ecosystem-Based Adaptation (EbA)</b> encompasses <b>local and landscape-scale strategies</b> for managing ecosystems to <b>enhance resilience</b>, maintain <b>essential ecosystem services</b>, and <b>reduce the vulnerability</b> of people, their livelihoods, and nature in response to <b>climate change</b>.</p> <p>EbA focuses on <b>the management, conservation, and restoration</b> of ecosystems to ensure they continue providing critical services that <b>help communities adapt</b> to climate change impacts. This approach involves <b>collaborative efforts</b> among <b>governments, communities, conservation groups, development organizations, and other stakeholders</b>, fostering <b>local action and empowerment</b> to build <b>environmental and social resilience</b>.</p> <p>EbA and <b>Community-Based Adaptation (CBA)</b> are <b>mutually supportive</b>, working together to strengthen adaptation efforts at both <b>ecosystem and community levels</b>.</p>
<b>Ecosystem engineer</b>	<p><b>Ecosystem engineers</b> are animals that significantly <b>modify their ecosystems</b>, often by <b>creating or altering habitats</b>. Their impact extends to other species that depend on these modified environments.</p> <p>There are <b>two types</b> of ecosystem engineers:</p> <ol style="list-style-type: none"> <li>1. <b>Allogenic engineers</b> – These species <b>physically transform</b> biotic and abiotic materials in their habitats (e.g., <b>beavers</b> build dams that reshape waterways).</li> </ol>

	<p>2. <b>Autogenic engineers</b> – These organisms <b>modify their environment through their own biological changes</b> (e.g., <b>trees</b> provide shelter and oxygen as they grow).</p> <p><b>Examples:</b></p> <ul style="list-style-type: none"> <li>● <b>Elephants</b> play a crucial role in their ecosystems. Through their diet, they <b>gather and disperse seeds</b>, promoting plant growth that sustains various species. As they move through forests and savannahs, they <b>bring down brush and trees</b>, making food more accessible for smaller animals.</li> <li>● <b>Sharks</b> help maintain ocean health by <b>regulating fish populations</b>. Their diet supports the growth of <b>algae-eating fish</b>, preventing excessive algal blooms and ensuring a balanced marine ecosystem.</li> </ul>
<b>Ecosystem services</b>	<p><b>Ecosystem services</b> refer to the <b>benefits provided by nature</b> that support human life, such as <b>clean water, fertile soil, and organic matter decomposition</b>. These services are essential for our survival, yet they are threatened by <b>biodiversity loss and environmental degradation</b>.</p> <p>Ecosystem services can be categorized into <b>four types</b>:</p> <ol style="list-style-type: none"> <li>1. <b>Supporting services</b> – Fundamental processes like <b>biodiversity maintenance, soil formation, and primary productivity</b>, which sustain all other ecosystem services.</li> <li>2. <b>Provisioning services</b> – <b>Tangible resources</b> provided by ecosystems, such as <b>food, fiber, fresh water, and fish</b>.</li> <li>3. <b>Regulating services</b> – <b>Natural processes</b> that help maintain balance, including <b>flood control, climate regulation, and carbon sequestration</b>.</li> <li>4. <b>Cultural services</b> – <b>Non-material benefits</b> like <b>tourism, spiritual enrichment, and aesthetic appreciation</b> that enhance human well-being.</li> </ol> <p>The term <b>‘ecosystem goods and services’</b> is synonymous with <b>ecosystem services</b>. To safeguard these benefits, <b>integrated management of land, water, and living resources</b> is crucial. This approach not only <b>promotes conservation and sustainability</b> but also <b>reduces disaster risks</b>, ensuring the continued availability of these life-supporting services.</p>
<b>Ecotourism</b>	<p><b>Ecotourism</b> is a form of <b>tourism focused on natural environments</b>, often involving <b>wildlife observation</b>. It plays a crucial role in <b>raising awareness about threatened ecosystems</b> and <b>promoting the conservation of vulnerable species</b>.</p> <p>Beyond conservation, <b>ecotourism benefits local communities</b> by providing <b>alternative livelihoods and sustainable income sources</b>, reducing dependence on environmentally harmful activities.</p> <p><b>Example:</b></p> <ul style="list-style-type: none"> <li>● <b>Whale watching</b> is a successful ecotourism initiative that offers a <b>sustainable income alternative</b> for communities that once relied on <b>whaling</b> for economic survival.</li> </ul>

	By fostering a <b>deeper connection with nature</b> , ecotourism encourages <b>responsible travel practices</b> that contribute to both <b>environmental preservation and community well-being</b> .
<b>Effective Climate Sensitivity</b>	<p><b>Effective Climate Sensitivity</b> is a measure of the <b>strength of climate feedback</b> at a given time, which can <b>vary based on past forcing and the current climate state</b>.</p> <p>Unlike equilibrium climate sensitivity, this metric is <b>evaluated under evolving, non-equilibrium conditions</b> using <b>climate model outputs</b>. It helps in understanding <b>how the climate responds dynamically</b> to external forcings over time.</p>
<b>El Niño - Southern Oscillation (ENSO)</b>	<p><b>El Niño</b> is a <b>climate pattern</b> characterized by <b>above-average warming of surface waters</b> in the <b>east-central tropical Pacific Ocean</b>. This warming disrupts <b>global weather patterns</b>, affecting <b>rainfall, wind circulation, and temperatures worldwide</b>.</p> <p>El Niño is part of the <b>El Niño-Southern Oscillation (ENSO)</b>, a <b>coupled atmosphere-ocean phenomenon</b> that also includes its <b>opposite phase, La Niña</b>, which is marked by <b>cooler-than-average Pacific waters</b>.</p> <p><b>Key Features of El Niño:</b></p> <ul style="list-style-type: none"> <li>• <b>Occurs irregularly every 2 to 7 years and lasts several months.</b></li> <li>• Weakens <b>trade winds</b>, strengthening the <b>equatorial counter current</b>, which shifts warm waters from the <b>Indonesian region to the eastern Pacific</b>.</li> <li>• <b>Disrupts marine ecosystems</b>, particularly along the <b>coast of Ecuador and Peru</b>, where warm waters affect <b>fisheries</b>.</li> <li>• Causes <b>significant changes in wind patterns, sea surface temperatures, and precipitation</b> across the <b>Pacific and beyond</b>.</li> </ul> <p>Because ENSO influences <b>climatic conditions worldwide</b>, understanding its patterns is crucial for <b>climate predictions, disaster preparedness, and global weather forecasting</b>.</p>
<b>Embodied Energy</b>	<p><b>Embodied energy</b> refers to the <b>total energy required</b> to produce a material or product, considering its entire <b>life cycle</b>—from raw material extraction to processing, manufacturing, and transportation.</p> <p>In the context of <b>environment and climate change</b>, embodied energy plays a crucial role in <b>assessing the carbon footprint</b> of materials, particularly in <b>construction, manufacturing, and industrial sectors</b>.</p> <p>Since <b>high-embodied-energy materials</b> contribute significantly to <b>carbon emissions</b>, promoting <b>low-carbon alternatives, recycling, and sustainable production</b> is essential for <b>reducing environmental impact</b> and advancing <b>climate action goals</b>.</p>
<b>Emergency Management</b>	<b>Emergency management</b> refers to the <b>strategic organization and coordination of resources</b> to effectively <b>prepare for, respond to, and recover from emergencies</b> . In the context of <b>environment and climate change</b> , it is crucial for <b>mitigating the impacts of climate-related disasters</b> , such as <b>floods, wildfires, hurricanes, and heatwaves</b> . With <b>climate change intensifying extreme weather events</b> , integrating

	<p><b>sustainable practices and disaster risk reduction strategies</b> into emergency management is essential for <b>ensuring environmental and community resilience</b>.</p>
<b>Emergency Services</b>	<p><b>Emergency services</b> are <b>specialized agencies</b> responsible for <b>protecting people, property, and the environment</b> during <b>emergency situations</b>. In the context of <b>climate change and environmental disasters</b>, these services play a critical role in <b>mitigating the impacts of extreme weather events</b> such as <b>wildfires, floods, hurricanes, and heatwaves</b>.</p> <p><b>Key Functions of Emergency Services:</b></p> <ul style="list-style-type: none"> <li>● <b>Disaster Response &amp; Relief</b> – Rapid intervention to <b>rescue affected populations</b>, manage hazardous materials, and provide emergency aid.</li> <li>● <b>Environmental Protection</b> – Containing <b>pollution, chemical spills, and wildfires</b> to prevent long-term ecological damage.</li> <li>● <b>Climate Resilience &amp; Adaptation</b> – Implementing <b>risk assessments, early warning systems, and sustainable recovery strategies</b> to strengthen community preparedness.</li> </ul> <p>As <b>climate-related emergencies</b> become more frequent and severe, enhancing emergency services with <b>climate-smart policies and sustainable resource management</b> is crucial for <b>protecting both people and ecosystems</b>.</p>
<b>Emission Factor</b>	<p><b>Emission factor</b> refers to the <b>ratio of pollutants released</b> to the <b>amount of raw material processed or energy consumed</b>. It is a key metric for <b>assessing environmental impact and regulating emissions</b> across various industries.</p> <ul style="list-style-type: none"> <li>● <b>Measures pollution intensity</b>, helping in <b>tracking greenhouse gas (GHG) emissions</b> from sectors such as <b>energy, manufacturing, and transportation</b>.</li> <li>● <b>Example:</b> In <b>iron production</b>, the emission factor might represent <b>pounds of particulate matter emitted per ton of raw material processed</b>.</li> <li>● <b>Essential for climate policies</b>, as it enables <b>carbon footprint calculations, emissions reporting, and regulatory compliance</b>.</li> </ul> <p>Reducing <b>high emission factors</b> through <b>cleaner technologies, renewable energy, and process efficiency</b> is vital for <b>lowering industrial pollution and combating climate change</b>.</p>
<b>Emission Inventory</b>	<p>An <b>emission inventory</b> is a <b>detailed record of air pollutant emissions</b>, categorized by <b>source</b> and <b>quantity released into the atmosphere</b>. It serves as a <b>critical tool for environmental management and climate action</b> by enabling the <b>monitoring, regulation, and reduction of emissions</b>.</p> <ul style="list-style-type: none"> <li>● <b>Tracks pollution sources</b>, including <b>industrial activities, transportation, agriculture, and energy production</b>.</li> <li>● <b>Supports policy development</b> by providing data to <b>establish emission standards and climate mitigation strategies</b>.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Essential for air quality management</b>, helping to <b>assess environmental impacts</b> and <b>implement pollution control measures</b>.</li> </ul> <p>A well-maintained <b>emission inventory</b> is crucial for <b>reducing greenhouse gas (GHG) emissions</b>, improving <b>air quality</b>, and achieving <b>climate targets</b> through <b>sustainable and data-driven decision-making</b>.</p>
<b>Emission Standard</b>	<p>An <b>emission standard</b> is a <b>legally mandated or voluntarily agreed-upon limit</b> on the <b>number of pollutants</b> that can be released into the environment. These standards play a crucial role in <b>controlling air pollution, mitigating climate change, and protecting public health</b>.</p> <ul style="list-style-type: none"> <li>● <b>Regulates emissions from industries, vehicles, power plants, and other pollution sources</b> to minimize environmental impact.</li> <li>● <b>Often based on emission factors</b>, meaning they <b>set permissible limits rather than absolute caps on emissions</b>.</li> <li>● <b>Supports climate action goals</b> by encouraging the <b>adoption of cleaner technologies, fuel efficiency, and pollution control measures</b>.</li> </ul> <p><b>Strict emission standards</b> are essential for <b>reducing greenhouse gas (GHG) emissions</b>, improving <b>air quality</b>, and ensuring a <b>sustainable, low-carbon future</b>.</p>
<b>Emissions</b>	<p><b>Emissions</b> refer to the <b>release of gases and other substances into the atmosphere</b>, primarily as a result of <b>human activities</b> such as <b>manufacturing, energy production, and transportation</b>. In the context of <b>climate change</b>, emissions—especially <b>greenhouse gases (GHGs)</b> like <b>carbon dioxide (CO<sub>2</sub>)</b> and <b>methane (CH<sub>4</sub>)</b>—are the <b>key drivers of global warming</b>.</p> <ul style="list-style-type: none"> <li>● <b>Measured in terms of concentration</b> (e.g., <b>parts per million (ppm)</b> in the atmosphere) or <b>total quantity released over time</b>.</li> <li>● <b>Major sources</b> include <b>fossil fuel combustion, deforestation, agriculture, and industrial processes</b>.</li> <li>● <b>Since the 1800s</b>, the <b>rise in GHG emissions</b> has led to <b>climate change, extreme weather events, and ecosystem disruptions</b>.</li> <li>● <b>Includes both direct emissions</b> (e.g., <b>CO<sub>2</sub> from burning coal</b>) and <b>precursor emissions</b> (e.g., <b>nitrogen oxides that contribute to smog and ozone formation</b>).</li> </ul> <p><b>Reducing emissions</b> through <b>renewable energy, carbon capture, sustainable practices, and stricter regulations</b> is critical for <b>mitigating climate change and ensuring a healthier planet</b>.</p>
<b>Emissions Factor</b>	<p><b>Emissions Factor</b></p> <p>An <b>emissions factor</b> is a <b>standardized measure</b> that <b>quantifies emissions relative to a specific activity</b>, helping to assess the <b>environmental impact of industrial processes, energy consumption, and transportation</b>. It is a <b>key tool in climate action</b>, enabling <b>emissions tracking, carbon accounting, and regulatory compliance</b>.</p> <ul style="list-style-type: none"> <li>● <b>Expressed as emissions per unit of activity</b>, such as <b>grams of CO<sub>2</sub> per barrel of fossil fuel burned</b> or <b>kilograms of methane per ton of livestock manure</b>.</li> </ul>



	<ul style="list-style-type: none"> <li>• Used to estimate total emissions from various sectors, including energy, agriculture, transportation, and manufacturing.</li> <li>• Essential for carbon footprint analysis, helping businesses and policymakers develop emissions reduction strategies and meet climate targets.</li> </ul> <p>Lowering emissions factors through cleaner technologies, efficiency improvements, and renewable energy adoption is crucial for reducing greenhouse gas (GHG) emissions and mitigating climate change.</p>
Emissions Permit	<p>An emissions permit is an official authorization granted by a regulatory authority, allowing a country, industry, or company to emit a specified number of pollutants into the atmosphere. These permits are key instruments in climate policy, helping to limit greenhouse gas (GHG) emissions and promote sustainable industrial practices.</p> <ul style="list-style-type: none"> <li>• Can be non-transferable (assigned directly to an entity) or tradable (bought and sold under carbon trading or cap-and-trade systems).</li> <li>• Issued by governments, intergovernmental organizations, or environmental agencies to regulate emissions at national, regional, or sectoral levels.</li> <li>• Encourages emission reductions by setting caps and allowing entities to trade excess allowances, creating financial incentives for sustainable practices.</li> <li>• Supports global climate agreements, such as the Kyoto Protocol and the Paris Agreement, by helping nations meet carbon reduction commitments.</li> </ul> <p>Emissions permits are crucial for market-based climate solutions, ensuring that industries transition toward low-carbon technologies while adhering to environmental regulations.</p>
Emissions Quota	<p>An emissions quota is a designated share of the total permissible emissions assigned to a country or group of countries within an international climate framework. It is a key mechanism for regulating greenhouse gas (GHG) emissions, ensuring compliance with global climate agreements and promoting equitable resource allocation.</p> <ul style="list-style-type: none"> <li>• Establishes a cap on emissions, limiting the total amount of pollutants that can be released.</li> <li>• Assigned under international climate frameworks, such as the Kyoto Protocol and the Paris Agreement, to help nations meet their carbon reduction commitments.</li> <li>• Encourages sustainable development by distributing emission allowances while allowing flexibility through carbon trading mechanisms.</li> </ul>

	<ul style="list-style-type: none"> <li>• Supports global efforts to mitigate climate change by ensuring that <b>high-emission countries take responsibility</b> while allowing developing nations to grow sustainably.</li> </ul> <p>Emissions quotas play a crucial role in <b>global climate governance</b>, fostering <b>international cooperation</b>, <b>emissions reduction</b>, and the <b>transition to a low-carbon economy</b>.</p>
Emissions Reduction Unit	<p>An <b>Emissions Reduction Unit (ERU)</b> represents <b>one metric ton of carbon dioxide (CO<sub>2</sub>) reduced or sequestered</b> through a <b>Joint Implementation (JI) project</b>, as defined in <b>Article 6 of the Kyoto Protocol</b>. It is a key instrument in <b>international carbon markets</b>, contributing to <b>global efforts to mitigate climate change</b>.</p> <ul style="list-style-type: none"> <li>• Generated through <b>Joint Implementation (JI) projects</b>, which allow <b>industrialized countries to invest in emission reduction projects in other nations</b> to meet their <b>climate commitments</b>.</li> <li>• Calculated using <b>Global Warming Potential (GWP)</b>, ensuring that reductions are <b>quantified and comparable across different greenhouse gases</b>.</li> <li>• Can be <b>traded in carbon markets</b>, allowing countries and businesses to <b>offset their emissions</b> while supporting <b>sustainable development projects</b>.</li> <li>• Helps in <b>meeting emission reduction targets</b> under the <b>Kyoto Protocol and subsequent climate agreements</b>, facilitating the <b>transition to a low-carbon economy</b>.</li> </ul> <p>Emissions Reduction Units (ERUs) promote <b>international cooperation</b> in tackling climate change by enabling <b>cost-effective emission reductions</b> and incentivizing <b>sustainable practices worldwide</b>.</p>
Emissions scenario	<p>An <b>emissions scenario</b> is a <b>plausible projection of future emissions of radiatively active substances</b> (such as <b>greenhouse gases and aerosols</b>) based on <b>assumptions about socio-economic trends, technological advancements, and policy decisions</b>. These scenarios help <b>model climate change impacts</b> and <b>inform global climate policies</b>.</p> <ul style="list-style-type: none"> <li>• Developed to <b>estimate future emissions</b> and their potential impact on <b>global warming and climate change</b>.</li> <li>• Based on <b>coherent and internally consistent assumptions</b>, considering factors like <b>population growth, economic development, energy consumption, and technological progress</b>.</li> <li>• Used as <b>input for climate models</b> to compute <b>climate projections and inform mitigation strategies</b>.</li> <li>• The <b>Intergovernmental Panel on Climate Change (IPCC)</b> has developed key emissions scenarios over time: <ul style="list-style-type: none"> <li>○ <b>IS92 Scenarios (1992)</b> – The first comprehensive emissions scenarios used in the <b>Second Assessment Report (1996)</b>.</li> <li>○ <b>SRES Scenarios (2000)</b> – Updated emissions pathways that <b>excluded climate policies</b> and explored different <b>development trajectories</b>.</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ <b>Representative Concentration Pathways (RCPs) and Shared Socioeconomic Pathways (SSPs)</b> – More recent frameworks guiding the <b>latest climate assessments</b>.</li> </ul> <p><b>Emissions scenarios play a crucial role in climate science</b>, helping policymakers and researchers <b>assess risks, set emission reduction targets, and develop climate action strategies</b> to mitigate global warming.</p>
<b>Emissions Tax</b>	<p>An <b>emissions tax</b> is a <b>government-imposed levy on each unit of CO<sub>2</sub> equivalent emissions</b> from sources subject to taxation. This economic instrument is designed to <b>reduce greenhouse gas emissions</b> by placing a financial cost on pollution, encouraging industries and individuals to <b>adopt cleaner technologies and sustainable practices</b></p> <ul style="list-style-type: none"> <li>● <b>Directly targets carbon emissions</b>, making <b>polluters financially accountable</b> for their environmental impact.</li> <li>● Often applied to <b>fossil fuel consumption</b>, as nearly all <b>carbon in fossil fuels</b> is ultimately released as <b>carbon dioxide</b> into the atmosphere.</li> <li>● When imposed on the <b>carbon content of fossil fuels</b>, it is referred to as a <b>carbon tax</b>, which effectively functions as an emissions tax on <b>fossil fuel-related emissions</b>.</li> <li>● <b>Encourages a transition to renewable energy sources</b>, energy efficiency, and <b>low-carbon technologies</b> by making <b>high-emission activities more expensive</b>.</li> <li>● Can generate <b>revenue for climate action</b>, funding <b>green initiatives, adaptation measures, and environmental protection programs</b>.</li> </ul> <p><b>Emissions taxes are a key policy tool</b> in the fight against <b>climate change</b>, aligning <b>economic incentives with environmental responsibility</b> to <b>drive emissions reductions and sustainable development</b>.</p>
<b>Emissions Trading</b>	<p><b>Emissions Trading</b></p> <p><b>Emissions trading</b> is a <b>market-based mechanism</b> designed to <b>reduce greenhouse gas (GHG) emissions</b> efficiently by allowing entities to <b>buy and sell emission allowances</b>. It is one of the <b>three market mechanisms under the Kyoto Protocol</b>, enabling <b>Annex I countries</b> to <b>trade Kyoto Protocol units</b> to meet their emission reduction targets.</p> <ul style="list-style-type: none"> <li>● Functions as a <b>cap-and-trade system</b>, where a <b>maximum allowable emission limit (cap)</b> is set, and <b>emission allowances</b> are allocated accordingly.</li> <li>● Entities that <b>reduce emissions beyond their required limits</b> can <b>sell excess allowances</b> to those <b>exceeding their limits</b>, promoting <b>cost-effective emission reductions</b>.</li> <li>● <b>Trading can occur</b> at multiple levels, including <b>within companies (intra-company)</b>, <b>at the national level (domestic)</b>, and <b>between countries (international trading)</b>.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Article 17 of the Kyoto Protocol</b> establishes a <b>tradable quota system</b>, where assigned amounts are determined based on <b>emission reduction and limitation commitments</b> under <b>Annex B of the Protocol</b>.</li> <li>● Encourages <b>technological innovation</b> and <b>investment in cleaner solutions</b>, as companies that adopt low-carbon practices can <b>profit from selling unused allowances</b>.</li> <li>● Forms the basis for <b>global carbon markets</b>, including <b>regional initiatives like the EU Emissions Trading System (EU ETS)</b> and other national cap-and-trade programs.</li> </ul> <p><b>Emissions trading plays a crucial role in climate policy</b>, offering a flexible and economically viable approach to <b>meeting global climate targets while incentivizing emission reductions</b>.</p>
<b>Empirical /Statistical Downscaling</b>	<p><b>Empirical or statistical downscaling</b> refers to <b>techniques used to refine global climate model (GCM) outputs</b> by establishing <b>statistical relationships between large-scale atmospheric variables and local/regional climate conditions</b>.</p> <ul style="list-style-type: none"> <li>● <b>Bridges the gap between coarse-resolution climate models and localized climate impacts</b>, enabling <b>more precise regional climate projections</b>.</li> <li>● <b>Relies on historical climate data</b> to develop <b>statistical relationships</b> that can be applied to <b>future climate scenarios</b>.</li> <li>● Used to assess <b>climate change impacts</b> at finer scales, aiding in <b>policy-making, disaster risk reduction, and adaptation planning</b>.</li> <li>● Commonly applied in <b>hydrology, agriculture, urban climate resilience, and ecosystem management</b> to evaluate <b>localized climate risks</b>.</li> <li>● Complements <b>dynamical downscaling</b>, which uses <b>regional climate models (RCMs)</b>, by offering a <b>computationally efficient alternative</b> for generating <b>high-resolution climate data</b>.</li> </ul> <p><b>Empirical/statistical downscaling is crucial</b> for translating <b>global climate projections into actionable insights</b> for <b>local adaptation and mitigation strategies</b>.</p>
<b>Endangered (Species)</b>	<p>A species is classified as <b>endangered</b> when its <b>population declines to critically low levels</b>, posing a <b>high risk of extinction</b> in the near future.</p> <ul style="list-style-type: none"> <li>● <b>Habitat destruction, climate change, pollution, and poaching</b> are major threats driving species toward <b>endangerment</b>.</li> <li>● <b>Biodiversity loss due to endangered species</b> disrupts <b>ecosystem balance and functions</b>, affecting <b>food chains, pollination, and natural climate regulation</b>.</li> <li>● <b>Conservation efforts, such as habitat protection, legal frameworks, and breeding programs</b>, are essential to <b>prevent extinction</b>.</li> <li>● <b>Climate change accelerates species endangerment</b> by altering <b>temperature, precipitation patterns, and ecosystems</b>, making it difficult for species to <b>adapt and survive</b>.</li> </ul>

	<ul style="list-style-type: none"> <li>International agreements like <b>CITES (Convention on International Trade in Endangered Species)</b> and initiatives such as the <b>IUCN Red List</b> categorize species based on their <b>risk of extinction</b>, guiding <b>global conservation policies</b>.</li> </ul> <p>Protecting <b>endangered species</b> is <b>critical</b> to maintaining <b>ecological stability</b> and <b>mitigating climate change impacts</b> through <b>biodiversity conservation</b>.</p>
<b>Endemic</b>	<p>A species, ecosystem, or environmental condition is considered <b>endemic</b> when it is <b>restricted to a specific geographic region</b> and is <b>not naturally found elsewhere</b>.</p> <ul style="list-style-type: none"> <li><b>Endemic species</b> are uniquely adapted to their native <b>habitats</b>, often found in <b>islands, isolated ecosystems, or biodiversity hotspots</b>.</li> <li><b>Climate change, habitat destruction, and invasive species</b> pose severe threats to <b>endemic biodiversity</b>, as these species have <b>limited adaptability and migration potential</b>.</li> <li><b>Endemic ecosystems</b>—such as coral reefs or rainforests—play a crucial role in <b>carbon sequestration, climate regulation, and maintaining ecological balance</b>.</li> <li><b>Endemic diseases</b> are illnesses that persist <b>within a specific region or population</b> due to environmental conditions, such as <b>vector-borne diseases influenced by climate variations</b>.</li> <li><b>Conservation efforts</b>, including <b>protected areas, reforestation, and climate adaptation strategies</b>, are essential to <b>preserve endemic species and ecosystems</b> from the growing threats of <b>global warming and human activities</b>.</li> </ul> <p>Safeguarding <b>endemic biodiversity</b> is vital for <b>climate resilience, ecosystem stability, and long-term sustainability</b>.</p>
<b>Energy</b>	<p><b>Energy</b> is the <b>capacity to perform work or produce heat</b>, playing a fundamental role in <b>natural ecosystems and human activities</b>.</p> <ul style="list-style-type: none"> <li><b>Energy sources</b> are classified into <b>renewable (e.g., solar, wind, hydro, biomass, geothermal)</b> and <b>non-renewable (e.g., fossil fuels like coal, oil, and natural gas)</b>.</li> <li>The <b>transition to clean energy</b> is crucial for <b>mitigating climate change</b> and <b>reducing greenhouse gas (GHG) emissions</b>.</li> <li><b>Energy efficiency and sustainable energy use</b> help in <b>conserving natural resources</b> and <b>reducing environmental degradation</b>.</li> <li>The <b>global energy sector</b> is a major contributor to <b>carbon emissions</b>, making <b>decarbonization strategies</b>, such as <b>electrification and carbon capture technologies</b>, essential for climate action.</li> <li><b>Energy storage solutions</b> (e.g., batteries, hydrogen fuel cells) and <b>grid modernization</b> support the integration of <b>renewable energy</b> into power systems.</li> </ul> <p>Shifting towards <b>low-carbon energy solutions</b> is key to ensuring a <b>sustainable, climate-resilient future</b> while balancing <b>economic growth and environmental protection</b>.</p>

<b>Energy Efficiency</b>	<p><b>Energy efficiency</b> refers to <b>using less energy to achieve the same level of service or output</b>, thereby reducing <b>energy waste and environmental impact</b>. It is measured as the <b>ratio of useful energy output to total energy input</b> in a <b>conversion process or system</b>.</p> <ul style="list-style-type: none"> <li>● <b>Energy efficiency</b> plays a crucial role in <b>reducing greenhouse gas (GHG) emissions</b> by <b>lowering fossil fuel consumption</b>.</li> <li>● It applies to <b>buildings, appliances, industrial processes, and transportation</b>, helping to <b>conserve natural resources</b> and <b>mitigate climate change</b>.</li> <li>● <b>Energy-efficient technologies</b>, such as <b>LED lighting, smart grids, and fuel-efficient vehicles</b>, contribute to <b>sustainable energy use</b>.</li> <li>● A practical example is the <b>installation of energy-efficient stoves</b> by <b>IFAW and WTI in Assam, India</b>, which has helped <b>save over 10,000 trees</b> by reducing the demand for firewood.</li> <li>● <b>Economic benefits</b> include <b>lower energy costs, enhanced energy security, and job creation in green industries</b>.</li> </ul> <p>Enhancing <b>energy efficiency</b> is one of the <b>most cost-effective strategies</b> to achieve <b>climate goals, reduce emissions, and protect ecosystems</b> while ensuring <b>sustainable development</b>.</p>
<b>Energy Service</b>	<p><b>Energy service</b> refers to the <b>useful application of energy</b> to perform tasks that meet consumer needs, such as <b>lighting, heating, cooling, transportation, and industrial operations</b>.</p> <ul style="list-style-type: none"> <li>● <b>Energy services</b> are essential for <b>modern living</b>, but their <b>efficiency and sustainability</b> determine their <b>environmental impact</b>.</li> <li>● The transition to <b>clean energy sources</b> such as <b>solar, wind, and hydropower</b> can significantly <b>reduce greenhouse gas (GHG) emissions</b> while maintaining reliable <b>energy services</b>.</li> <li>● <b>Improving energy efficiency</b> in <b>buildings, industries, and transportation</b> can enhance <b>energy service delivery</b> while <b>minimizing energy waste</b>.</li> <li>● Sustainable <b>energy services</b> contribute to <b>climate resilience</b> by ensuring <b>equitable access to clean energy</b> while reducing reliance on <b>fossil fuels</b>.</li> </ul> <p>Shifting towards <b>low-carbon, energy-efficient technologies</b> in <b>energy services</b> is crucial for <b>combating climate change</b> and promoting <b>sustainable development</b>.</p>
<b>ENERGY STAR</b>	<p><b>ENERGY STAR</b> is a <b>voluntary program</b> led by the <b>U.S. Environmental Protection Agency (EPA)</b> that helps <b>businesses and individuals</b> adopt <b>energy-efficient solutions</b> to <b>reduce costs and mitigate climate change</b>.</p> <ul style="list-style-type: none"> <li>● <b>ENERGY STAR-certified products, buildings, and appliances</b> meet <b>high energy efficiency standards</b>, leading to <b>lower energy consumption</b> and <b>reduced greenhouse gas (GHG) emissions</b>.</li> </ul>

	<ul style="list-style-type: none"> <li>• The program promotes <b>sustainable energy use</b> in <b>residential, commercial, and industrial sectors</b>, encouraging a <b>transition toward a low-carbon economy</b>.</li> <li>• <b>By reducing energy waste</b>, ENERGY STAR helps <b>conserve natural resources</b>, decrease dependence on <b>fossil fuels</b>, and enhance <b>climate resilience</b>.</li> <li>• Consumers and businesses using <b>ENERGY STAR-labelled products</b> contribute to <b>environmental sustainability</b> while benefiting from <b>lower utility bills and long-term cost savings</b>.</li> </ul> <p>ENERGY STAR plays a <b>critical role</b> in <b>climate action</b> by fostering <b>energy efficiency, carbon footprint reduction, and sustainable development</b>.</p>
<b>Energy Tax</b>	<p>An <b>energy tax</b> is a <b>levy imposed on the energy content of fuels</b> to <b>discourage excessive energy consumption</b> and <b>reduce carbon dioxide (CO<sub>2</sub>) emissions</b> from <b>fossil fuel use</b>.</p> <ul style="list-style-type: none"> <li>• <b>Energy taxes</b> aim to <b>curb greenhouse gas (GHG) emissions</b> by making <b>high-carbon energy sources more expensive</b>, thereby incentivizing <b>cleaner energy alternatives</b>.</li> <li>• By <b>reducing demand for fossil fuels</b>, energy taxes support the <b>transition to renewable energy sources</b> such as <b>solar, wind, and hydroelectric power</b>.</li> <li>• <b>Governments use energy taxation</b> as an instrument for <b>climate policies</b>, promoting <b>energy efficiency</b> and <b>sustainable consumption patterns</b>.</li> <li>• Revenue generated from <b>energy taxes</b> can be reinvested in <b>climate adaptation and mitigation projects, green technologies, and public transportation improvements</b>.</li> </ul> <p><b>Energy taxation</b> is a <b>key tool</b> for <b>climate action</b>, driving <b>emission reductions, energy efficiency, and the adoption of sustainable energy solutions</b>.</p>
<b>Energy Transformation</b>	<p><b>Energy transformation</b> refers to the <b>conversion of energy from one form to another</b>, such as the <b>conversion of fossil fuel energy into electricity</b> or <b>solar energy into heat and power</b>.</p> <ul style="list-style-type: none"> <li>• <b>Energy transformation</b> plays a <b>critical role in the transition to clean energy</b>, as it enables the <b>conversion of renewable sources</b> like <b>wind, solar, and hydropower</b> into <b>usable energy</b>.</li> <li>• Traditional <b>fossil fuel-based energy transformations</b> contribute to <b>greenhouse gas (GHG) emissions</b>, whereas <b>renewable energy transformations</b> offer <b>low-carbon alternatives</b>.</li> <li>• <b>Advancements in energy storage and smart grids</b> are improving the <b>efficiency and sustainability of energy transformations</b>, making <b>clean energy</b> more accessible.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Decarbonizing energy transformation processes</b> is essential for achieving global climate targets and reducing environmental impact.</li> </ul> <p>A sustainable energy transformation is key to mitigating climate change, enhancing energy security, and promoting a low-carbon economy.</p>
<b>Energy transition</b>	<p><b>Energy transition</b> refers to the systematic shift from fossil fuel-based energy sources—such as coal, oil, and natural gas—to renewable and low-carbon energy alternatives, including solar, wind, hydropower, and bioenergy.</p> <p>The traditional energy sector is a major contributor to climate change, with fossil fuel combustion being the primary source of greenhouse gas (GHG) emissions.</p> <ul style="list-style-type: none"> <li>● <b>Energy transition is essential for reducing carbon footprints</b>, enhancing energy security, and mitigating the impacts of climate change.</li> <li>● It involves <b>decarbonization of energy production, electrification of key sectors, and advancements in energy storage and efficiency.</b></li> <li>● <b>Global policies, technological innovations, and financial investments</b> are driving the acceleration of this transition.</li> <li>● <b>Achieving a sustainable energy transition</b> is crucial for meeting international climate goals, such as those outlined in the Paris Agreement.</li> </ul> <p>A successful energy transition will pave the way for a cleaner, more resilient, and climate-friendly energy future.</p>
<b>Engineering Resilience</b>	<p><b>Engineering resilience</b> refers to the ability of a system to recover and return to its original state after a disturbance or external shock.</p> <ul style="list-style-type: none"> <li>● In the face of <b>climate change-induced disruptions</b>, such as extreme weather events, natural disasters, and ecosystem degradation, engineering resilience plays a crucial role in <b>designing climate-resilient infrastructure and adaptive systems.</b></li> <li>● It is widely applied in <b>urban planning, water resource management, and energy systems</b> to ensure <b>rapid recovery and minimal functional loss</b> after disturbances.</li> <li>● <b>Enhancing engineering resilience</b> is essential for <b>climate adaptation strategies</b>, helping communities withstand rising sea levels, flooding, heatwaves, and other environmental stresses.</li> <li>● The concept is used in <b>eco-engineering approaches</b> that integrate <b>nature-based solutions</b> with traditional infrastructure to improve long-term <b>sustainability and climate resilience.</b></li> </ul> <p>By <b>strengthening engineering resilience</b>, societies can <b>better prepare for climate-related challenges and build a more sustainable and adaptive future.</b></p>



<b>Enhanced Greenhouse Effect</b>	<p>The <b>enhanced greenhouse effect</b> refers to the <b>intensification of Earth's natural greenhouse effect due to increased concentrations of greenhouse gases (GHGs) such as carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>), primarily from human activities.</b></p> <ul style="list-style-type: none"> <li>● <b>Human-induced emissions</b> from <b>burning fossil fuels, deforestation, industrial processes, and agriculture</b> have significantly increased GHG levels in the atmosphere.</li> <li>● This leads to <b>higher heat retention</b>, causing <b>global temperatures to rise</b>, resulting in <b>climate change</b> and associated impacts such as <b>sea-level rise, extreme weather events, and biodiversity loss.</b></li> <li>● Unlike the <b>natural greenhouse effect</b>, which is essential for maintaining Earth's habitable temperature, the <b>enhanced greenhouse effect disrupts climate stability</b>, accelerating <b>global warming</b> beyond natural variations.</li> <li>● <b>Mitigating the enhanced greenhouse effect</b> requires <b>reducing carbon emissions, transitioning to renewable energy, enhancing carbon sinks (forests and oceans), and adopting sustainable land-use practices.</b></li> </ul> <p>Addressing the <b>enhanced greenhouse effect</b> is critical for <b>limiting climate change impacts and ensuring a sustainable future for ecosystems and human societies.</b></p>
<b>Ensemble</b>	<p>In <b>climate science</b>, an <b>ensemble</b> refers to a <b>group of parallel model simulations</b> used for <b>climate projections</b>, helping to estimate <b>uncertainty</b> in future climate scenarios.</p> <ul style="list-style-type: none"> <li>● <b>Ensemble modelling</b> involves multiple simulations that differ in <b>initial conditions or model structures</b>, providing a <b>range of possible climate outcomes.</b></li> <li>● <b>Single-model ensembles</b> with varying <b>initial conditions</b> help assess <b>uncertainty due to internal climate variability.</b></li> <li>● <b>Multi-model ensembles</b>, which include simulations from <b>different climate models</b>, account for <b>uncertainty due to model differences</b> and improve <b>confidence in climate projections.</b></li> <li>● These simulations are crucial for <b>policymakers and scientists</b> to understand <b>climate risks, plan adaptation strategies, and design mitigation measures.</b></li> </ul> <p>By analysing <b>ensemble projections</b>, scientists can better <b>predict temperature trends, extreme weather events, and long-term climate patterns</b>, enhancing <b>climate resilience and decision-making.</b></p>
<b>Enteric Fermentation</b>	<p>In the <b>agriculture sector</b>, <b>enteric fermentation</b> is a <b>natural digestive process in livestock, particularly cattle</b>, that generates <b>methane (CH<sub>4</sub>), a potent greenhouse gas.</b></p> <ul style="list-style-type: none"> <li>● <b>Methane emissions from enteric fermentation</b> account for <b>one-third of agricultural sector emissions</b>, making it a <b>significant contributor to climate change.</b></li> </ul>

	<ul style="list-style-type: none"> <li>● This process occurs when <b>microorganisms in the digestive system</b> break down food, producing <b>methane as a by-product</b>, which is then <b>released into the atmosphere through belching</b>.</li> <li>● <b>Cattle, sheep, and other ruminants</b> are the primary sources, with <b>cattle being the largest emitters</b> due to their <b>large numbers and unique digestive system</b>.</li> <li>● Strategies to <b>reduce methane emissions</b> from enteric fermentation include <b>improving animal diets, using feed additives, and adopting sustainable livestock management practices</b>.</li> <li>● <b>Mitigating methane emissions</b> from livestock is essential for <b>reducing agricultural greenhouse gas emissions and achieving global climate goals</b>.</li> </ul> <p>Addressing <b>enteric fermentation emissions</b> is a key focus in <b>climate action efforts</b>, particularly in the pursuit of <b>sustainable agriculture and methane reduction commitments</b>.</p>
<b>Environment</b>	<p>The <b>environment</b> refers to all <b>living (biotic) and non-living (abiotic) components</b> that exist <b>naturally on Earth or within a specific region</b>.</p> <ul style="list-style-type: none"> <li>● It includes <b>air, water, soil, ecosystems, and biodiversity</b>, all of which are <b>interconnected and essential for sustaining life</b>.</li> <li>● The <b>global environment is under increasing pressure</b> due to <b>climate change, pollution, deforestation, and biodiversity loss</b>.</li> <li>● <b>Human activities</b>, such as <b>industrialization, fossil fuel combustion, and deforestation</b>, have significantly <b>altered the natural environment</b>, leading to <b>global warming and ecosystem degradation</b>.</li> <li>● Protecting and restoring the <b>environment</b> is crucial for <b>climate resilience, sustainability, and the well-being of future generations</b>.</li> </ul> <p>A <b>healthy environment</b> is fundamental to <b>climate stability, biodiversity conservation, and sustainable development</b>.</p>
<b>Environment Impact Auditing</b>	<p><b>Environmental Impact Auditing</b> refers to the <b>systematic assessment of a business's environmental compliance, performance, and management practices</b> to ensure adherence to <b>environmental regulations, sustainability principles, and best practices</b>.</p> <ul style="list-style-type: none"> <li>● It evaluates whether an organization is <b>meeting environmental protection requirements</b> and following <b>sound environmental practices</b>.</li> <li>● It plays a critical role in <b>identifying and mitigating environmental risks</b>, such as <b>pollution, resource depletion, and carbon emissions</b>.</li> <li>● <b>Environmental audits</b> help in <b>enhancing sustainability strategies, improving corporate environmental responsibility, and ensuring alignment with climate goals</b>.</li> <li>● In many cases, <b>environmental impact auditing is mandatory</b> under <b>national and international environmental laws</b> to ensure <b>compliance and accountability</b>.</li> </ul>

		By conducting <b>regular environmental audits</b> , businesses and industries can <b>minimize their ecological footprint, enhance transparency, and contribute to a sustainable future.</b>
<b>Environment Monitoring</b>	<b>Impact</b>	<p><b>Environmental Impact Monitoring</b> refers to the <b>systematic observation and assessment of environmental conditions and the factors influencing them</b> to track changes and support sustainable decision-making.</p> <ul style="list-style-type: none"> <li>● It is crucial for <b>detecting and predicting environmental changes</b> caused by <b>human activities, industrial operations, and climate variability.</b></li> <li>● Helps in <b>tracking pollution levels, biodiversity loss, and ecosystem degradation</b>, providing <b>early warning signs</b> for potential environmental crises.</li> <li>● Plays a vital role in <b>climate adaptation and mitigation strategies</b> by offering <b>scientific data</b> for developing <b>sustainable policies and regulations.</b></li> <li>● Provides <b>essential baseline data</b> for <b>environmental planning, impact assessments, and conservation projects.</b></li> <li>● The <b>procedure for environmental monitoring is legally mandated</b> in many regions to ensure <b>accountability and compliance</b> with <b>environmental protection laws.</b></li> </ul> <p>By implementing <b>effective environmental monitoring systems</b>, governments, industries, and organizations can <b>mitigate environmental risks, improve resource management, and support global sustainability efforts.</b></p>
<b>Environmental Audit</b>		An <b>environmental audit</b> is an <b>independent evaluation</b> of an entity's <b>adherence to environmental laws, regulations, and sustainability standards.</b> It helps identify areas for improvement in <b>environmental performance and compliance.</b>
<b>Environmental Degradation</b>		<b>Environmental degradation</b> refers to the <b>decline in the environment's ability</b> to support <b>social and ecological needs.</b> It can <b>increase the frequency and severity of natural disasters</b> , making communities more <b>vulnerable.</b> <b>Human-induced degradation</b> includes <b>deforestation, soil erosion, desertification, loss of biodiversity, pollution (air, water, and land), climate change, sea level rise, and ozone depletion.</b>
<b>Environmental Assessment</b>	<b>Impact</b>	<p><b>Environmental Impact Assessment (EIA)</b> is a <b>systematic process</b> used to evaluate the potential <b>environmental consequences</b> of a proposed project, policy, or development activity <b>before implementation.</b> The objective of an EIA is to ensure that <b>environmental factors are integrated into decision-making</b>, minimizing or mitigating adverse effects on ecosystems, biodiversity, and human health.</p> <p>EIA is an essential <b>policy tool</b> that provides <b>scientific evidence and analysis</b> to assess how projects—from infrastructure development to industrial expansion—impact air, water, land, and local communities. It plays a critical role in <b>sustainable development</b> by ensuring that environmental concerns are considered <b>from project conception to decision-making.</b></p> <p>EIA is widely used in <b>national policy frameworks</b> and <b>international development initiatives</b>, particularly in sectors like <b>energy, mining, urban planning, and industrial manufacturing.</b> It involves:</p>

	<ul style="list-style-type: none"> <li>● <b>Screening</b> – Determining whether an EIA is required for a specific project.</li> <li>● <b>Scoping</b> – Identifying the <b>key environmental issues</b> and the scope of assessment.</li> <li>● <b>Impact Analysis</b> – Evaluating <b>potential environmental, social, and economic impacts</b>.</li> <li>● <b>Mitigation Measures</b> – Proposing alternatives and strategies to <b>minimize or eliminate</b> environmental harm.</li> <li>● <b>Public Participation</b> – Engaging <b>local communities and stakeholders</b> to consider their concerns.</li> <li>● <b>Decision-Making &amp; Monitoring</b> – Approving the project based on environmental feasibility and ensuring compliance through ongoing monitoring.</li> </ul> <p>A well-conducted <b>EIA</b> not only identifies risks but also provides <b>solutions, alternatives, and best practices</b> to promote environmentally responsible development. It is a <b>legal requirement</b> in many countries and serves as a <b>guiding principle</b> for sustainable planning, reducing conflicts between development and environmental conservation.</p>
<b>Environmental Refugee</b>	<p>An <b>Environmental Refugee</b> is an individual or community that is <b>forced to migrate</b> from their homeland due to <b>sudden or long-term environmental changes</b> that threaten their livelihood, safety, or well-being. These environmental disruptions can be caused by <b>natural disasters, climate change, or human-induced environmental degradation</b>.</p> <p><b>Key causes of environmental displacement include:</b></p> <ul style="list-style-type: none"> <li>● <b>Extreme Weather Events</b> – Hurricanes, typhoons, and cyclones displacing coastal communities.</li> <li>● <b>Sea-Level Rise</b> – Submerging low-lying islands and coastal cities, making them uninhabitable.</li> <li>● <b>Desertification &amp; Drought</b> – Depleting water resources, reducing agricultural productivity, and forcing rural populations to relocate.</li> <li>● <b>Deforestation &amp; Land Degradation</b> – Leading to loss of arable land and increasing vulnerability to landslides and soil erosion.</li> <li>● <b>Glacial Melting &amp; River Flooding</b> – Increasing risks of displacement in mountainous and riverine regions.</li> </ul> <p>When migration is <b>involuntary</b> and driven by <b>climate-induced disasters</b>, the term <b>Climate Refugee</b> is often used. However, <b>international law does not yet recognize climate refugees as a formal category</b>, leading to challenges in providing them with legal protection and support.</p> <p><b>Implications of Environmental Migration:</b></p> <ul style="list-style-type: none"> <li>● <b>Social &amp; Economic Strain</b> – Increased pressure on urban areas and host communities.</li> <li>● <b>Loss of Cultural Heritage</b> – Forced displacement disrupts traditional ways of life and local identities.</li> <li>● <b>Political &amp; Legal Challenges</b> – Lack of international frameworks to protect displaced populations.</li> </ul>

		As <b>climate change intensifies</b> , the number of <b>environmental refugees is expected to rise</b> , making it crucial to develop <b>adaptive strategies, policy responses, and international agreements</b> to address this growing humanitarian and environmental challenge.
<b>Environmentally Sound Technologies</b>	<b>Sound</b>	<p><b>Environmentally Sound Technologies (ESTs)</b> are <b>innovative solutions</b> that aim to <b>protect the environment, reduce pollution, and promote sustainable resource use</b> while aligning with <b>national socio-economic, cultural, and environmental priorities</b>. These technologies are designed to <b>minimize environmental impact</b>, enhance <b>energy and resource efficiency</b>, and improve <b>waste management</b> compared to traditional alternatives.</p> <p><b>Key Characteristics of ESTs:</b></p> <ul style="list-style-type: none"> <li>● <b>Lower Environmental Impact</b> – Produce <b>fewer emissions and pollutants</b>, reducing their contribution to climate change.</li> <li>● <b>Efficient Resource Utilization</b> – Optimize the use of <b>water, energy, and raw materials</b>, reducing wastage.</li> <li>● <b>Sustainable Waste Management</b> – Encourage <b>recycling, reuse, and safer disposal</b> of waste materials.</li> <li>● <b>Adaptability &amp; Compatibility</b> – Can be <b>tailored to local environmental and socio-economic conditions</b>, making them viable across different regions.</li> </ul> <p><b>Examples of Environmentally Sound Technologies:</b></p> <ul style="list-style-type: none"> <li>● <b>Renewable Energy Systems</b> – Solar, wind, hydro, and geothermal energy that replace fossil fuels and reduce greenhouse gas emissions.</li> <li>● <b>Energy-Efficient Technologies</b> – LED lighting, smart grids, and high-efficiency appliances that lower energy consumption.</li> <li>● <b>Sustainable Agriculture Practices</b> – Precision farming, organic fertilizers, and agroforestry that minimize soil degradation and water use.</li> <li>● <b>Eco-Friendly Industrial Processes</b> – Cleaner production methods and circular economy principles that reduce waste generation.</li> <li>● <b>Green Transportation Solutions</b> – Electric vehicles, fuel-efficient public transport, and non-motorized transport options that cut down air pollution.</li> </ul> <p>The <b>adoption and promotion</b> of <b>Environmentally Sound Technologies</b> are essential for achieving <b>sustainable development goals (SDGs)</b>, <b>reducing climate risks, and transitioning towards a low-carbon economy</b>. Governments, businesses, and communities must collaborate to <b>scale up innovation, provide financial incentives, and strengthen policy frameworks</b> to accelerate the deployment of ESTs globally.</p>
<b>Epidemic</b>		An <b>epidemic</b> refers to the <b>sudden and widespread occurrence of a disease, infection, or health-related event</b> within a specific population or geographic region, exceeding the normal expected levels. While epidemics are often associated with <b>infectious diseases</b> , they can also include <b>non-communicable diseases, environmental hazards, and climate-related health crises</b> . With climate change increasing the

		frequency and severity of <b>epidemics</b> , urgent <b>policy actions</b> , <b>global cooperation</b> , and <b>sustainable development</b> are necessary to <b>mitigate health risks and build resilient communities</b> .
<b>Equilibrium Experiment</b>	<b>Climate</b>	<p>An <b>Equilibrium Climate Experiment</b> is a <b>model-based scientific study</b> where a <b>climate system is allowed to fully adjust</b> to a <b>change in radiative forcing</b> (such as increased greenhouse gas concentrations or variations in solar radiation). These experiments provide insights into the <b>final equilibrium state</b> of the climate after the forcing stabilizes but do <b>not capture the time-dependent response</b> or transient changes occurring during the adjustment phase.</p> <p><b>Key Aspects of Equilibrium Climate Experiments:</b></p> <ul style="list-style-type: none"> <li>• <b>Long-Term Climate Response:</b> Unlike transient climate experiments, which focus on gradual changes over time, equilibrium experiments reveal <b>how the climate system would eventually stabilize</b> after external forcing.</li> <li>• <b>Climate Sensitivity Estimation:</b> They help scientists estimate <b>Equilibrium Climate Sensitivity (ECS)</b>, which measures the global temperature increase resulting from a doubling of CO<sub>2</sub> concentrations.</li> <li>• <b>Impacts on Global Climate Models (GCMs):</b> These experiments are crucial for refining <b>General Circulation Models (GCMs)</b> and improving <b>climate projections</b> used in policy-making and mitigation strategies.</li> <li>• <b>Limitations:</b> Since equilibrium experiments do <b>not consider the rate of change</b> in climate variables, they may overlook short-term climate feedback mechanisms, such as <b>ice sheet melting, ocean circulation shifts, and abrupt weather pattern disruptions</b>.</li> </ul> <p>As climate change accelerates, <b>equilibrium climate experiments remain critical for understanding the Earth's long-term climate trajectory</b>, helping shape more effective and sustainable climate action policies.</p>
<b>Equilibrium Sensitivity</b>	<b>Climate</b>	<p><b>Equilibrium Climate Sensitivity (ECS)</b> refers to the <b>long-term change in global mean surface temperature</b> that occurs once the climate system fully adjusts to a <b>doubling of atmospheric CO<sub>2</sub> concentrations</b> compared to pre-industrial levels. More broadly, it represents the <b>stabilized change in surface air temperature</b> resulting from a <b>unit change in radiative forcing</b> (measured in °C per W/m<sup>2</sup>).</p> <p><b>Key Aspects of Equilibrium Climate Sensitivity:</b></p> <ul style="list-style-type: none"> <li>• <b>Indicator of Long-Term Warming:</b> ECS is a <b>crucial metric for understanding global warming</b> and predicting how Earth's climate will respond to sustained greenhouse gas emissions.</li> <li>• <b>Derived from Climate Models:</b> It is typically estimated using <b>complex coupled General Circulation Models (GCMs)</b>, which require <b>long-term simulations</b> to assess the Earth's full climate response.</li> <li>• <b>Range of Sensitivity Estimates:</b> Scientific studies suggest ECS values typically range between <b>1.5°C to 4.5°C</b>, with uncertainties due to <b>cloud feedbacks, ocean heat uptake, and atmospheric processes</b>.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Different from Transient Climate Sensitivity (TCS):</b> Unlike <b>Transient Climate Sensitivity (TCS)</b>, which measures <b>shorter-term warming trends</b>, ECS represents the <b>final stabilized temperature increase</b> after the climate system reaches a new equilibrium.</li> </ul> <p>As climate models improve, <b>refining ECS estimates remains a priority</b> for climate science, ensuring that global efforts to combat climate change are <b>based on accurate projections of Earth's future warming trajectory</b>.</p>
<b>Equilibrium Line in Glacial Systems</b>	<p>The <b>equilibrium line</b> on a glacier is the altitude at which <b>the net mass balance is zero</b>, meaning that <b>ice accumulation from snowfall is exactly balanced by ice loss through ablation (melting and sublimation)</b>. This marks the transition where the <b>growth of the glacier due to snowfall is offset by the loss of ice</b>.</p> <p>Below the <b>equilibrium line</b>, ice and snow experience <b>significant melting</b> during warmer seasons, preventing snow from persisting year-round. Above this line, <b>accumulation dominates</b>, contributing to glacier expansion. The position of the equilibrium line is a <b>key indicator of climate change</b>, as shifts in temperature and precipitation patterns directly influence its altitude.</p>
<b>Erosion</b>	<p><b>Erosion</b> is the <b>natural process of soil and rock removal and transport</b> caused by <b>weathering, gravity-driven mass movements, and the action of environmental forces such as rivers, glaciers, ocean waves, winds, and underground water</b>. This process <b>reshapes landscapes over time</b> but can be accelerated by <b>deforestation, unsustainable land use, and climate change</b>, leading to <b>soil degradation, loss of agricultural productivity, and increased vulnerability to natural disasters</b>.</p>
<b>Ethnic group</b>	<p>An <b>ethnic group</b> is a community of people who share a <b>common heritage, language, culture, and often religious beliefs</b>, fostering a sense of collective identity. Members of an ethnic group typically emphasize <b>shared ancestry, traditions, and social ties</b>, which may influence customs, practices, and even patterns of marriage within the group (endogamy).</p>
<b>Eustatic Sea Level Rise</b>	<p><b>Eustatic sea level rise</b> refers to a <b>global increase in sea levels caused by changes in the volume of the world's oceans</b>. This phenomenon is primarily driven by <b>thermal expansion of seawater due to global warming and the melting of land-based ice sheets and glaciers</b>. Unlike local sea level changes influenced by land subsidence or uplift, <b>eustatic rise affects coastlines worldwide, increasing the risk of coastal erosion, flooding, and habitat loss for marine and terrestrial ecosystems</b>. It is a significant indicator of <b>climate change</b> and has far-reaching implications for <b>coastal communities, infrastructure, and biodiversity</b>.</p>
<b>Eutrophication</b>	<p><b>Eutrophication</b> is the process by which a <b>water body, often a lake or coastal area, becomes enriched with excessive nutrients</b>, primarily <b>nitrogen and phosphorus</b>. This can occur <b>naturally over long periods</b> or be <b>accelerated by human activities</b>, such as <b>agricultural runoff, wastewater discharge, and industrial pollution</b>. The excess nutrients <b>stimulate excessive algal growth (algal blooms)</b>, which <b>depletes oxygen levels in the water</b> when the algae decompose. This results in <b>seasonal or persistent oxygen deficiency (hypoxia)</b>, <b>harming aquatic life and disrupting ecosystems</b>. <b>Eutrophication contributes to biodiversity loss, fish kills, and the degradation of water quality</b>, making it a critical environmental concern in the context of <b>climate change and sustainable water management</b>.</p>

Evaporation	<p>Evaporation is the process by which water transitions from a liquid state to a gaseous state (water vapor) due to heat energy from the sun. This natural process plays a crucial role in the water cycle, influencing weather patterns, cloud formation, and global climate regulation. Increased temperatures due to climate change accelerate evaporation rates, which can lead to more intense droughts, shifts in precipitation patterns, and reduced water availability in certain regions. Additionally, higher evaporation from oceans and water bodies contributes to extreme weather events such as heavy rainfall and storms. Managing water conservation and sustainable land use practices is essential to mitigate the adverse impacts of accelerated evaporation in a warming climate.</p>
Evapotranspiration	<p>Evapotranspiration is the combined process of water loss from the Earth's surface through evaporation and from vegetation through transpiration. This natural process plays a vital role in the global water cycle, regulating moisture levels in ecosystems and influencing climate patterns. Higher temperatures due to climate change can accelerate evapotranspiration rates, leading to faster soil moisture depletion, reduced groundwater recharge, and increased drought risks. Conversely, changes in land use, such as deforestation and urbanization, can disrupt evapotranspiration, affecting local and regional climate dynamics. Sustainable water management and afforestation efforts are crucial to mitigating the negative impacts of altered evapotranspiration rates on agriculture, biodiversity, and water resources.</p>
Exhaust Emission	<p>Exhaust emissions refer to the gases released into the atmosphere due to the combustion of fossil fuels such as gasoline, diesel, coal, natural gas, and fuel oil. These emissions are discharged through exhaust pipes, flue gas stacks, or propulsion nozzles in vehicles, industrial facilities, and power plants. Key pollutants in exhaust emissions include carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), nitrogen oxides (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), and particulate matter (PM), all of which contribute to air pollution and climate change.</p> <p>Transportation and industrial sectors are major contributors to exhaust emissions, significantly impacting air quality, human health, and global warming. Reducing exhaust emissions through cleaner fuels, electric vehicles (EVs), improved combustion efficiency, and stricter emission regulations is essential for mitigating climate change and protecting environmental and public health.</p>
Expert Group on Technology Transfer (EGTT)	<p>The Expert Group on Technology Transfer (EGTT) was established at COP-7 with the objective of enhancing the implementation of Article 4.5 of the United Nations Framework Convention on Climate Change (UNFCCC). Its primary role is to analyze, identify, and facilitate the transfer of environmentally sound technologies (ESTs) from developed to developing countries to support climate change mitigation and adaptation efforts.</p> <p>Technology transfer is a crucial component in global climate action, as it enables developing nations to access low-carbon technologies, improve energy efficiency, and build resilience against climate-related challenges. The EGTT works to strengthen capacity-building, financial mechanisms, and policy frameworks to accelerate technology deployment and ensure alignment with national and international climate goals.</p>



<b>Exposure</b>	<p><b>Exposure</b> refers to the <b>degree to which people, ecosystems, infrastructure, or economic assets are subjected to climate-related hazards</b>. It encompasses both <b>long-term shifts in climate conditions</b> (such as rising temperatures or changing precipitation patterns) and <b>short-term climate variability</b>, including the <b>frequency and intensity of extreme weather events</b> like heat waves, storms, and floods.</p> <p>In the context of <b>climate risk assessment</b>, <b>exposure determines the potential for damage or loss</b> based on the presence of <b>people, property, ecosystems, or infrastructure in hazard-prone areas</b>. <b>Higher exposure increases vulnerability and risk, making adaptation strategies crucial for climate resilience</b>. Measures of exposure may include <b>the number of people, economic value of assets, or the extent of ecosystems affected by climate hazards</b>.</p>
<b>Extensive Risk</b>	<p><b>Extensive risk</b> refers to the <b>widespread and recurrent exposure of dispersed populations to persistent, low- or moderate-intensity climate hazards</b>. These hazards, often <b>localized and chronic in nature</b>, include <b>recurring floods, landslides, storms, and droughts</b>, which may not always cause immediate large-scale disasters but lead to <b>cumulative long-term socio-economic and environmental impacts</b>.</p> <p>This type of risk is <b>particularly prevalent in rural areas and the margins of rapidly expanding urban centres</b>, where <b>poverty, unplanned urbanization, and environmental degradation</b> heighten <b>vulnerability to climate hazards</b>. The cumulative effects of <b>extensive risks</b> can erode <b>livelihoods, degrade ecosystems, and undermine community resilience</b>, making long-term adaptation and risk reduction strategies essential.</p>
<b>External Climate Variability</b>	<p><b>External Climate Variability</b> refers to <b>fluctuations in the climate system driven by external factors, either natural or anthropogenic (human-induced)</b>. These variations occur due to <b>external forces that alter the Earth's energy balance</b>, rather than internal dynamics within the climate system.</p> <p>Key drivers of <b>natural external climate variability</b> include <b>solar radiation changes, volcanic eruptions, and long-term orbital cycles (Milankovitch cycles)</b>. On the other hand, <b>anthropogenic external forcing</b> arises from <b>greenhouse gas emissions, deforestation, industrial pollution, and large-scale land-use changes</b>, which significantly impact global and regional climate patterns.</p> <p>Understanding <b>external climate variability</b> is essential for <b>distinguishing between natural climate fluctuations and human-induced climate change</b>, helping policymakers and scientists develop effective <b>climate adaptation and mitigation strategies</b>.</p>
<b>External forcing</b>	<p><b>External Forcing</b> refers to <b>influences originating outside the climate system that drive changes in Earth's climate</b>. These forcing agents alter the planet's <b>energy balance</b>, leading to <b>shifts in temperature, precipitation patterns, and atmospheric circulation</b>.</p> <p>Key sources of <b>external forcing</b> include:</p> <ul style="list-style-type: none"> <li>● <b>Natural Factors: Volcanic eruptions</b>, which release aerosols that temporarily cool the climate, and <b>solar variations</b>, such as changes in solar radiation affecting global temperatures.</li> <li>● <b>Anthropogenic Factors: Human-induced greenhouse gas emissions, deforestation, and land-use changes</b>, which significantly impact atmospheric composition and energy distribution.</li> </ul>

	Understanding <b>external forcing</b> is crucial for <b>climate modelling and impact assessments</b> , as it helps distinguish <b>natural climate variability</b> from <b>human-driven climate change</b> , informing effective <b>mitigation and adaptation strategies</b> .
<b>Externalities</b>	<p><b>Externalities</b> refer to the <b>unintended consequences of an individual's or organization's activities that affect others, without being reflected in market prices</b>. In the context of <b>environment and climate change</b>, externalities often take the form of <b>environmental degradation</b> resulting from economic activities.</p> <p>Key examples of <b>negative environmental externalities</b> include:</p> <ul style="list-style-type: none"> <li>● <b>Air pollution</b> from industrial emissions and vehicular exhaust, impacting public health and ecosystems.</li> <li>● <b>Global warming</b> caused by excessive <b>greenhouse gas emissions</b>, leading to climate disruptions.</li> <li>● <b>Deforestation and loss of biodiversity</b>, reducing ecosystem resilience.</li> <li>● <b>Water contamination</b> due to industrial waste and agricultural runoff, affecting freshwater resources.</li> </ul> <p>Since <b>negative externalities impose costs on society</b>, <b>policy interventions</b> such as <b>carbon pricing, pollution taxes, and environmental regulations</b> are essential to <b>internalize these costs</b> and promote <b>sustainable development</b>.</p>
<b>Extinction</b>	<p><b>Extinction</b> refers to the <b>complete disappearance of a species from the Earth</b>, meaning that no individuals of the species remain alive. In the context of <b>environment and climate change</b>, extinction is often driven by <b>human activities and environmental disruptions</b>, accelerating the <b>loss of biodiversity</b> and destabilizing ecosystems.</p> <p>Key factors contributing to <b>species extinction</b> include:</p> <ul style="list-style-type: none"> <li>● <b>Habitat destruction</b> due to deforestation, urbanization, and land conversion for agriculture.</li> <li>● <b>Climate change</b>, which alters ecosystems, disrupts food chains, and increases extreme weather events.</li> <li>● <b>Pollution</b>, including plastic waste, industrial chemicals, and oil spills, contaminating natural habitats.</li> <li>● <b>Overexploitation</b> through hunting, poaching, and overfishing, reducing species populations beyond recovery.</li> <li>● <b>Invasive species</b> that outcompete native species for resources and disrupt ecological balance.</li> </ul> <p><b>Biodiversity loss</b> due to extinction has severe consequences, including <b>ecosystem collapse, reduced resilience to climate change, and loss of critical ecological services</b>. Conservation efforts, such as <b>protected areas, habitat restoration, and legal frameworks like the Endangered Species Act</b>, are crucial to <b>prevent further extinctions and maintain ecological stability</b>.</p>
<b>Extirpation</b>	<b>Extirpation</b> , also known as <b>local extinction</b> , refers to the <b>disappearance of a species from a specific geographic area while it continues to exist elsewhere</b> . Unlike complete <b>extinction</b> , where a species is wiped out globally, extirpation means that populations have vanished from certain regions but may still survive in other parts of the world. <b>Extirpation can disrupt ecosystems, weaken biodiversity, and lead</b>

	<p><b>to cascading effects on food chains and ecological stability.</b> If not addressed, local extinctions can contribute to <b>global extinction</b> over time. <b>Conservation efforts</b> such as <b>habitat restoration, wildlife corridors, and legal protections</b> are essential to prevent extirpation and maintain <b>ecosystem balance</b>.</p>
<b>Extreme weather event</b>	<p>An <b>extreme weather event</b> refers to a <b>meteorological occurrence that is statistically rare for a specific location and time period</b>. While definitions of ‘rare’ may vary, such events typically fall <b>outside the 10th or 90th percentile</b> of historical weather patterns. The characteristics of <b>extreme weather</b> can differ from region to region, depending on local climatic conditions.</p> <p><b>Types of Extreme Weather Events in the Context of Climate Change:</b></p> <ul style="list-style-type: none"> <li>● <b>Heatwaves</b> – Prolonged periods of excessively high temperatures that can cause heat stress, wildfires, and droughts.</li> <li>● <b>Heavy Rainfall &amp; Floods</b> – Unusually intense precipitation leading to flash floods, river overflows, and waterlogging in urban areas.</li> <li>● <b>Droughts</b> – Extended periods of low precipitation, causing water shortages, agricultural losses, and desertification.</li> <li>● <b>Storms &amp; Hurricanes</b> – Intensified tropical cyclones, typhoons, or hurricanes, often fuelled by warmer ocean temperatures.</li> <li>● <b>Cold Spells &amp; Blizzards</b> – Unexpectedly severe snowfall and freezing conditions disrupting ecosystems and infrastructure.</li> </ul> <p><b>Extreme Weather vs. Extreme Climate Events:</b></p> <ul style="list-style-type: none"> <li>● <b>Extreme Weather Events</b> occur over a short period, such as a single storm or heatwave.</li> <li>● <b>Extreme Climate Events</b> are prolonged patterns of extreme weather, such as <b>multiple seasons of drought or extended monsoon disruptions</b>.</li> </ul> <p><b>Connection to Climate Change:</b></p> <p>Although <b>individual extreme weather events cannot be directly attributed to climate change</b>, the <b>increased frequency and intensity of such events</b> are <b>strongly linked to global warming</b>. Rising greenhouse gas emissions are <b>altering atmospheric and oceanic patterns</b>, leading to <b>more unpredictable and severe weather phenomena</b>.</p> <p><b>Impacts &amp; Need for Resilience:</b></p> <p><b>Extreme weather events</b> pose <b>serious threats</b> to human lives, biodiversity, and economies. <b>Building climate resilience</b> through <b>early warning systems, sustainable infrastructure, and adaptive policies</b> is crucial to <b>mitigating damage and ensuring long-term environmental sustainability</b>.</p>
<b>Fallow</b>	<p><b>Fallow</b> refers to a <b>period during which agricultural land is left unplanted</b> to allow soil nutrients to replenish, improve soil health, and enhance long-term productivity. This practice is a <b>crucial component of sustainable land management</b> and helps maintain soil fertility while reducing the risk of land degradation.</p>

	<p><b>Importance in the Context of Environment &amp; Climate Change:</b></p> <ul style="list-style-type: none"> <li>● <b>Soil Regeneration:</b> Allowing land to remain fallow helps <b>restore organic matter</b>, improve <b>soil structure</b>, and prevent nutrient depletion.</li> <li>● <b>Carbon Sequestration:</b> Fallow land can support <b>natural vegetation growth</b>, which aids in <b>carbon capture and storage</b>, mitigating climate change impacts.</li> <li>● <b>Erosion Control:</b> By reducing continuous cultivation, fallow periods help <b>minimize soil erosion</b> caused by wind and water.</li> <li>● <b>Water Conservation:</b> Uncultivated land reduces <b>evapotranspiration rates</b>, allowing moisture to be retained in the soil for future crop cycles.</li> <li>● <b>Biodiversity Enhancement:</b> Fallow fields can act as <b>temporary habitats</b> for pollinators, insects, and small wildlife, contributing to <b>ecosystem stability</b>.</li> </ul> <p><b>Types of Fallow Practices:</b></p> <ul style="list-style-type: none"> <li>● <b>Short-Term Fallow:</b> Land left unplanted for one or two seasons to recover soil fertility.</li> <li>● <b>Long-Term Fallow:</b> Land is left uncultivated for several years, often leading to natural reforestation and biodiversity restoration.</li> <li>● <b>Rotational Fallow:</b> Part of a <b>crop rotation system</b>, where specific sections of land are periodically rested to sustain soil health.</li> </ul> <p><b>Relevance to Sustainable Agriculture &amp; Climate Adaptation:</b></p> <p>As climate change <b>increases soil degradation, water scarcity, and extreme weather events</b>, <b>adopting fallow practices</b> can be an essential <b>adaptive strategy</b> to ensure <b>resilient and sustainable farming systems</b>. Governments and environmental agencies encourage <b>agroecological approaches</b>, including fallow management, to promote <b>climate-smart agriculture and long-term food security</b>.</p>
<b>Feedstock</b>	<p><b>Feedstock</b> refers to <b>raw materials</b>, typically derived from <b>plants, agricultural waste, or organic matter</b>, that are <b>processed into fuel, energy, or industrial products</b>. It plays a <b>critical role in bioenergy production, circular economy strategies, and sustainable resource management</b>. As the world transitions to <b>low-carbon energy systems</b>, <b>sustainably managed feedstocks</b> are essential for <b>reducing emissions, enhancing energy security, and promoting a circular economy</b>. However, <b>unsustainable feedstock production</b>—such as deforestation for biofuel crops—can lead to <b>biodiversity loss, soil degradation, and water stress</b>, underscoring the need for <b>responsible sourcing and policy interventions</b>.</p>
<b>Financial Additionality</b>	<p><b>Financial Additionality</b> refers to the <b>additional funding provided for a project beyond existing financial commitments</b> from sources such as the <b>Global Environment Facility (GEF), Official Development Assistance (ODA), Annex I country commitments, or other international cooperation mechanisms</b>.</p> <p><b>Importance in the Context of Environment &amp; Climate Change:</b></p>

	<ul style="list-style-type: none"> <li>● <b>Ensuring New &amp; Additional Funding:</b> Financial additionality ensures that <b>climate and environmental projects receive fresh investments</b>, rather than simply reallocating or repackaging existing financial resources.</li> <li>● <b>Supporting Climate Finance Mechanisms:</b> It plays a <b>critical role in climate finance frameworks</b>, ensuring that developed nations provide <b>new funding to support developing countries</b> in their <b>mitigation and adaptation efforts</b>.</li> <li>● <b>Avoiding Double Counting:</b> Financial additionality prevents <b>funding overlap</b>, ensuring that <b>climate finance commitments</b> genuinely contribute to <b>new initiatives</b> rather than substituting previously allocated budgets.</li> <li>● <b>Enhancing Impact &amp; Scalability:</b> By securing additional financial resources, projects can <b>expand their reach</b>, incorporate <b>innovative solutions</b>, and ensure <b>long-term sustainability</b>.</li> </ul> <p><b>Examples of Financial Additionality in Climate Action:</b></p> <ul style="list-style-type: none"> <li>● <b>Renewable Energy Projects:</b> A solar or wind energy project receiving <b>new international climate finance</b> rather than relying solely on national energy subsidies.</li> <li>● <b>Sustainable Agriculture &amp; Forestry Initiatives:</b> Reforestation or agroforestry programs that receive <b>additional funding</b> from climate adaptation funds, ensuring they do not depend solely on <b>existing conservation budgets</b>.</li> <li>● <b>Climate Resilience Infrastructure:</b> Investments in <b>flood defence systems, water conservation, and disaster preparedness</b> that receive <b>extra funding</b> beyond what governments or development agencies had previously committed.</li> </ul> <p><b>Relevance to Global Climate Agreements:</b></p> <p>Financial additionality is a <b>key principle under the United Nations Framework Convention on Climate Change (UNFCCC)</b> and the <b>Paris Agreement</b>, ensuring that <b>developed nations fulfil their climate finance obligations</b> without diverting funds from other critical development priorities.</p>
Financial Capital	<p><b>Financial Capital</b> refers to the <b>monetary resources available to individuals, communities, or businesses</b>, including <b>savings, access to credit, regular remittances, or pensions</b>, which support <b>various livelihood and economic activities</b>. It plays a <b>crucial role in economic resilience, sustainability, and environmental investments</b>.</p> <p><b>Examples of Financial Capital in Climate Action:</b></p> <ul style="list-style-type: none"> <li>● <b>Green Bonds &amp; Climate Finance:</b> Governments and corporations issuing <b>green bonds</b> to fund <b>sustainable projects</b>, such as <b>solar energy farms, afforestation, and efficient water management</b>.</li> <li>● <b>Microfinance for Sustainable Agriculture:</b> Providing <b>small loans</b> to farmers for adopting <b>organic farming practices, water-efficient irrigation, and agroforestry systems</b>.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Community-Based Climate Funds:</b> Local communities pooling financial resources to invest in <b>coastal protection, clean energy solutions, or sustainable fisheries.</b></li> </ul> <p><b>Relevance to Global Climate Agreements:</b></p> <p><b>Financial capital mobilization</b> is a key component of international climate frameworks, including the <b>UNFCCC and Paris Agreement</b>, which emphasize <b>climate finance mechanisms to support developing nations in their transition to sustainable economies.</b></p>
<b>Financial Mechanism</b>	<p>The <b>Financial Mechanism</b> is a key instrument under the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b>, designed to provide <b>financial resources</b> to support <b>developing countries</b> in implementing climate-related actions. Under this mechanism, <b>developed country Parties (Annex II Parties)</b> are obligated to contribute financial resources to assist <b>developing nations in addressing climate change mitigation, adaptation, and sustainable development.</b></p> <p><b>Key Features of the Financial Mechanism:</b></p> <ul style="list-style-type: none"> <li>● <b>Supports Developing Countries:</b> Provides financial aid to <b>developing nations</b> to help them <b>implement climate policies, transition to green economies, and build climate resilience.</b></li> <li>● <b>Managed by the Global Environment Facility (GEF):</b> The <b>GEF</b> operates the financial mechanism, ensuring funds are allocated to <b>climate action projects, including renewable energy, biodiversity conservation, and sustainable land management.</b></li> <li>● <b>Accountability to the Conference of the Parties (COP):</b> The <b>mechanism is reviewed every four years</b> by the <b>COP</b>, ensuring transparency, effectiveness, and alignment with evolving climate goals.</li> <li>● <b>Enables Climate Commitments:</b> Helps nations <b>fulfil their Nationally Determined Contributions (NDCs)</b> under the <b>Paris Agreement</b> by providing necessary financial support for <b>emission reductions and adaptation strategies.</b></li> </ul> <p><b>Examples of Financial Mechanisms Supporting Climate Action:</b></p> <ul style="list-style-type: none"> <li>● <b>Green Climate Fund (GCF):</b> Established to help <b>developing nations finance low-carbon, climate-resilient projects.</b></li> <li>● <b>Adaptation Fund (AF):</b> Provides grants for <b>climate adaptation projects, particularly in vulnerable communities.</b></li> <li>● <b>Least Developed Countries Fund (LDCF):</b> Supports <b>climate resilience projects in least developed nations.</b></li> <li>● <b>Special Climate Change Fund (SCCF):</b> Focuses on <b>technology transfer, capacity building, and sector-specific climate adaptation.</b></li> </ul> <p>The <b>financial mechanism</b> is an essential pillar of the <b>UNFCCC, the Kyoto Protocol, and the Paris Agreement</b>, ensuring that <b>developing countries receive financial assistance</b> to address climate challenges while promoting <b>sustainable and equitable growth.</b></p>
<b>Flash floods</b>	<p><b>Flash floods</b> are <b>rapid, intense flooding events</b> that occur within a <b>short period</b> due to <b>extreme rainfall, sudden snowmelt, glacial lake outbursts, or dam failures.</b> These floods develop quickly, often <b>within minutes to hours</b>, and can be extremely <b>destructive</b>, posing <b>severe risks to lives, infrastructure, and ecosystems.</b></p>

	<p><b>Key Characteristics of Flash Floods:</b></p> <ul style="list-style-type: none"><li>● <b>Sudden Onset:</b> Can occur <b>without warning</b>, making evacuation and preparedness difficult.</li><li>● <b>Triggered by Extreme Weather Events:</b> Heavy <b>rainfall in a short period</b>, <b>glacial melts</b>, or <b>dam burst</b> can lead to flash floods.</li><li>● <b>High Velocity and Force:</b> The <b>rapid flow of water</b> carries debris, erodes landscapes, and damages infrastructure.</li><li>● <b>Increased Occurrence Due to Climate Change:</b> Rising global temperatures lead to <b>more intense storms</b>, <b>accelerated glacial melt</b>, and <b>altered precipitation patterns</b>, increasing the <b>frequency and severity of flash floods</b>.</li></ul> <p><b>Mitigation and Preparedness Measures:</b></p> <ul style="list-style-type: none"><li>● <b>Early Warning Systems:</b> Improved <b>forecasting and real-time alerts</b> to warn at-risk communities.</li><li>● <b>Afforestation &amp; Soil Conservation:</b> <b>Preventing deforestation and restoring vegetation</b> to reduce surface runoff and soil erosion.</li><li>● <b>Infrastructure Resilience:</b> Strengthening <b>dams, embankments, and drainage systems</b> to withstand extreme flooding.</li><li>● <b>Community Awareness &amp; Preparedness:</b> Educating communities about <b>flood risks, evacuation routes, and emergency response plans</b>.</li></ul> <p>With <b>climate change intensifying extreme weather events</b>, the <b>risk of flash floods is increasing globally</b>, particularly in <b>vulnerable regions like the Indian Himalayas</b>. Addressing this challenge requires a <b>combination of climate adaptation strategies, improved land-use planning, and disaster risk management</b> to minimize <b>human and environmental losses</b>.</p>
<b>Flood</b>	<p>A <b>flood</b> occurs when <b>water overflows its usual boundaries</b>, submerging land that is normally dry. Flooding can result from <b>heavy rainfall, overflowing rivers, coastal storm surges, rapid snowmelt, or glacial lake outbursts</b>. <b>Climate change is intensifying flood risks</b>, with increasing <b>rainfall intensity, rising sea levels, and extreme weather events</b> leading to <b>more frequent and severe flooding</b> in many regions.</p> <p><b>Types of Floods:</b></p> <ol style="list-style-type: none"><li>1. <b>River (Fluvial) Floods:</b> Occur when <b>rivers overflow</b> due to excessive rainfall or melting snow.</li><li>2. <b>Flash Floods:</b> <b>Sudden, intense floods</b> caused by extreme rainfall over a short period, often with little warning.</li><li>3. <b>Urban Floods:</b> Result from <b>poor drainage systems</b> in cities, where rainfall accumulates quickly due to impervious surfaces.</li><li>4. <b>Pluvial Floods:</b> Surface water <b>flooding due to excessive rainfall</b>, even without nearby rivers or water bodies overflowing.</li><li>5. <b>Sewer Floods:</b> Happen when <b>drainage or sewer systems become overwhelmed</b>, leading to water backup.</li><li>6. <b>Coastal Floods:</b> Triggered by <b>storm surges, high tides, or sea-level rise</b>, causing seawater to flood coastal areas.</li><li>7. <b>Glacial Lake Outburst Floods (GLOFs):</b> Occur when <b>glacial lakes burst</b> due to rising temperatures and ice melt, releasing massive amounts of water downstream.</li></ol>

	<p><b>Floods and Climate Change:</b></p> <ul style="list-style-type: none"> <li>● <b>Increased Rainfall:</b> Climate change is <b>projected to intensify precipitation patterns</b>, making floods <b>more frequent and severe</b>.</li> <li>● <b>Rising Sea Levels:</b> Coastal communities face <b>greater flood risks</b> due to rising ocean levels and stronger storm surges.</li> <li>● <b>Melting Glaciers:</b> <b>Higher temperatures accelerate glacial melt</b>, increasing the risk of <b>GLOFs</b> in mountainous regions.</li> <li>● <b>Extreme Weather Events:</b> More intense <b>cyclones, hurricanes, and typhoons</b> contribute to higher flood occurrences.</li> </ul> <p><b>Impacts of Flooding:</b></p> <ul style="list-style-type: none"> <li>● <b>Loss of Life &amp; Property:</b> Floods <b>destroy homes, displace populations, and cause fatalities</b>.</li> <li>● <b>Infrastructure Damage:</b> Roads, bridges, and buildings suffer <b>severe damage</b>, leading to <b>economic losses</b>.</li> <li>● <b>Agricultural &amp; Food Security Threats:</b> Crops can be <b>destroyed, soil eroded, and water sources contaminated</b>.</li> <li>● <b>Waterborne Diseases:</b> Stagnant floodwaters <b>increase the spread of diseases</b> like cholera and dengue.</li> <li>● <b>Ecosystem Disruptions:</b> Flooding <b>affects wetlands, river systems, and biodiversity</b>, altering natural habitats.</li> </ul> <p><b>Mitigation and Adaptation Strategies:</b></p> <ul style="list-style-type: none"> <li>● <b>Early Warning Systems:</b> <b>Improved forecasting and monitoring</b> to alert at-risk populations.</li> <li>● <b>Flood-Resistant Infrastructure:</b> Constructing <b>levees, embankments, and flood-resistant buildings</b>.</li> <li>● <b>Wetland &amp; Watershed Protection:</b> Restoring <b>natural floodplains</b> to absorb excess water.</li> <li>● <b>Sustainable Urban Planning:</b> Enhancing <b>drainage systems, green spaces, and permeable surfaces</b> to reduce water accumulation.</li> <li>● <b>Community Preparedness &amp; Disaster Management:</b> Educating communities on <b>flood risks, evacuation plans, and emergency response</b>.</li> </ul> <p>With <b>climate change exacerbating flood risks worldwide</b>, urgent action is required to <b>enhance resilience, improve infrastructure, and implement adaptive measures</b> to mitigate the devastating impacts of flooding.</p>
<p><b>Fluorinated Gases (F-Gases)</b></p>	<p><b>Fluorinated gases (F-gases)</b> are <b>potent synthetic greenhouse gases</b> that include <b>hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>)</b>. These gases are primarily released from <b>industrial activities</b> and are often used as <b>substitutes for ozone-depleting substances</b> like <b>chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons</b>.</p> <p><b>Environmental &amp; Climate Impact:</b></p> <ul style="list-style-type: none"> <li>● <b>Severe Greenhouse Effect:</b> Despite being emitted in smaller quantities than CO<sub>2</sub> or CH<sub>4</sub>, <b>fluorinated gases have an extremely high warming potential, sometimes thousands of times more potent than CO<sub>2</sub></b>.</li> </ul>



	<ul style="list-style-type: none"> <li>● <b>Ozone Layer Protection vs. Climate Risk:</b> While F-gases have <b>helped replace ozone-depleting substances</b>, their contribution to <b>global warming remains a significant concern</b>.</li> <li>● <b>Long-Term Persistence:</b> Unlike CO<sub>2</sub>, which can be absorbed by oceans and forests, <b>many F-gases do not break down easily in nature</b>, leading to prolonged environmental damage.</li> </ul> <p><b>Mitigation Strategies:</b></p> <ul style="list-style-type: none"> <li>● <b>Phase-Out &amp; Regulation:</b> Global agreements like the <b>Montreal Protocol (Kigali Amendment)</b> aim to <b>reduce HFC use and transition to climate-friendly alternatives</b>.</li> <li>● <b>Development of Alternatives:</b> Adoption of <b>natural refrigerants</b> such as <b>hydrocarbons (HCs)</b>, <b>ammonia (NH<sub>3</sub>)</b>, and <b>carbon dioxide (CO<sub>2</sub>-based coolants)</b>.</li> <li>● <b>Enhanced Industrial Practices:</b> Implementing <b>leak detection, recovery, and recycling of refrigerants</b> to minimize emissions.</li> <li>● <b>Policy &amp; Incentives:</b> Governments are encouraging <b>low-GWP technologies</b> and banning high-GWP substances in various applications.</li> </ul> <p>While <b>fluorinated gases</b> are crucial in many industries, their <b>high global warming potential and long lifespan</b> make them a <b>major climate threat</b>. <b>Stronger regulations, sustainable alternatives, and industry-wide changes</b> are necessary to <b>mitigate their impact and transition toward a low-carbon future</b>.</p>
<b>Fluorocarbons</b>	<p><b>Fluorocarbons</b> are <b>carbon-fluorine compounds</b> that may also contain <b>other elements such as hydrogen, chlorine, or bromine</b>. These synthetic chemicals are widely used in <b>industrial, commercial, and household applications</b>, but they pose <b>significant environmental and climate risks</b> due to their role in <b>ozone depletion and global warming</b>.</p> <p><b>Types of Fluorocarbons:</b></p> <ol style="list-style-type: none"> <li>1. <b>Chlorofluorocarbons (CFCs):</b> <ul style="list-style-type: none"> <li>○ Once widely used in <b>refrigeration, air conditioning, and aerosol propellants</b>.</li> <li>○ <b>Severely depletes the ozone layer</b> and was phased out under the <b>Montreal Protocol</b>.</li> </ul> </li> <li>2. <b>Hydrochlorofluorocarbons (HCFCs):</b> <ul style="list-style-type: none"> <li>○ A transitional substitute for CFCs with <b>lower ozone depletion potential (ODP)</b>.</li> <li>○ Still contributes to <b>global warming</b> and is being gradually phased out.</li> </ul> </li> <li>3. <b>Hydrofluorocarbons (HFCs):</b> <ul style="list-style-type: none"> <li>○ <b>Do not deplete the ozone layer</b> but have a <b>high global warming potential (GWP)</b>.</li> </ul> </li> </ol>

	<ul style="list-style-type: none"><li>○ Commonly used in <b>refrigeration, air conditioning, and insulation foams.</b></li><li>○ Being phased down under the <b>Kigali Amendment to the Montreal Protocol.</b></li></ul> <p>4. <b>Perfluorocarbons (PFCs):</b></p> <ul style="list-style-type: none"><li>○ <b>Extremely potent greenhouse gases with long atmospheric lifespans</b> (up to 50,000 years).</li><li>○ Emitted from <b>aluminium production, semiconductor manufacturing, and refrigeration.</b></li></ul> <p><b>Environmental &amp; Climate Impact:</b></p> <ul style="list-style-type: none"><li>● <b>Ozone Depletion:</b> CFCs and HCFCs <b>break down ozone molecules</b>, allowing harmful <b>ultraviolet (UV) radiation</b> to reach Earth.</li><li>● <b>Global Warming:</b> HFCs and PFCs <b>trap heat in the atmosphere</b>, contributing to <b>climate change</b>. Some fluorocarbons are <b>thousands of times more potent than CO<sub>2</sub></b> in warming the planet.</li><li>● <b>Persistent in the Atmosphere:</b> Many fluorocarbons <b>remain in the atmosphere for decades or even centuries</b>, making their effects long-lasting.</li></ul> <p><b>Mitigation &amp; Alternatives:</b></p> <ul style="list-style-type: none"><li>● <b>Phasing Out Harmful Fluorocarbons:</b> Global agreements like the <b>Montreal Protocol and Kigali Amendment</b> aim to <b>eliminate CFCs and HCFCs and reduce HFC use.</b></li><li>● <b>Adopting Natural Refrigerants:</b> Climate-friendly alternatives include <b>hydrocarbons (HCs), ammonia (NH<sub>3</sub>), and CO<sub>2</sub>-based coolants.</b></li><li>● <b>Enhanced Industrial Practices:</b> Implementing <b>leak detection, refrigerant recovery, and recycling</b> to reduce emissions.</li></ul> <p>Fluorocarbons have played a crucial role in various industries, but their <b>severe environmental and climate impacts require urgent action.</b> Global regulations, sustainable alternatives, and responsible usage are essential to <b>mitigate their effects and transition to a greener future.</b></p>
<b>Fog</b>	<p>Fog is a <b>dense collection of tiny water droplets or ice crystals</b> that remain <b>suspended in the air</b> near the <b>Earth's surface</b>. It is a <b>low-lying cloud</b> that <b>reduces visibility</b> and is formed due to the condensation of <b>moisture in the air</b>, often caused by <b>cooling temperatures or increased humidity.</b></p> <p><b>Types of Fog:</b></p> <ol style="list-style-type: none"><li>1. <b>Radiation Fog:</b> Forms on <b>clear, calm nights</b> when the ground <b>loses heat rapidly</b>, cooling the air above it.</li><li>2. <b>Advection Fog:</b> Develops when <b>warm, moist air moves over a cooler surface</b>, leading to condensation. Common near <b>coastal areas.</b></li></ol>

	<ol style="list-style-type: none"> <li>3. <b>Upslope Fog:</b> Forms when <b>moist air is forced to rise along a slope</b>, cooling and condensing into fog.</li> <li>4. <b>Evaporation Fog (Steam Fog):</b> Occurs when <b>cold air moves over warmer water</b>, causing water vapor to rise and condense.</li> <li>5. <b>Freezing Fog:</b> Contains <b>supercooled water droplets</b> that freeze upon contact with surfaces, creating <b>dangerous icy conditions</b>.</li> </ol> <p><b>Environmental &amp; Climate Relevance:</b></p> <ul style="list-style-type: none"> <li>● <b>Regulates Local Climate:</b> Fog <b>traps heat and moisture</b>, influencing <b>temperature and humidity levels</b>.</li> <li>● <b>Supports Ecosystems:</b> Many coastal and forest ecosystems <b>depend on fog for moisture</b>, such as the <b>Redwood forests in California</b>.</li> <li>● <b>Air Pollution Interaction:</b> Fog can <b>trap pollutants</b>, leading to <b>smog formation</b>, particularly in urban areas.</li> <li>● <b>Impact of Climate Change:</b> Rising global temperatures can <b>alter fog patterns</b>, affecting <b>ecosystems, agriculture, and weather conditions</b>.</li> </ul> <p>Fog plays a crucial role in local weather and ecosystems, but its interaction with <b>climate change and pollution</b> requires further study. Understanding fog formation and its environmental effects can help in <b>mitigating hazards</b> and <b>adapting to changing climatic conditions</b>.</p>
<b>Food Insecurity</b>	<p><b>Food insecurity</b> refers to a <b>lack of reliable access to sufficient, safe, and nutritious food</b> needed for <b>normal growth, development, and an active, healthy life</b>. It can result from multiple factors, including <b>food unavailability, economic constraints, inadequate distribution systems, and poor utilization at the household level</b>.</p> <p><b>Types of Food Insecurity:</b></p> <ol style="list-style-type: none"> <li>1. <b>Chronic Food Insecurity:</b> Long-term lack of access to food due to <b>persistent poverty, climate change, or weak agricultural systems</b>.</li> <li>2. <b>Seasonal Food Insecurity:</b> Occurs in <b>cyclical patterns</b>, often linked to <b>seasonal droughts, monsoons, or agricultural cycles</b>.</li> <li>3. <b>Transitory Food Insecurity:</b> A sudden and temporary food shortage caused by <b>natural disasters, conflicts, or economic crises</b>.</li> </ol> <p><b>Climate Change and Food Insecurity:</b></p> <ul style="list-style-type: none"> <li>● <b>Rising temperatures and changing rainfall patterns</b> affect crop yields and food production.</li> <li>● <b>Increased frequency of extreme weather events</b> disrupts supply chains and destroys food sources.</li> <li>● <b>Desertification and soil degradation</b> reduce arable land, limiting agricultural productivity.</li> <li>● <b>Shifts in pest and disease patterns</b> impact livestock and crop health, further affecting food availability.</li> </ul> <p>Food insecurity remains a <b>global challenge</b>, exacerbated by <b>climate change, economic instability, and geopolitical conflicts</b>. Ensuring <b>food security</b> requires a <b>multi-faceted approach</b> that integrates <b>sustainability, policy interventions, and equitable food systems</b> to safeguard access to nutrition for present and future generations.</p>

<b>Food security</b>	<p><b>Food security</b> refers to a condition where <b>all people, at all times, have reliable access to sufficient, safe, and nutritious food</b> that meets their <b>dietary needs and preferences</b> for an <b>active and healthy life</b> (World Food Summit, 1996). A household is considered <b>food-secure</b> when its members <b>do not experience hunger or the risk of starvation</b>.</p> <p><b>Key Components of Food Security:</b></p> <ol style="list-style-type: none"> <li>1. <b>Food Availability:</b> Sufficient quantities of food must be <b>produced, stored, and distributed</b> effectively.</li> <li>2. <b>Food Access:</b> People must have <b>economic and physical access</b> to food, which depends on <b>income levels, food prices, and distribution systems</b>.</li> <li>3. <b>Food Utilization:</b> The food consumed should be <b>nutritionally adequate and safe</b>, and people should have knowledge of <b>healthy diets and food preparation</b>.</li> <li>4. <b>Stability:</b> Food security must be <b>consistent over time</b>, without risks from <b>climate shocks, economic downturns, or conflicts</b>.</li> </ol> <p><b>Climate Change and Food Security:</b></p> <ul style="list-style-type: none"> <li>● <b>Increased frequency of extreme weather events</b> disrupts food production and supply chains.</li> <li>● <b>Desertification and land degradation</b> limit agricultural land, reducing yields.</li> <li>● <b>Changing precipitation patterns</b> affect crop cycles and food availability.</li> <li>● <b>Shifts in pest and disease dynamics</b> impact livestock and crops, threatening food stability.</li> </ul> <p><b>Strategies to Strengthen Food Security:</b></p> <ul style="list-style-type: none"> <li>● <b>Sustainable agriculture and climate-resilient crops</b> to adapt to changing conditions.</li> <li>● <b>Efficient water management and soil conservation</b> to maintain agricultural productivity.</li> <li>● <b>Improved food distribution networks and storage facilities</b> to reduce food loss.</li> <li>● <b>Economic policies and social safety nets</b> to enhance food access for vulnerable populations.</li> <li>● <b>Reducing food waste and promoting responsible consumption</b> to maximize resources.</li> </ul> <p><b>Food security is not just about food production; it also requires stable economies, sustainable environmental practices, and resilient food systems.</b> Addressing <b>climate change, economic disparities, and distribution inefficiencies</b> is crucial to ensuring that food security is maintained for present and future generations.</p>
<b>Food Sufficiency</b>	<p><b>Food Sufficiency</b> refers to the capability of a region, country, or community to produce enough food to meet the dietary needs of its population without relying heavily on external sources. It is a crucial aspect of <b>food security</b> and is influenced by factors such as <b>agricultural</b></p>

	<p><b>productivity, climate conditions, water availability, and sustainable farming practices.</b> Climate change, with its impacts on <b>crop yields, soil fertility, and water resources</b>, poses a significant challenge to maintaining food sufficiency globally.</p>
<b>Forcing Mechanism</b>	<p><b>Forcing Mechanism</b> refers to any process that <b>disrupts the Earth's energy balance</b>, altering the relationship between <b>incoming solar radiation and outgoing infrared radiation</b>. These mechanisms drive climate change and can be <b>natural</b> or <b>anthropogenic (human-induced)</b>.</p> <ul style="list-style-type: none"> <li>• <b>Natural forcing mechanisms</b> include <b>variations in solar irradiance, volcanic eruptions</b>, and long-term <b>orbital changes</b> affecting Earth's climate.</li> <li>• <b>Anthropogenic forcing mechanisms</b> primarily involve <b>greenhouse gas emissions</b>, deforestation, and industrial activities that enhance the <b>natural greenhouse effect</b>, leading to global warming.</li> </ul> <p>Understanding forcing mechanisms is crucial for <b>climate modelling</b> and <b>predicting future climate scenarios</b>, helping policymakers design effective <b>mitigation and adaptation strategies</b>.</p>
<b>Forecast</b>	<p><b>Forecast</b> refers to a <b>definite statement or statistical estimate</b> predicting the <b>likely occurrence of a future event or condition</b> within a specific area. Forecasts are widely used in <b>meteorology, climate science, and environmental planning</b> to anticipate changes in <b>weather patterns, temperature fluctuations, precipitation, and extreme weather events</b>.</p> <p>In the context of <b>climate change</b>, forecasting involves <b>climate models and data analysis</b> to project <b>long-term trends</b> such as rising temperatures, shifts in precipitation patterns, and increased frequency of extreme weather events. Accurate forecasting is essential for <b>disaster preparedness, resource management, and climate adaptation strategies</b>.</p>
<b>Forest Carbon Partnership Facility</b>	<p>The <b>Forest Carbon Partnership Facility (FCPF)</b>, operational since <b>June 2008</b>, is a <b>global initiative</b> aimed at <b>reducing greenhouse gas emissions</b> caused by <b>deforestation and forest degradation</b>. It supports the <b>REDD+ framework</b>, which includes:</p> <ul style="list-style-type: none"> <li>• <b>Reducing emissions from deforestation and forest degradation</b></li> <li>• <b>Conserving forest carbon stocks</b></li> <li>• <b>Sustainable management of forests</b></li> <li>• <b>Enhancing forest carbon stocks</b></li> </ul> <p>The <b>FCPF</b> assists <b>developing countries</b> in building <b>capacities and financial mechanisms</b> for <b>forest-based climate action</b>, promoting <b>carbon sequestration, biodiversity conservation, and sustainable livelihoods</b>.</p>
<b>Forest Degradation</b>	<p><b>Forest Degradation</b> refers to the <b>deterioration of a forest's structure, function, and capacity</b> to provide <b>ecological services and resources</b>. Unlike <b>deforestation</b>, which involves the complete removal of forests, <b>degradation results in a decline in forest quality</b> while still maintaining tree cover.</p>

	<p>Key impacts of <b>forest degradation</b> include:</p> <ul style="list-style-type: none"> <li>● <b>Reduction in tree density and biomass</b>, affecting carbon storage.</li> <li>● <b>Loss of biodiversity</b>, leading to a decline in species richness and genetic diversity.</li> <li>● <b>Decline in ecosystem services</b>, such as water regulation, soil stabilization, and climate moderation.</li> <li>● <b>Increased vulnerability to climate change</b>, making forests less resilient to extreme weather events.</li> </ul> <p>Forest degradation is often driven by <b>unsustainable logging, agricultural expansion, infrastructure development, forest fires, and climate change</b>, significantly impacting global <b>carbon cycles and biodiversity conservation</b>.</p>
<b>Forest Governance</b>	<p><b>Forest Governance</b> refers to the <b>framework of policies, institutions, and processes</b> that influence how forests are <b>managed, conserved, and utilized</b>. It involves <b>decision-making structures</b> that define expectations, allocate power, and ensure accountability in forest management.</p> <p>Key aspects of <b>forest governance</b> include:</p> <ul style="list-style-type: none"> <li>● <b>Policy and legal frameworks</b> that regulate forest conservation and use.</li> <li>● <b>Institutional structures</b> responsible for forest management, including government agencies, local communities, and private entities.</li> <li>● <b>Stakeholder participation</b>, ensuring inclusive decision-making involving indigenous communities, businesses, and environmental organizations.</li> <li>● <b>Transparency and accountability</b>, promoting responsible and sustainable forest resource management.</li> <li>● <b>Law enforcement and monitoring</b>, preventing illegal logging, deforestation, and land encroachment.</li> </ul> <p>Effective <b>forest governance</b> is essential for <b>sustainable forest management (SFM), biodiversity conservation, climate change mitigation, and maintaining ecosystem services</b>. Poor governance can lead to <b>deforestation, degradation, and conflicts over land use</b>, undermining efforts to combat climate change.</p>
<b>Forest Investment Program</b>	<p><b>Forest Investment Program (FIP)</b> is a specialized initiative under the <b>Strategic Climate Fund (SCF)</b>, which operates within the broader framework of the <b>Climate Investment Funds (CIF)</b>. The FIP is designed to support <b>developing countries</b> in their efforts to:</p> <ul style="list-style-type: none"> <li>● <b>Reduce deforestation and forest degradation (REDD+)</b>, thereby curbing greenhouse gas emissions.</li> <li>● <b>Promote sustainable forest management (SFM)</b> to enhance biodiversity, ecosystem resilience, and local livelihoods.</li> <li>● <b>Strengthen forest governance and policy frameworks</b> to enable long-term conservation efforts.</li> <li>● <b>Protect and enhance forest carbon reservoirs</b>, contributing to global climate mitigation goals.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Empower indigenous peoples and local communities</b> by integrating them into sustainable forest management practices.</li> </ul> <p>By providing <b>financial and technical support</b>, the <b>FIP</b> helps developing nations transition towards <b>low-carbon, climate-resilient forest management</b>, ensuring forests continue to serve as vital carbon sinks and biodiversity hotspots.</p>
<b>Forest Management</b>	<p><b>Forest Management</b> refers to the systematic administration of forests, balancing <b>ecological, economic, legal, and social</b> considerations to ensure their <b>sustainable use and conservation</b>. It encompasses:</p> <ul style="list-style-type: none"> <li>● <b>Silviculture</b> – The scientific cultivation and growth management of forests.</li> <li>● <b>Forest Protection</b> – Safeguarding forests from threats such as deforestation, pests, wildfires, and climate change impacts.</li> <li>● <b>Regulation and Policy</b> – Implementing laws and governance structures to ensure responsible forest utilization.</li> <li>● <b>Sustainable Resource Use</b> – Managing timber, non-timber forest products, and ecosystem services without compromising biodiversity.</li> <li>● <b>Community and Indigenous Involvement</b> – Encouraging participatory forest management to enhance conservation efforts.</li> </ul> <p>Effective <b>forest management</b> plays a critical role in <b>climate change mitigation, carbon sequestration, and biodiversity conservation</b>, ensuring forests continue to provide essential ecological and socio-economic benefits.</p>
<b>Forest State</b>	<p><b>Forest State</b> refers to the <b>overall condition and composition</b> of a forest ecosystem, defined by:</p> <ul style="list-style-type: none"> <li>● The <b>dominant tree species</b> present in a given location.</li> <li>● The <b>functional roles</b> of these species within the ecosystem, including their contribution to <b>carbon storage, biodiversity, and habitat stability</b>.</li> <li>● <b>Structural characteristics</b> such as tree height, canopy layers, stem density, and biomass accumulation at maturity.</li> </ul> <p>Understanding the <b>forest state</b> is crucial for assessing <b>ecosystem health, resilience to climate change, and the effectiveness of conservation or restoration efforts</b>. Changes in forest state due to <b>deforestation, degradation, or climate variability</b> can significantly impact <b>carbon sequestration, biodiversity, and local livelihoods</b>.</p>
<b>Forest Transition</b>	<p><b>Forest Transition</b> refers to a <b>land-use change phenomenon</b> where a region shifts from a phase of <b>net forest loss (deforestation)</b> to a phase of <b>net forest gain (reforestation or afforestation)</b>. This transition typically occurs due to:</p> <ul style="list-style-type: none"> <li>● <b>Economic shifts</b> from agriculture to industrial or service sectors, reducing pressure on forests.</li> <li>● <b>Urbanization and rural-to-urban migration</b>, leading to land abandonment and natural forest regeneration.</li> <li>● <b>Forest conservation policies and afforestation programs</b> driven by environmental awareness and climate action.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Improved agricultural productivity</b>, reducing the need for further land expansion.</li> </ul> <p>Understanding <b>forest transition</b> is critical in climate change discussions, as it highlights how socio-economic and policy changes can <b>influence forest recovery, biodiversity conservation, and carbon sequestration</b>.</p>
<b>Fossil Fuel</b>	<p><b>Fossil Fuels</b> are <b>carbon-based energy sources</b> derived from the <b>ancient remains of plants and animals</b> that have been transformed over <b>millions of years</b> under intense heat and pressure within the Earth's crust. These include <b>coal, crude oil, natural gas, and heavy oils</b>, all of which are <b>non-renewable</b> on human timescales.</p> <p>The <b>combustion of fossil fuels</b> for <b>electricity, transportation, and industrial activities</b> is the <b>largest contributor to climate change</b>, as it releases <b>massive amounts of carbon dioxide (CO<sub>2</sub>) and other greenhouse gases (GHGs)</b> into the atmosphere. This leads to:</p> <ul style="list-style-type: none"> <li>● <b>Global warming</b> by intensifying the greenhouse effect.</li> <li>● <b>Air pollution</b> through emissions of sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and particulate matter.</li> <li>● <b>Environmental degradation</b> from extraction processes such as mining, drilling, and fracking.</li> </ul> <p>Transitioning away from <b>fossil fuels</b> towards <b>renewable energy sources</b> like solar, wind, and hydro is essential for <b>mitigating climate change and ensuring sustainable development</b>.</p>
<b>Frost</b>	<p><b>Frost</b> is the <b>solid deposition of water vapor</b> from <b>saturated air</b> onto surfaces that have cooled <b>below both the dew point and the freezing point of water (0°C or 32°F)</b>. This occurs when moisture in the air <b>directly transitions from gas to solid (sublimation)</b>, forming ice crystals on exposed surfaces such as plants, soil, and buildings. Understanding frost formation is crucial for <b>climate adaptation strategies</b>, such as <b>frost-resistant crops, early warning systems, and sustainable land management practices</b>.</p>
<b>Fuel Switching</b>	<p><b>Fuel switching</b> refers to the <b>substitution of one type of fuel for another</b> to achieve specific economic, environmental, or energy efficiency goals. In the context of <b>climate change</b>, it typically involves replacing <b>high-carbon fuels</b> with <b>lower-carbon alternatives</b> to <b>reduce greenhouse gas (GHG) emissions</b> and improve energy efficiency.</p> <p><b>Key Environmental and Climate Considerations:</b></p> <ul style="list-style-type: none"> <li>● <b>Reduction in Carbon Emissions:</b> Switching from <b>coal to natural gas</b> or <b>diesel to biofuels</b> can significantly lower <b>CO<sub>2</sub> emissions per unit of energy produced</b>.</li> <li>● <b>Transition to Renewable Energy:</b> While switching from <b>coal to natural gas</b> offers <b>short-term emission reductions</b>, the long-term goal is to <b>transition towards renewables</b> like <b>solar, wind, and green hydrogen</b>.</li> <li>● <b>Air Quality Improvements:</b> Using <b>cleaner fuels</b> reduces emissions of <b>particulate matter (PM), sulfur oxides (SO<sub>x</sub>), and nitrogen oxides (NO<sub>x</sub>)</b>, leading to better <b>air quality and public health benefits</b>.</li> </ul>



	<ul style="list-style-type: none"> <li>● <b>Industrial and Transportation Adaptation:</b> Industries and transportation sectors are increasingly adopting <b>fuel-switching strategies</b>, such as using <b>electric vehicles (EVs) instead of gasoline-powered cars</b> or replacing <b>coal-fired boilers with biomass or hydrogen-powered systems</b>.</li> <li>● <b>Challenges in Implementation:</b> Some fuel-switching options require <b>infrastructure changes, investment costs, and policy support</b> to be viable on a large scale.</li> </ul> <p><b>Examples of Fuel Switching in Climate Action:</b></p> <ul style="list-style-type: none"> <li>● <b>Coal to Natural Gas:</b> Reduces CO<sub>2</sub> emissions by up to <b>50%</b> compared to coal-fired power plants.</li> <li>● <b>Gasoline/Diesel to Electric Vehicles:</b> Eliminates tailpipe emissions and reduces reliance on fossil fuels.</li> <li>● <b>Industrial Processes:</b> Transitioning from <b>coal-fired kilns to hydrogen or biomass-based energy</b> in steel and cement production.</li> <li>● <b>Cooking Fuels:</b> Switching from <b>firewood or kerosene to LPG, biogas, or solar cookers</b> to curb deforestation and indoor air pollution.</li> </ul> <p>Fuel switching is an <b>essential step</b> in the broader <b>energy transition</b> towards a <b>low-carbon economy</b>, contributing to <b>global climate goals</b> and <b>net-zero emissions targets</b>.</p>
<b>Functional Groups</b>	<b>Functional groups</b> refer to <b>assemblages of species</b> that perform <b>similar ecological roles</b> within an <b>ecosystem</b> , such as <b>pollination, primary production, decomposition, or herbivory</b> . These groups ensure <b>ecosystem stability and resilience</b> by providing redundancy—if one species decline, others within the same group can compensate. By maintaining <b>functional diversity</b> , ecosystems can <b>better withstand climate impacts</b> , ensuring <b>continued delivery of critical services</b> like <b>carbon sequestration, food production, and water purification</b> .
<b>Fundamental Niche</b>	A <b>fundamental niche</b> refers to the <b>geographic area</b> where a species <b>could potentially survive and thrive</b> , given an ideal set of <b>abiotic factors</b> (such as temperature, humidity, sunlight, and soil type), <b>without competition or other biotic interactions</b> . Understanding <b>fundamental niches</b> is crucial for <b>biodiversity conservation, ecological forecasting, and climate resilience planning</b> .
<b>Fungibility Emission</b>	<b>Fungibility</b> in the context of <b>greenhouse gas (GHG) emissions</b> refers to the <b>interchangeability of emission reductions</b> , allowing flexibility in how and where reductions occur. This principle is central to <b>carbon markets and climate policy mechanisms</b> , such as those established under the <b>Kyoto Protocol</b> and subsequent agreements. The concept of <b>fungibility in emissions</b> plays a crucial role in <b>international climate agreements, corporate sustainability goals, and carbon pricing strategies</b> .
<b>General Circulation Model (GCM)</b>	<p>A <b>General Circulation Model (GCM)</b> is a <b>sophisticated, three-dimensional computer model</b> used to <b>simulate the Earth's climate system</b> and predict <b>human-induced climate change</b>. These models incorporate a vast range of environmental and atmospheric factors to provide <b>detailed climate projections</b>.</p> <p><b>Key Features and Climate Relevance:</b></p>

	<ul style="list-style-type: none"> <li>● <b>Comprehensive Climate Simulation</b> – GCMs simulate <b>global atmospheric, oceanic, and land surface interactions</b>, integrating <b>solar radiation, greenhouse gas concentrations, cloud cover, and ice boundaries</b>.</li> <li>● <b>Predicting Climate Change</b> – These models help assess <b>long-term climate trends</b> and the <b>impacts of human activities</b>, such as <b>fossil fuel burning and deforestation</b>.</li> <li>● <b>Complex and Evolving</b> – Modern GCMs now include <b>advanced climate components</b>, such as <b>carbon cycle feedbacks, aerosols, and extreme weather events</b>, improving accuracy in forecasting <b>future climate scenarios</b>.</li> <li>● <b>Policy and Decision-Making Tool</b> – GCM outputs are <b>essential for climate policy development</b>, guiding <b>international agreements</b> like the <b>IPCC reports, Paris Agreement goals, and national climate action plans</b>.</li> </ul> <p>By <b>modelling climate processes at a global scale</b>, GCMs play a <b>critical role in understanding climate dynamics and shaping climate mitigation and adaptation strategies</b>.</p>
<b>Genetic Diversity</b>	<p><b>Genetic diversity</b> refers to the <b>total variety of genetic characteristics</b> within a species, including variations in <b>nucleotides, genes, chromosomes, or entire genomes</b>. It plays a crucial role in maintaining the <b>health, adaptability, and resilience</b> of populations in response to <b>environmental changes</b>. By <b>preserving genetic diversity</b>, ecosystems and agricultural systems can become <b>more resilient to climate change impacts, extreme weather events, and emerging diseases</b>, ensuring long-term <b>ecological balance and food security</b>.</p>
<b>Geo-Engineering</b>	<p><b>Geo-engineering</b> refers to <b>large-scale technological interventions</b> aimed at <b>stabilizing the Earth's climate system</b> by directly altering the <b>planet's energy balance</b> to counteract the effects of <b>climate change and the enhanced greenhouse effect</b>. While <b>geo-engineering</b> presents <b>potential solutions</b> for mitigating climate change, it remains <b>controversial</b> due to <b>scientific uncertainties, ethical dilemmas, and risks of unintended consequences</b>. Thus, it is widely regarded as a <b>complementary approach</b> rather than a replacement for <b>emission reductions and sustainable climate action</b>.</p>
<b>Geographic Information System (GIS)</b>	<p><b>Geographic Information System (GIS)</b></p> <p>A <b>Geographic Information System (GIS)</b> is a <b>computer-based system</b> designed to <b>collect, store, manage, analyze, and visualize spatially referenced information</b> along with its associated <b>attribute data</b>.</p> <p><b>Key Components of GIS:</b></p> <ol style="list-style-type: none"> <li>1. <b>Hardware</b> – Computers, servers, GPS devices, and remote sensing tools used for data collection and processing.</li> <li>2. <b>Software</b> – Specialized GIS applications (e.g., ArcGIS, QGIS) that enable mapping, data management, and spatial analysis.</li> <li>3. <b>Data</b> – Includes <b>spatial data</b> (coordinates, maps, satellite images) and <b>attribute data</b> (descriptive information linked to locations).</li> <li>4. <b>People</b> – GIS analysts, geographers, researchers, and decision-makers who use GIS for various applications.</li> <li>5. <b>Methods</b> – Techniques and models used for spatial analysis, data processing, and visualization.</li> </ol>

	<p><b>Applications of GIS:</b></p> <ul style="list-style-type: none"> <li>● <b>Environmental Management</b> – Tracking deforestation, mapping biodiversity, monitoring air and water quality.</li> <li>● <b>Urban Planning</b> – Designing transportation networks, zoning, and infrastructure development.</li> <li>● <b>Disaster Management</b> – Predicting floods, tracking wildfires, and managing emergency response.</li> <li>● <b>Agriculture</b> – Precision farming, soil mapping, and crop monitoring.</li> <li>● <b>Climate Change Studies</b> – Analysing temperature variations, sea-level rise, and carbon footprint mapping.</li> <li>● <b>Public Health</b> – Mapping disease outbreaks and planning healthcare services.</li> </ul> <p>GIS is a <b>powerful tool</b> that helps in <b>spatial decision-making</b> by integrating diverse datasets and providing <b>data-driven insights</b> for <b>sustainable development and climate action</b>.</p>
<b>Geological Hazard</b>	<p>A <b>geological hazard</b> refers to a <b>natural geological process or phenomenon</b> that has the potential to cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption or environmental damage.</p> <p><b>Types of Geological Hazards:</b></p> <ol style="list-style-type: none"> <li>1. <b>Earthquakes</b> – Sudden shaking of the ground caused by tectonic movements.</li> <li>2. <b>Volcanic Activity</b> – Eruptions, lava flows, and emissions of gases that can impact air quality and land.</li> <li>3. <b>Landslides &amp; Rockslides</b> – Movement of rock, soil, or debris down a slope due to gravity.</li> <li>4. <b>Surface Collapses &amp; Sinkholes</b> – Sudden ground collapses, often caused by underground erosion or human activities.</li> <li>5. <b>Debris or Mudflows</b> – Rapid movement of water-saturated debris, often triggered by heavy rainfall or seismic activity.</li> </ol> <p><b>Contributing Factors:</b></p> <ul style="list-style-type: none"> <li>● <b>Tectonic Movements</b> – Plate tectonics driving earthquakes and volcanic eruptions.</li> <li>● <b>Soil and Rock Conditions</b> – Loose or water-saturated soils increasing landslide risks.</li> <li>● <b>Climate and Hydrometeorological Factors</b> – Heavy rainfall and storms intensifying erosion, floods, and landslides.</li> <li>● <b>Human Activities</b> – Deforestation, mining, and urbanization increase geological hazard risks.</li> </ul> <p>Geological hazards, when combined with climate factors, pose <b>significant risks</b> but can be <b>managed</b> through <b>scientific research, policy interventions, and community preparedness</b>.</p>

<b>Geosphere</b>	<p>The <b>geosphere</b> refers to the <b>solid components of Earth</b>, including <b>soils, sediments, and rock layers</b> that form the Earth's crust, both on <b>continents and beneath the ocean floors</b>. It consists of various layers, such as the <b>lithosphere</b> (rigid outer shell and tectonic plates), the <b>asthenosphere</b> (semi-fluid layer allowing plate movements), the <b>mantle</b> (thick and hot layer beneath the crust), and the <b>core</b>, which is divided into a <b>liquid outer core</b> and a <b>solid inner core</b>. The geosphere plays a crucial role in <b>supporting life</b> by providing <b>essential minerals</b> and a <b>stable surface for ecosystems</b>. It interacts with the <b>atmosphere</b> and <b>hydrosphere</b>, influencing <b>weathering, erosion, and nutrient cycles</b>, and contributes to <b>climate regulation</b> by <b>storing carbon</b> in rocks and <b>releasing it through volcanic activity</b>. Additionally, it drives <b>geological processes</b> such as <b>plate tectonics, earthquakes, and mountain formation</b>, shaping the <b>Earth's physical structure and landforms</b> over millions of years.</p>
<b>Glacial Lake</b>	<p>A <b>glacial lake</b> is a <b>body of water formed by melting glaciers</b>. It can be located in different positions relative to the glacier:</p> <ul style="list-style-type: none"> <li>● <b>Pro-glacial lake</b> – Forms at the <b>front</b> of a glacier.</li> <li>● <b>Supra-glacial lake</b> – Forms <b>on the surface</b> of a glacier.</li> <li>● <b>Englacial lake</b> – Located <b>within the glacier</b>.</li> <li>● <b>Sub-glacial lake</b> – Forms at the <b>glacier bed</b>.</li> </ul> <p>Glacial lakes are important indicators of <b>climate change</b>, as their formation and expansion are linked to <b>glacial retreat and rising temperatures</b>. They can also pose <b>hazards</b>, such as <b>Glacial Lake Outburst Floods (GLOFs)</b>, which can cause <b>severe downstream flooding and destruction</b>.</p>
<b>Glacial Lake Outburst Flood (GLOFs)</b>	<p>A <b>Glacial Lake Outburst Flood (GLOF)</b> occurs when water stored in a <b>glacial lake</b> is suddenly released due to the <b>failure of a natural dam</b> formed by a glacier or moraine.</p> <p><b>Causes of GLOFs:</b></p> <ul style="list-style-type: none"> <li>● <b>Melting glaciers</b> due to <b>climate change</b>.</li> <li>● <b>Avalanches or landslides</b> displacing lake water.</li> <li>● <b>Seismic activity</b> weakening the moraine or glacier dam.</li> <li>● <b>Heavy rainfall</b> increasing water pressure on the dam.</li> </ul> <p><b>Impacts of GLOFs:</b></p> <ul style="list-style-type: none"> <li>● <b>Massive flooding</b> in downstream areas.</li> <li>● <b>Destruction of infrastructure</b> (bridges, roads, settlements).</li> <li>● <b>Loss of life and displacement</b> of communities.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Soil erosion and environmental degradation.</b></li> </ul> <p><b>Monitoring and early warning systems</b> are essential to mitigate the risks associated with GLOFs.</p>
<b>Glacier</b>	<p>A <b>glacier</b> is a <b>large, slow-moving mass of ice</b> that forms when <b>snow accumulates over years, compresses into ice, and begins to flow downhill</b> due to gravity.</p> <p><b>Key Features of Glaciers:</b></p> <ul style="list-style-type: none"> <li>● Found on <b>every continent except Australia.</b></li> <li>● Can <b>terminate on land or in water</b> (e.g., icebergs calving into the sea).</li> <li>● <b>Largest reservoir of freshwater</b> on Earth, second only to the oceans in total water storage.</li> <li>● <b>Formed over centuries</b> as snow compacts into ice.</li> </ul> <p><b>Types of Glaciers:</b></p> <ul style="list-style-type: none"> <li>● <b>Valley Glaciers:</b> Flow through mountain valleys.</li> <li>● <b>Ice Caps &amp; Ice Sheets:</b> Cover large land areas, such as Antarctica and Greenland.</li> <li>● <b>Tidewater Glaciers:</b> Flow into the sea and form icebergs.</li> </ul> <p><b>Glaciers &amp; Climate Change:</b></p> <ul style="list-style-type: none"> <li>● <b>Melting faster</b> due to <b>global warming.</b></li> <li>● <b>Affect sea levels, water cycles, and weather patterns</b> globally.</li> <li>● <b>Glacier retreat</b> impacts <b>freshwater availability</b> and ecosystems.</li> </ul> <p><b>Glacier dynamics</b> are influenced by <b>bedrock topography, accumulation at high altitudes, and melting at lower altitudes.</b></p>
<b>Global Average Temperature</b>	<p><b>Global Average Temperature</b> is an <b>estimate of Earth's mean surface air temperature</b> averaged across the entire planet. It serves as a <b>key indicator of climate change</b>, reflecting long-term temperature trends influenced by <b>natural variability and human activities</b> such as greenhouse gas emissions.</p> <p><b>Key Aspects:</b></p> <ul style="list-style-type: none"> <li>● <b>Measured using land, ocean, and satellite data</b> for accuracy.</li> <li>● <b>Rising global temperatures</b> are linked to <b>climate change</b> impacts like extreme weather, ice melt, and sea-level rise.</li> <li>● <b>Industrial-era warming</b> has led to a <b>significant increase</b> in the global average temperature, with recent decades being the warmest on record.</li> </ul>

<b>Global Environment Facility</b>	<p>The <b>Global Environment Facility (GEF)</b> is an independent financial organization that unites <b>182 member governments</b> in partnership with <b>international institutions, nongovernmental organizations</b>, and the <b>private sector</b> to address global environmental challenges. The GEF provides <b>grants</b> to <b>developing countries</b> and countries with economies in transition for projects that focus on areas such as <b>biodiversity, climate change, international waters, land degradation</b>, the <b>ozone layer</b>, and <b>persistent organic pollutants</b>. By funding these initiatives, the GEF helps link <b>local, national, and global environmental issues</b>, promoting <b>sustainable livelihoods</b> and facilitating solutions that benefit the global environment.</p>
<b>Global Surface Temperature</b>	<p>The <b>global surface temperature</b> refers to the <b>area-weighted global average</b> of two key components: (1) the <b>sea surface temperature</b> over the oceans, which represents the sub-surface bulk temperature in the first few meters of the ocean, and (2) the <b>surface air temperature</b> over land, measured 1.5 meters above the ground. It serves as an estimate of the <b>global mean surface air temperature</b>. However, when tracking changes over time, <b>anomalies</b> (deviations from climatology) are primarily used. This measurement is typically based on the <b>area-weighted global average</b> of the <b>sea surface temperature anomaly</b> and <b>land surface air temperature anomaly</b>.</p>
<b>Global temperature</b>	<p><b>Global temperature</b> is the average of air temperature recordings from weather stations on both <b>land and sea</b>, along with some <b>satellite measurements</b>. The period from <b>2006 to 2015</b> was recorded as the <b>warmest decade</b> on record, since <b>thermometer-based observations</b> began nearly <b>150 years ago</b>.</p>
<b>Global Warming</b>	<p><b>Global warming</b> refers to the recent and ongoing <b>global average increase</b> in temperature near the Earth's surface. In the early <b>1960s</b>, scientists recognized that <b>carbon dioxide</b> levels in the atmosphere were rising. Later, they discovered increases in <b>methane, nitrous oxide</b>, and other gases, which trap heat and warm the Earth, much like a greenhouse. This led scientists to conclude that increasing levels of <b>greenhouse gases</b> would cause global warming.</p> <p><b>Global warming</b> is the increase in the <b>global average temperature</b> observed due to changing climate patterns, with temperatures projected to rise by <b>1.5°C</b> by <b>2040</b>. While the terms <b>climate change</b> and <b>global warming</b> are often used interchangeably, <b>global warming</b> specifically refers to the rising surface temperature of the Earth, while <b>climate change</b> encompasses broader changes in patterns such as <b>wind, rainfall</b>, and other atmospheric shifts.</p> <p>Human activities, which have led to the increased levels of greenhouse gases in the atmosphere, are the major drivers of global warming. Some media outlets use the term "<b>global heating</b>" to more accurately reflect the severity of the crisis. The gradual increase in global surface temperature due to <b>radiative forcing</b> caused by <b>anthropogenic emissions</b> is known as <b>global warming</b>.</p>
<b>Global Warming Potential (GWP)</b>	<p><b>Global Warming Potential (GWP)</b> is a measure of the total energy that a greenhouse gas absorbs over a particular period of time, usually <b>100 years</b>, compared to <b>carbon dioxide</b>. It is an index that describes the <b>radiative characteristics</b> of well-mixed greenhouse gases and represents the combined effect of the different times these gases remain in the atmosphere and their relative effectiveness in absorbing <b>outgoing infrared radiation</b>.</p>

	<p>This index approximates the <b>time-integrated warming effect</b> of a unit mass of a given greenhouse gas in today's atmosphere, relative to that of <b>carbon dioxide</b>. <b>GWP</b> is used to compare the ability of different greenhouse gases to absorb heat over a specified period of time, which can range from <b>20 to 500 years</b>. The time frame is important because each gas has a different rate at which it is removed from the atmosphere.</p> <p>For example, the <b>sulfur hexafluoride (SF<sub>6</sub>)</b> GWP at <b>20 years</b> is <b>15,100</b>, meaning it has <b>15,100 times</b> more warming potential than carbon dioxide over that period.</p> <p>Carbon dioxide is always assigned a GWP of <b>1</b>, and other gases are compared to it for the same timeframe. The <b>Kyoto Protocol</b> relies on <b>GWPs</b> from pulse emissions over a <b>100-year time frame</b> to set emission reduction targets.</p>
<b>Globalization</b>	<p><b>Globalization</b> refers to the growing <b>integration</b> and <b>interdependence</b> of countries worldwide through the increasing volume and variety of <b>cross-border transactions</b> in goods and services. It also involves the <b>free international capital flows</b> and the more rapid and widespread diffusion of <b>technology, information, and culture</b>. This process facilitates global connections, enhancing economic, social, and political interrelationships between nations and regions.</p>
<b>Grassland</b>	<p><b>Grassland</b> refers to areas where the vegetation is dominated by <b>grasses</b> (Poaceae) and other <b>herbaceous</b> (non-woody) plants. These ecosystems typically experience periodic droughts and fires, which maintain the dominance of grasses over shrubs and trees. Grasslands are found in various parts of the world and serve as important habitats for a wide variety of wildlife while also providing valuable resources such as grazing land for livestock.</p>
<b>Green energy</b>	<p><b>Green energy</b> refers to energy derived from <b>renewable sources</b> such as <b>wind, solar</b>, and sometimes <b>geothermal</b> or <b>biomass</b>. Unlike fossil fuels, the production of green energy produces minimal or no carbon emissions, making it a cleaner alternative. However, there is some debate over whether certain renewable energy sources, such as <b>hydropower</b>, can be fully considered "green," as large-scale hydropower projects can have significant impacts on <b>rivers</b> and <b>ecosystems</b>, altering natural habitats and water flows.</p>
<b>Green hydrogen</b>	<p><b>Green hydrogen</b> is produced through <b>electrolysis</b>, where water is split into hydrogen and oxygen using <b>clean energy sources</b> such as <b>solar</b> or <b>wind power</b>. This process is considered sustainable because it produces no direct carbon emissions, making it a key solution for reducing greenhouse gas emissions in sectors like transportation and industry.</p>
<b>Greenhouse Effect</b>	<p>The <b>greenhouse effect</b> refers to the process by which heat is trapped in the Earth's atmosphere, leading to the warming of the planet's surface. Here's how it works:</p> <ul style="list-style-type: none"> <li>Some of the heat from the Earth's surface is emitted as infrared radiation and tries to escape into space. However, certain gases in the atmosphere, known as <b>greenhouse gases</b> (such as <b>carbon dioxide, water vapor, methane, and ozone</b>), absorb and re-radiate this heat back toward the Earth's surface, keeping the lower atmosphere warm. This process is similar to how a greenhouse traps heat.</li> </ul>

	<ul style="list-style-type: none"> <li>• The <b>natural greenhouse effect</b> is crucial for maintaining temperatures conducive to life on Earth. Without it, the planet's average temperature would be much colder.</li> <li>• The <b>enhanced greenhouse effect</b> occurs when human activities, such as burning fossil fuels, release <b>additional greenhouse gases</b> into the atmosphere. This increases the amount of heat trapped, causing the Earth's average temperature to rise, contributing to <b>global warming</b> and climate change.</li> </ul> <p>In summary, while the natural greenhouse effect is necessary for life, the increased concentration of greenhouse gases from human activities is intensifying the effect, leading to global warming.</p>
<b>Greenhouse Gas (GHG)</b>	<p><b>Greenhouse gases (GHGs)</b> are atmospheric gases that contribute to the <b>greenhouse effect</b> by trapping infrared radiation, which leads to global warming. These gases include <b>water vapor (H<sub>2</sub>O)</b>, <b>carbon dioxide (CO<sub>2</sub>)</b>, <b>methane (CH<sub>4</sub>)</b>, <b>nitrous oxide (N<sub>2</sub>O)</b>, <b>ozone (O<sub>3</sub>)</b>, and several industrial gases such as <b>chlorofluorocarbons (CFCs)</b>, <b>hydrochlorofluorocarbons (HCFCs)</b>, <b>hydrofluorocarbons (HFCs)</b>, <b>perfluorocarbons (PFCs)</b>, and <b>sulfur hexafluoride (SF<sub>6</sub>)</b>. Among these, <b>water vapor</b> is the most abundant, but its levels are primarily influenced by temperature, not directly by human activity. <b>Carbon dioxide (CO<sub>2</sub>)</b>, however, is the second most prevalent and the primary greenhouse gas released by human activities, particularly the burning of fossil fuels. <b>Methane (CH<sub>4</sub>)</b> and <b>nitrous oxide (N<sub>2</sub>O)</b>, although present in smaller amounts, are far more effective at trapping heat. The increase in the concentrations of these gases, especially due to human activities such as deforestation, industrial processes, and fossil fuel combustion, has been a major driver of <b>global warming</b> and <b>climate change</b>.</p>
<b>Greenwashing</b>	<p><b>Greenwashing</b> is a term coined by environmentalist <b>Jay Westerveld</b> in 1986, referring to a practice where companies or organizations falsely portray their products or services as environmentally friendly, even though they may be harmful to the environment. The goal of <b>greenwashing</b> is often to capitalize on consumers' increasing demand for sustainable and eco-friendly options or to deflect negative attention regarding environmentally damaging practices. However, companies engaging in <b>greenwashing</b> typically do not make substantial changes to their operations or products to reduce their environmental impact, relying instead on deceptive marketing tactics to create a misleading impression of environmental responsibility.</p>
<b>Gross Primary Production</b>	<p><b>Gross Primary Production (GPP)</b> refers to the total amount of carbon that is fixed from the atmosphere through the process of <b>photosynthesis</b>. It represents the total energy captured by plants and other photosynthetic organisms, such as algae, from sunlight and converted into organic matter. This is the foundation of the carbon cycle, as it provides the energy required for plant growth and sustains ecosystems.</p>
<b>Group of 77 (G-77) and China</b>	<p>The <b>Group of 77 (G-77) and China</b> is a coalition of developing countries established in 1967, originally under the United Nations Conference on Trade and Development (UNCTAD). The group's primary goal is to promote and harmonize the economic interests and negotiating positions of its 131 member states. The G-77 plays a key role in international discussions on various global issues, including climate change, poverty reduction, and sustainable development. Although China is not a full member of the G-77, it has aligned itself with the group in</p>



	various negotiations, especially on issues related to climate and development. The G-77 and China work to amplify the voices of developing countries on the global stage.
<b>Habit</b>	A <b>habit</b> is an acquired pattern of behavior that often occurs automatically and is repeated regularly. It typically develops through repetition or regular practice, making the behavior less conscious over time. Habits can be both positive, such as exercising daily, or negative, like smoking.
<b>Habitat</b>	A <b>habitat</b> is the specific environment or place where an organism or species tends to live. It refers to a more locally defined portion of the total environment, including factors such as food sources, climate, shelter, and other living conditions that support the organism's survival and reproduction.
<b>Habitat Fragmentation</b>	<b>Habitat fragmentation</b> is the process in which larger areas of habitat are divided into smaller patches. These smaller patches have a reduced total area and are often isolated from each other by a matrix of different types of habitats that differ from the original habitat. This fragmentation can disrupt ecosystems, making it harder for species to migrate, find food, and reproduce, potentially leading to declines in biodiversity.
<b>Hail</b>	<b>Hail</b> is a type of solid precipitation that consists of balls or irregular lumps of ice, known as hailstones. These hailstones are primarily made of water ice and can vary in size from 5 millimetres (0.2 inches) to 150 millimetres (5.9 inches) in diameter. Larger hailstones typically form during severe thunderstorms when strong updrafts carry raindrops to higher altitudes, where they freeze and accumulate layers of ice before falling to the ground.
<b>Halocarbons</b>	<p><b>Halocarbons</b> are compounds that contain carbon atoms bonded with halogen elements such as chlorine, bromine, fluorine, or iodine. These compounds can act as powerful greenhouse gases in the atmosphere. The chlorine and bromine-containing halocarbons are particularly concerning because they contribute to the depletion of the ozone layer.</p> <p>Halocarbons are typically non-flammable and nonreactive, but some can be broken down by ultraviolet radiation in the upper atmosphere, releasing free halogen atoms that damage the ozone layer. Chlorine-based halocarbons, known as organochlorides, are the most common type. Additionally, certain halocarbons have been implicated as significant greenhouse gases, contributing to global warming.</p>
<b>Hazard</b>	A <b>hazard</b> refers to a dangerous phenomenon, substance, human activity, or condition that has the potential to cause <b>loss of life, injury</b> , or other health impacts, as well as <b>property damage, loss of livelihoods and services, social and economic disruption</b> , or <b>environmental damage</b> . In the context of <b>environmental and climate change</b> , hazards are often associated with <b>natural disasters</b> such as floods, storms, heatwaves, wildfires, and sea-level rise, which are increasingly intensified by climate change.

	<p>The <b>Hyogo Framework for Action</b> identifies these hazards as those originating from <b>natural sources</b> (such as geological, meteorological, and hydrological events), as well as <b>technological</b> and <b>environmental risks</b> that can exacerbate the impacts of climate change. These hazards can stem from a range of <b>biological</b> and <b>technological</b> sources, often acting simultaneously or in combination.</p> <p>In <b>disaster risk reduction</b>, hazards are often quantified based on <b>historical data</b> and <b>scientific analysis</b>, which assess the <b>frequency</b> and <b>intensity</b> of these events in various regions. Understanding these hazards is critical for formulating effective climate adaptation and mitigation strategies.</p>
<b>Hazard Based Approach</b>	<p>A <b>Hazard-Based Approach</b> is a conceptual and analytical method used in adaptation projects that places its primary focus on the <b>biophysical aspects of climate-related risk</b>, particularly the <b>climate hazard</b> itself. This approach identifies and assesses the various <b>climate hazards</b> such as temperature rise, extreme weather events, or sea-level rise, and their direct impact on communities, ecosystems, and infrastructure.</p> <p>By focusing on the physical characteristics of these hazards, this approach helps in understanding how <b>climate change</b> and its related risks manifest in the environment. It serves as a basis for developing targeted <b>adaptation strategies</b> aimed at reducing vulnerability to specific <b>climate hazards</b>. However, it is often complemented with other frameworks that address the broader <b>social, economic, and institutional factors</b> that influence the resilience and adaptive capacity of communities.</p>
<b>Hazard Mapping</b>	<p><b>Hazard Mapping</b> is the process of geographically identifying areas where specific phenomena are likely to pose a threat to human settlements and infrastructure. This process involves creating <b>hazard maps</b> that pinpoint regions vulnerable to <b>natural hazards</b> such as earthquakes, hurricanes, and tornadoes, as well as areas at risk of <b>manmade disasters</b>. For example, <b>hazard maps</b> may highlight zones near <b>nuclear power plants, chemical disposal sites, or refineries</b> that are susceptible to threats like explosions or fires.</p> <p>In the context of <b>climate change</b>, hazard mapping also includes areas vulnerable to <b>climate-related risks</b> such as <b>flooding, storm surges, and droughts</b>, enabling better planning and decision-making to mitigate the impacts of these hazards on human populations and ecosystems. Effective hazard mapping is crucial for <b>disaster risk reduction</b> and <b>climate adaptation strategies</b>, helping to minimize exposure to potential dangers and safeguard lives, property, and livelihoods.</p>
<b>Heat domes</b>	<p><b>Heat Domes</b> occur when <b>hot ocean air</b> gets trapped over a large area due to high atmospheric pressure. This pressure system forces the air downwards, causing it to heat up as it compresses. The result is the formation of a “lid” or a <b>dome of trapped heat</b> over the region, which leads to dangerously high temperatures.</p> <p>In the context of <b>climate change</b>, heat domes are becoming more frequent and intense due to rising global temperatures. As the <b>atmosphere warms</b>, these pressure systems can linger for longer periods, creating prolonged <b>heat waves</b>. This phenomenon poses significant risks to human health, agriculture, and ecosystems, as it can lead to <b>heat-related illnesses, crop failures, and wildfires</b>. Heat domes are a growing concern in the <b>fight against climate change</b>, highlighting the need for stronger <b>climate adaptation and mitigation strategies</b>.</p>

<b>Heat Island</b>	<p><b>Heat Island</b> refers to an <b>urban area</b> that experiences higher temperatures compared to its surrounding rural or non-urban areas. This phenomenon occurs as <b>urbanization</b> progresses, with buildings, roads, and other infrastructures replacing <b>open land</b> and <b>vegetation</b>. These man-made surfaces, such as concrete and asphalt, absorb more solar energy during the day and release it slowly at night, causing temperatures in cities to be significantly higher than in surrounding areas, a condition known as the <b>Urban Heat Island Effect</b>.</p> <p>In the context of <b>climate change</b>, heat islands contribute to the overall warming of cities, leading to <b>increased energy consumption</b> (due to higher demand for air conditioning), <b>worsened air quality</b>, and greater health risks such as <b>heat strokes</b> and <b>respiratory issues</b>. Addressing heat islands is an important part of <b>climate adaptation</b> strategies, including the use of <b>green infrastructure</b> like <b>green roofs</b>, <b>trees</b>, and <b>cool pavements</b> to reduce urban temperatures and improve resilience to climate change.</p>
<b>Heat Waves</b>	<p><b>Heat Waves</b> refer to a prolonged period of <b>excessive heat</b>, typically lasting for several days, and often accompanied by <b>high humidity</b>. These extreme weather events can lead to dangerously high temperatures, which significantly impact both human health and the environment. Heat waves are particularly concerning as they increase the risk of <b>heat-related illnesses</b>, such as <b>heat stroke</b> and <b>dehydration</b>, and can strain <b>healthcare systems</b> and <b>energy grids</b> due to the high demand for cooling.</p> <p>In the context of <b>climate change</b>, heat waves are expected to become more frequent, intense, and longer in duration. This is due to rising global temperatures and changes in weather patterns. <b>Urban areas</b>, with their higher density of buildings and reduced green spaces, are particularly vulnerable to heat waves, as they experience the <b>Urban Heat Island effect</b>. As such, heat waves are a key factor in <b>climate adaptation</b> planning, requiring improved <b>infrastructure</b>, better <b>heat action plans</b>, and increased <b>public awareness</b> to reduce their impacts on vulnerable populations.</p>
<b>Heritage Site</b>	<p>A <b>Heritage Site</b> is a location that holds significant cultural, historical, or natural value, and is officially recognized by UNESCO as part of its <b>World Heritage Sites</b> program. These sites include <b>natural wonders</b> such as forests, mountains, lakes, and deserts, as well as <b>man-made landmarks</b> like monuments, buildings, cities, or complex structures. Being designated as a UNESCO World Heritage Site highlights the site's exceptional importance to humanity and acknowledges its <b>outstanding universal value</b>.</p> <p>World Heritage Sites are important for <b>preserving cultural heritage</b> and <b>biodiversity</b>, as well as promoting <b>sustainable tourism</b>. The designation also aims to <b>protect</b> these areas from threats posed by urbanization, climate change, and other human activities. In the context of <b>climate change</b>, many heritage sites face increased risk from rising sea levels, extreme weather events, and other environmental stresses, making their <b>conservation</b> and <b>management</b> critical for future generations.</p>
<b>Hindu Kush Himalaya</b>	<p>The <b>Hindu Kush Himalaya (HKH)</b> refers to a vast and complex mountain range that stretches across South and Central Asia, encompassing both the <b>Hindu Kush</b> mountain range (spanning 800 kilometres from Afghanistan to Tajikistan) and the <b>Himalayas</b> (extending from Pakistan to Myanmar). This region is of immense environmental, cultural, and economic significance, serving as a critical source of water, energy, and biodiversity for millions of people in the region.</p>

	<p>Recent assessments, such as the <b>2023 report by the International Centre for Integrated Mountain Development (ICIMOD)</b>, have highlighted significant changes occurring in the HKH region due to <b>climate change</b>. The <b>melting of glaciers</b> is accelerating, with many glaciers retreating at an alarming rate. Additionally, <b>snowfall days</b> are becoming less frequent, and <b>permafrost</b> is beginning to melt. These changes pose severe risks to the local communities and ecosystems that depend on the glaciers, rivers, and climate-regulated environments.</p> <p>The <b>impacts of climate change</b> in the HKH region are far-reaching. They include disruptions to the <b>water supply</b>, which is critical for agriculture, hydropower, and daily consumption, as well as threats to <b>biodiversity</b> due to altered habitats and ecosystems. <b>Rising temperatures</b> and unpredictable weather patterns are also intensifying the vulnerability of people living in these areas. The ramifications of these changes will not only affect the countries within the Hindu Kush Himalaya region but also have <b>global implications</b> as the mountains are the "water towers" for much of <b>South Asia</b>. Effective climate action and regional cooperation will be crucial in addressing the growing challenges in this vital region.</p>
<b>Hot Air/ Paper Credit</b>	<p><b>Hot Air</b> refers to a situation where some governments or entities may meet their greenhouse gas emissions reduction targets under international agreements like the <b>Kyoto Protocol</b> with minimal effort. These governments may achieve their targets by exploiting loopholes or utilizing <b>excessive emissions credits</b> from sources that don't reflect genuine emission reductions. As a result, they could flood the emissions credit market with these <b>credits</b>, undermining the market's effectiveness. This situation reduces the incentives for other countries or businesses to make substantial efforts to reduce their own <b>domestic emissions</b>, as the market is flooded with credits that don't represent real reductions.</p> <p>In the context of <b>paper credits</b>, the term refers to the use of <b>financial instruments</b> such as <b>promissory notes</b>, <b>due bills</b>, or other debt-related evidence to generate carbon credits without corresponding environmental impact. These <b>paper credits</b> may be issued as part of a system designed to encourage emission reductions, but if they lack genuine environmental verification or result from accounting tricks, they essentially function as "<b>paper credits</b>", offering little or no real benefit to the environment. Both <b>hot air</b> and <b>paper credits</b> are issues in international climate negotiations, as they undermine the integrity and effectiveness of mechanisms aimed at tackling <b>climate change</b>.</p>
<b>Hot waves</b>	<p><b>Heat waves</b> refer to extended periods of <b>exceptionally high temperatures</b>, often accompanied by <b>high humidity</b>. These extreme weather events can significantly affect both human health and the environment. Prolonged exposure to heat waves can lead to dehydration, heat exhaustion, and heat strokes, particularly in vulnerable populations such as the elderly and children. Additionally, heat waves can exacerbate energy demands, strain water resources, and contribute to <b>wildfires</b> and <b>droughts</b>. In the context of <b>climate change</b>, the frequency, intensity, and duration of heat waves are expected to increase, making them a major concern for public health, agriculture, and urban infrastructure.</p>
<b>Human Capital</b>	<p><b>Human capital</b> refers to the <b>skills, knowledge, health, and labor abilities</b> of individuals that are essential for pursuing various livelihood strategies and contributing to economic and social development. It encompasses the education, training, and experiences that enable individuals to perform tasks effectively and adapt to changing conditions. In the context of <b>climate change</b> and <b>sustainable development</b>,</p>

	human capital plays a crucial role in <b>building resilience</b> , fostering innovation, and ensuring the successful implementation of environmental policies. Investing in human capital, through education, healthcare, and capacity-building, is critical for tackling challenges related to climate change, poverty alleviation, and long-term sustainability.
<b>Human Development</b>	<p><b>Human Development</b> is a comprehensive development paradigm that goes beyond mere increases or decreases in national income. It focuses on creating an environment where people can <b>realize their full potential</b>, lead <b>productive, creative</b> lives, and pursue their own <b>needs and interests</b>. At its core, human development emphasizes <b>quality of life, equity, empowerment, and sustainability</b>, ensuring that individuals have access to opportunities for <b>education, healthcare, economic security, and participation</b> in decision-making processes.</p> <p>In the context of <b>climate change</b> and <b>environmental sustainability</b>, human development is intrinsically linked to the creation of <b>resilient societies</b>. By fostering social inclusion, promoting <b>sustainable livelihoods</b>, and prioritizing <b>climate justice</b>, human development seeks to empower communities to adapt to climate challenges, reduce vulnerabilities, and ensure <b>long-term well-being</b> for future generations.</p>
<b>Humidity</b>	<p><b>Humidity</b> refers to the <b>amount of water vapor</b> present in the air. It is typically measured as a percentage, with <b>relative humidity</b> representing the amount of water vapor in the air compared to the maximum amount the air can hold at a given temperature.</p> <p>Humidity plays a significant role in <b>climate and weather patterns</b>, influencing both the <b>comfort</b> of human populations and the occurrence of <b>extreme weather events</b>, such as <b>heatwaves, storms, and floods</b>. High humidity can make hot temperatures feel even hotter, as it reduces the body's ability to cool itself through evaporation of sweat. In the context of <b>climate change</b>, increased humidity levels, particularly in <b>tropical regions</b>, are expected to contribute to more intense <b>heat stress</b> and <b>health risks</b>.</p>
<b>Hybrid</b>	<b>Hybrid</b> refers to approaches that combine <b>uniform</b> and <b>site-specific methods</b> within an <b>iterative process</b> to develop and assess a range of <b>adaptation strategies</b> . This approach recognizes that while certain strategies may be broadly applicable across regions or systems, others require tailoring to specific local conditions or needs. By integrating these two approaches, a hybrid method allows for <b>flexibility and customization</b> , ensuring that adaptation efforts are both <b>effective</b> and <b>context-appropriate</b> . This is particularly important in the context of <b>climate change adaptation</b> , where diverse local challenges and ecosystems require a mix of <b>global knowledge</b> and <b>local expertise</b> .
<b>Hydro Meteorological Hazard</b>	<b>Hydro-meteorological hazards</b> refer to processes or phenomena of <b>atmospheric, hydrological, or oceanographic</b> nature that have the potential to cause significant impacts. These impacts may include <b>loss of life, injury, other health effects, property damage, loss of livelihoods and services, social and economic disruption, and environmental damage</b> . Examples of such hazards include <b>floods, droughts, hurricanes, typhoons, and storm surges</b> . These events are closely linked to climate variability and change, and their frequency and intensity are expected to increase due to global warming. Understanding and managing these hazards is critical for building <b>resilience</b> in vulnerable communities and ecosystems.
<b>Hydrocarbons</b>	<b>Hydrocarbons</b> are organic compounds made up of only <b>hydrogen</b> and <b>carbon</b> atoms. These substances are the primary components of <b>fossil fuels</b> such as <b>coal, petroleum, and natural gas</b> . When hydrocarbons are burned for <b>power generation</b> or used as <b>fuel</b> in

	<p>transportation, they release <b>carbon dioxide (CO<sub>2</sub>)</b> and other <b>greenhouse gases</b> into the atmosphere. This process significantly contributes to <b>climate change</b> by enhancing the <b>greenhouse effect</b> and increasing global temperatures. The burning of hydrocarbons is a major source of anthropogenic (human-induced) greenhouse gas emissions, which are a key driver of the ongoing <b>climate crisis</b>. Reducing the use of fossil fuels and transitioning to <b>renewable energy sources</b> is essential for mitigating climate change.</p>
<b>Hydrochlorofluorocarbons (HCFCs)</b>	<p><b>Hydrochlorofluorocarbons (HCFCs)</b> are chemical compounds composed of <b>hydrogen, fluorine, chlorine</b>, and <b>carbon</b> atoms. While HCFCs are considered <b>ozone-depleting substances (ODS)</b>, they are less harmful to the <b>ozone layer</b> than <b>chlorofluorocarbons (CFCs)</b>. HCFCs were introduced as <b>temporary replacements</b> for CFCs to help reduce ozone depletion. However, despite being less potent, HCFCs still contribute to <b>ozone layer degradation</b> and are also classified as <b>greenhouse gases</b>, meaning they trap heat in the atmosphere and contribute to <b>global warming</b>. Efforts are ongoing to phase out HCFCs in favour of more environmentally friendly alternatives as part of international agreements like the <b>Montreal Protocol</b>.</p>
<b>Hydrofluorocarbons (HFCs)</b>	<p><b>Hydrofluorocarbons (HFCs)</b> are a group of <b>greenhouse gases</b> that are targeted for reduction under the <b>Kyoto Protocol</b>. These compounds were developed as replacements for <b>chlorofluorocarbons (CFCs)</b>, which were found to be harmful to the ozone layer. HFCs are primarily used in <b>refrigeration, air conditioning</b>, and <b>semiconductor manufacturing</b>. Although they do not contribute to ozone depletion, HFCs are potent <b>greenhouse gases</b> with <b>Global Warming Potentials (GWPs)</b> ranging from <b>1,300 to 11,700</b>, making them significantly more effective at trapping heat in the atmosphere compared to carbon dioxide. Due to their high GWP, efforts are underway to phase out HFCs under international agreements like the <b>Montreal Protocol's Kigali Amendment</b> to mitigate their contribution to <b>climate change</b>.</p>
<b>Hydrologic Cycle</b>	<p>The <b>Hydrologic Cycle</b> (also known as the <b>Water Cycle</b>) is a continuous process through which water moves around the Earth. It includes several key stages: <b>evaporation</b>, where water transforms from liquid to vapor; <b>transportation</b>, both vertical and horizontal, of water vapor; <b>condensation</b>, where vapor forms clouds; <b>precipitation</b>, such as rain or snow; and <b>runoff</b>, which moves water back to oceans and other bodies of water. In addition, <b>transpiration</b> from plants and <b>infiltration</b> of water into the soil are critical parts of the cycle.</p> <p>The hydrologic cycle plays a crucial role in regulating <b>climate</b> by influencing factors like <b>surface vegetation, cloud formation, snow and ice</b>, and <b>soil moisture</b>. It is also responsible for about <b>25 to 30 percent of heat transport</b> from the equator to the <b>polar regions</b> in the <b>mid-latitudes</b>, contributing significantly to regional and global climate patterns. Through these processes, the hydrologic cycle maintains the Earth's water balance and supports ecosystems globally.</p>
<b>Hydrologic model</b>	<p>A <b>Hydrologic Model</b> is a computer-based tool used to simulate and analyze large amounts of historical data related to water processes. These models help predict how various <b>climate variables</b>, such as <b>temperature, precipitation</b>, and <b>carbon dioxide levels</b>, might influence the <b>hydrologic cycle</b>. By using mathematical equations and algorithms, hydrologic models can estimate water flow, distribution, and storage across different environments.</p> <p>Such models are crucial for understanding the impacts of climate change on water resources, managing <b>flood risks</b>, improving <b>water management</b> strategies, and supporting <b>sustainable land use planning</b>. These models assist in forecasting how environmental changes</p>

	will affect <b>water availability</b> , <b>flooding</b> , and <b>droughts</b> , thereby helping policymakers and scientists make informed decisions for <b>climate adaptation</b> and <b>mitigation</b> .
<b>Hydrosphere</b>	<p>The <b>Hydrosphere</b> refers to the component of the <b>climate system</b> that includes all water found on, under, and above the surface of the Earth. It encompasses various forms of water, such as <b>oceans</b>, <b>seas</b>, <b>rivers</b>, <b>freshwater lakes</b>, and <b>underground water</b> (including groundwater). The hydrosphere plays a crucial role in regulating Earth's climate by storing and transporting heat, as well as influencing <b>weather patterns</b> and <b>precipitation</b>.</p> <p>The hydrosphere is intimately connected with the <b>atmosphere</b>, <b>biosphere</b>, and <b>lithosphere</b>, forming a dynamic system that drives the <b>water cycle</b>. This system is essential for sustaining life, supporting ecosystems, and providing resources like freshwater for human consumption and agriculture. Additionally, changes in the hydrosphere, such as <b>melting glaciers</b> or <b>rising sea levels</b>, are key indicators of <b>climate change</b>.</p>
<b>Ice cap</b>	<p>An <b>ice cap</b> is a dome-shaped mass of ice that covers a highland area, typically at higher latitudes or altitudes. Unlike <b>ice sheets</b>, which cover vast landmasses and are found in regions like Antarctica and Greenland, ice caps are much smaller in scale. They are typically found in polar regions or high mountainous areas and can cover an area of less than 50,000 square kilometres.</p> <p>Ice caps play an important role in regulating the Earth's climate and sea levels. They store significant amounts of freshwater, and as temperatures rise due to climate change, the melting of ice caps contributes to <b>sea level rise</b>. The loss of ice caps can also affect local ecosystems and water availability for nearby human populations.</p>
<b>Ice Core</b>	<p>An <b>ice core</b> is a cylindrical sample of ice extracted from glaciers or ice sheets to study past climate conditions. These cores contain trapped air bubbles, which allow scientists to analyze the composition of the atmosphere from thousands of years ago. By examining the levels of <b>carbon dioxide</b>, <b>methane</b>, and other greenhouse gases within the air pockets, researchers can estimate historical concentrations of these gases, providing insight into past climate trends and their correlation with temperature changes.</p> <p>In addition to the air analysis, the ice itself can reveal information about historical temperature fluctuations through the study of isotopic ratios and physical properties such as the layers of snow accumulation. Ice cores are essential tools in paleoclimatology, helping scientists understand the Earth's climate history and predict future trends, particularly in the context of <b>climate change</b> and its long-term impacts on global systems.</p>
<b>Ice Loss</b>	<p><b>Ice loss</b> refers to the reduction in mass of both sea ice and land ice, which is primarily driven by rising temperatures due to climate change. This loss occurs in two main forms: the <b>melting of sea ice</b> and the <b>retreat of land ice</b> (such as glaciers and ice sheets). Sea ice loss occurs when the ice that forms on the ocean surface melts due to warmer temperatures, and land ice loss happens when glaciers and ice sheets shrink as they melt or break apart.</p>

	<p><b>Ice loss</b> is a significant contributor to <b>global sea level rise</b>. As ice melts, it directly adds water to the oceans, raising their levels. Furthermore, the loss of ice reduces the Earth's reflective surface (albedo), leading to even greater absorption of solar energy, which accelerates the melting process in a feedback loop. The retreat of land-based ice, particularly in regions like Greenland and Antarctica, is a major driver of long-term sea level rise, threatening coastal communities and ecosystems worldwide.</p>
<b>Ice Sheet</b>	<p><b>Ice Sheet</b> refers to a massive, thick layer of ice that covers a significant portion of land, extending over tens of thousands of square miles. These ice sheets are large enough to flow outward from a central high plateau, shaping the underlying bedrock topography. The two main ice sheets on Earth are located in <b>Greenland</b> and <b>Antarctica</b>, which together contain more than <b>99 percent</b> of the world's freshwater ice.</p> <p>The <b>Greenland Ice Sheet</b> is experiencing significant and rapid melting, especially during the summer months, contributing to rising sea levels. <b>Antarctica's Ice Sheet</b>, though also losing mass, has a slower and more localized melt pattern for now. The ice sheet flows outward through fast-moving ice streams or glaciers, some of which discharge into the sea or onto ice shelves floating on the ocean. These ice shelves are particularly vulnerable to climate change, as the warming oceans and atmospheric temperatures cause them to break apart.</p> <p>Historically, during <b>ice ages</b>, there were additional ice sheets covering other parts of the Earth, but today, the Greenland and Antarctic ice sheets are the dominant ones. The retreat and melting of these ice sheets due to climate change are major contributors to <b>global sea level rise</b>, impacting coastal ecosystems and human settlements worldwide.</p>
<b>Ice Shelf</b>	<p><b>Ice Shelf</b> refers to a large, floating platform of ice that forms from the outflow of land ice, typically at the edge of a continent. It extends over the sea but remains attached to the land at its inland edge. Ice shelves act as a barrier, helping to slow the flow of land ice from glaciers into the ocean, thus playing a key role in regulating sea level rise.</p> <p>However, in the past few decades, <b>rapid disintegration</b> and <b>collapses of ice shelves</b> have been observed, particularly along the <b>Antarctic Peninsula</b> and in regions of <b>Canada</b>. These events are primarily driven by warming ocean temperatures and atmospheric conditions, which weaken the ice shelf's structural integrity. When an ice shelf breaks apart or collapses, the land ice behind it can flow more quickly into the ocean, accelerating the contribution to <b>sea level rise</b>. This process poses significant risks to coastal ecosystems and human populations living near the sea.</p>
<b>ILO Convention 169</b>	<p><b>ILO Convention 169</b> is a <b>legally binding international instrument</b> that specifically addresses the rights of <b>indigenous and tribal peoples</b>. Adopted in <b>1989</b>, it provides a framework for ensuring the protection of these groups' cultural, social, and economic rights. As of today, <b>20 countries</b> have ratified the convention. Once a country ratifies the Convention, it has one year to align its national <b>legislation, policies, and programs</b> with the Convention before it becomes legally binding.</p> <p>The Convention applies to:</p> <ol style="list-style-type: none"> <li>1. <b>Tribal peoples</b> whose social, cultural, and economic conditions distinguish them from the broader national community, and whose status is governed by their own <b>customs, traditions</b>, or special laws and regulations.</li> </ol>



	<p>2. <b>Indigenous peoples</b> who are descendants of the populations that inhabited a country prior to colonization or the establishment of present state boundaries. These peoples, regardless of legal status, continue to preserve their unique <b>social, economic, cultural, and political institutions</b>.</p> <p>As the Convention mandates, any climate strategies such as <b>REDD</b> (Reducing Emissions from Deforestation and Forest Degradation) must respect <b>traditional knowledge</b>, skills, and practices of indigenous communities. This ensures that their role in environmental conservation and sustainable land-use practices is recognized and protected in climate action plans.</p>
<b>Impact</b>	<b>Impact</b> refers to the <b>detrimental</b> or <b>beneficial consequences</b> of climate change on both <b>natural</b> and <b>human systems</b> . These impacts can manifest in various forms, including changes in ecosystems, biodiversity, agricultural productivity, human health, infrastructure, and social and economic well-being. The severity and nature of these impacts often depend on the intensity of climate change, geographic location, and the resilience of affected systems. The recognition of climate impacts is crucial for shaping mitigation and adaptation strategies.
<b>Impact Assessment</b>	<b>Impact Assessment</b> is the process of <b>identifying</b> and <b>evaluating</b> the <b>detrimental</b> and <b>beneficial consequences</b> of climate change on both <b>natural</b> and <b>human systems</b> . It involves analysing how climate change affects various sectors, such as ecosystems, agriculture, infrastructure, human health, and socio-economic conditions. The goal of impact assessment is to understand the extent and nature of these impacts, which helps in developing informed strategies for <b>mitigation</b> and <b>adaptation</b> to minimize negative outcomes and enhance resilience to climate change.
<b>Incentives (Climate)</b>	<b>Incentives (climate)</b> refer to any <b>financial or non-financial factors</b> that <b>enable</b> or <b>motivate</b> a particular course of action related to climate change. These incentives are designed to encourage individuals, organizations, or governments to adopt behaviours or practices that contribute to <b>climate mitigation</b> and <b>adaptation</b> . They can include <b>monetary rewards</b> (such as subsidies, tax breaks, or grants), as well as <b>non-monetary incentives</b> (like recognition, technical assistance, or capacity-building support). The goal is to drive positive environmental actions, such as reducing carbon emissions, enhancing energy efficiency, or promoting sustainable practices, by aligning incentives with climate goals.
<b>Indicators</b>	<b>Indicators</b> are <b>quantitative</b> or <b>qualitative parameters</b> that offer a <b>simple and reliable basis</b> for assessing <b>changes</b> in a system or phenomenon. In the context of <b>climate adaptation</b> , indicators play a critical role in monitoring and evaluating progress. Within frameworks like the <b>Adaptation Planning Framework (APF)</b> , a set of indicators is used to characterize <b>adaptation phenomena</b> , establish a <b>baseline</b> , and track <b>changes</b> in priority systems over time. These indicators help assess the effectiveness of adaptation measures, identify trends, and guide decision-making to ensure that climate adaptation strategies are aligned with evolving environmental conditions and vulnerabilities.
<b>Indigenous Peoples</b>	<b>Indigenous Peoples</b> refer to communities whose <b>ancestors</b> inhabited a particular area or country long before outsiders arrived, often through <b>conquest, settlement</b> , or other means, and dominated them. These peoples continue to live more in accordance with their own <b>social, economic, and cultural customs and traditions</b> rather than those of the dominant society or nation they are now part of. Indigenous

	<p>peoples are often referred to by terms such as "<b>native</b>," "<b>aboriginal</b>," or "<b>tribal</b>" peoples. Their unique relationship with land, culture, and tradition is vital for preserving biodiversity, climate resilience, and indigenous knowledge systems. Climate change strategies often recognize the role of indigenous peoples' traditional knowledge and sustainable practices in tackling environmental challenges.</p>
<b>Indirect Aerosol Effect</b>	<p><b>Indirect Aerosol Effect</b> refers to the impact aerosols have on the climate system through their interaction with clouds. Aerosols can act as <b>condensation nuclei</b>, which are particles that provide a surface for water vapor to condense upon, forming cloud droplets. This leads to changes in cloud properties, influencing climate dynamics.</p> <p>There are two primary <b>indirect effects</b> of aerosols:</p> <ol style="list-style-type: none"> <li>1. <b>First Indirect Effect (Cloud Albedo or Twomey Effect)</b>: Aerosols increase the number of small cloud droplets, which enhances the cloud's reflectivity (albedo). This results in more sunlight being reflected back into space, leading to a cooling effect on the Earth's surface.</li> <li>2. <b>Second Indirect Effect (Cloud Lifetime Effect or Albrecht Effect)</b>: Aerosols can alter the lifetime of clouds by influencing the rate at which droplets coalesce to form rain. By reducing the droplet size and delaying precipitation, aerosols can extend the cloud's lifespan, further increasing its cooling effect due to higher reflectivity over a longer period.</li> </ol> <p>These effects contribute to <b>radiative forcing</b>, influencing the Earth's energy balance and climate.</p>
<b>Indirect Emissions</b>	<p><b>Indirect Emissions</b> refer to the greenhouse gas emissions that occur as a result of the generation of electricity, heat, or steam consumed by a building, home, or business. These emissions are considered "indirect" because they are produced at the power plant where the energy is generated, not at the site where it is used.</p> <p>For example, if a business uses electricity from a coal-powered plant, the emissions from burning coal to generate that electricity are indirect emissions associated with that business. These emissions are an important aspect of <b>Scope 2 emissions</b> in greenhouse gas accounting, which are attributed to the consumption of purchased electricity, steam, or heat. Reducing indirect emissions typically involves increasing energy efficiency or shifting to renewable energy sources.</p>
<b>Industrial Revolution</b>	<p>The <b>Industrial Revolution</b> refers to a period of rapid industrial growth and transformation that began in England during the second half of the 18th century and spread to Europe, North America, and beyond. This period marked a significant shift from agrarian economies to ones dominated by industrial manufacturing, technological innovation, and mechanized production.</p> <p>One of the most significant consequences of the Industrial Revolution was the dramatic increase in the <b>combustion of fossil fuels</b>, particularly coal, followed by oil and natural gas. These energy sources fuelled the machinery of factories, transportation, and energy generation, leading to a substantial rise in the levels of <b>carbon dioxide</b> and other greenhouse gases in the atmosphere. This was the onset of <b>anthropogenic climate change</b>, as human activities began to have a large-scale impact on global climate patterns. The <b>IPCC's Fourth</b></p>

	<p><b>Assessment Report (2007)</b> marked the period before 1750 as the <b>pre-industrial</b> era, emphasizing the historical context of climate change's acceleration due to industrialization.</p> <p>In essence, the Industrial Revolution not only transformed economies but also initiated a long-term shift in the Earth's climate system, contributing to the challenges of climate change we face today.</p>
<b>Infrared Radiation</b>	<p><b>Infrared Radiation</b> refers to light with wavelengths longer than visible red light but shorter than microwave radiation. It is often perceived as <b>heat</b>. All objects, including the Earth's surface, atmosphere, and clouds, emit <b>infrared radiation</b>, also known as <b>terrestrial or long-wave radiation</b>. This is in contrast to <b>solar radiation</b>, which is predominantly <b>short-wave radiation</b> due to the high temperature of the Sun.</p> <p>In the context of the <b>greenhouse effect</b>, <b>infrared radiation</b> refers to the <b>heat energy</b> emitted by the Earth's surface and its atmosphere. <b>Greenhouse gases</b> (such as carbon dioxide, methane, and water vapor) absorb a significant portion of this radiation and <b>re-radiate</b> it back towards the surface, thereby warming the Earth. This process is a key driver of <b>global warming</b> and climate change.</p>
<b>Input Based Payment</b>	<p><b>Input-Based Payment</b> refers to a system where payment is made based on the <b>input</b> or resources provided to achieve a certain output or result. In this context, inputs may include <b>energy, work, power</b>, or other resources that are used to drive a machine or process. This payment structure is often used to compensate for the number of resources or energy consumed during the operation of a system, with the focus on the quantity or quality of inputs rather than the final output or product.</p>
<b>Institutional Appraisal</b>	<p><b>Institutional Appraisal</b> refers to the process of analysing and assessing institutions, particularly those that have a significant influence in a given context. This analysis focuses on understanding their role, degree of influence, functioning, and how they interact with other institutions. Institutional appraisal is crucial for understanding the key factors that affect local livelihoods. It is often carried out using participatory methods in collaboration with local communities to capture their perceptions of the roles played by these institutions. Additionally, it can involve a more focused evaluation of a single institution's strengths, weaknesses, leadership, internal structures, and overall capacity with the goal of strengthening the institution. This process may also be referred to as <b>institutional mapping</b>.</p>
<b>Integrated assessment</b>	<p><b>Integrated Assessment</b> is an interdisciplinary process that combines, analyses, interprets, and communicates knowledge from various scientific disciplines to evaluate complex societal issues. This approach helps ensure that all relevant aspects are considered for better decision-making. It typically includes combining results and models from physical, biological, economic, and social sciences, as well as examining the interactions between these components. The goal is to assess the status and consequences of environmental change and to evaluate the policy responses to address those changes. By integrating various perspectives, integrated assessments aim to provide a holistic view of the issue at hand, supporting effective and informed decisions.</p>
<b>Integrated landscape and water resource management</b>	<p><b>Integrated Landscape and Water Resource Management</b> involves the holistic management of land and water resources to balance conservation and sustainable use.</p>

	<ul style="list-style-type: none"> <li>● <b>Integrated Landscape Management</b> focuses on harmonizing the protection and management of wildlife habitats with other land uses, considering the livelihoods of people who depend on the land, as well as the survival of wildlife. This approach seeks to achieve ecological, social, and economic sustainability.</li> <li>● <b>Integrated Water Resource Management (IWRM)</b> encompasses practices that manage water resources efficiently, such as building dams, employing agricultural techniques to improve water retention, and planting trees. These strategies help water seep into the landscape, allowing it to be retained through the dry season and reducing the impact of droughts. IWRM ensures that both people and wildlife can thrive in the landscape by managing water resources sustainably.</li> </ul> <p>Together, these approaches emphasize a coordinated, multi-disciplinary effort to ensure long-term ecological balance, community well-being, and resilience to climate change.</p>
<b>Integrated Risk Assessment</b>	<p><b>Integrated Risk Assessment</b> is a comprehensive process that evaluates the potential risks associated with an asset by considering both the likelihood of specific impacts occurring and the consequences of those impacts on the surrounding community or region. This assessment looks at various factors, including:</p> <ul style="list-style-type: none"> <li>● <b>Health and safety impacts:</b> How risks could affect human well-being and safety.</li> <li>● <b>Economic consequences:</b> The financial and economic implications for businesses, industries, or the community.</li> <li>● <b>Environmental impacts:</b> Potential damage to ecosystems, biodiversity, and natural resources.</li> <li>● <b>Cultural effects:</b> The impact on local traditions, heritage, and cultural values.</li> <li>● <b>Other considerations:</b> Any additional factors that could be relevant depending on the asset and its context.</li> </ul> <p>The goal of an integrated risk assessment is to develop a comprehensive understanding of potential risks, enabling informed decision-making and the development of strategies to mitigate or manage those risks effectively.</p>
<b>Intensive Risk</b>	<p><b>Intensive Risk</b> refers to the potential for catastrophic disaster impacts that arise when large concentrations of people and economic activities are exposed to intense hazard events. These events, such as strong earthquakes, active volcanoes, heavy floods, tsunamis, or major storms, can lead to high mortality rates, significant asset loss, and widespread disruption.</p> <p>Key characteristics of intensive risk include:</p> <ul style="list-style-type: none"> <li>● <b>High exposure:</b> Dense populations and economic activities concentrated in hazard-prone areas.</li> <li>● <b>High vulnerability:</b> Limited capacity of these areas to cope with or recover from the disaster.</li> <li>● <b>Potential for severe consequences:</b> The combination of high exposure and vulnerability results in potentially catastrophic impacts.</li> </ul> <p>Intensive risk is especially prevalent in large cities or urban centres, where the density of people and infrastructure can amplify the effects of natural hazards, leading to greater loss of life and property damage.</p>

<p><b>Interaction Effect</b></p>	<p><b>Interaction Effect</b> refers to the combined impact that climate change policy instruments (such as greenhouse gas policies, permits, regulations, or carbon taxes) have when interacting with existing domestic tax systems. These effects can either increase or decrease costs and influence economic factors.</p> <p>There are two key types of interaction effects:</p> <ol style="list-style-type: none"> <li>1. <b>Cost-Increasing Tax Interaction:</b> This reflects how greenhouse gas policies can affect the functioning of labor and capital markets. By increasing the costs of production, such policies can reduce real wages and returns on capital. For example, a carbon tax or emissions regulations raise production costs, which can lead to higher prices for goods and services, thereby reducing the income generated from labor and capital.</li> <li>2. <b>Cost-Reducing Revenue-Recycling Effect:</b> This involves how the revenues generated from climate policies (like taxes or emissions permits) are recycled back into the economy, often through tax reductions or investments in other areas. If these revenues are used to reduce other taxes (such as payroll or income taxes), it can offset some of the economic burdens imposed by climate policies, potentially leading to a more favourable outcome for labor and capital markets.</li> </ol> <p>Thus, the <b>interaction effect</b> refers to the dynamic relationship between climate policies and existing tax systems, influencing economic outcomes like wages, investment returns, and overall production costs.</p>
<p><b>Intergovernmental Panel on Climate Change (IPCC)</b></p>	<p>The <b>Intergovernmental Panel on Climate Change (IPCC)</b> is a scientific body established in 1988 by the <b>United Nations Environment Programme (UNEP)</b> and the <b>World Meteorological Organization (WMO)</b>. Its primary mission is to assess and provide comprehensive reports on the latest scientific, technical, and socio-economic information related to climate change. These reports are based on the collective expertise of hundreds of scientists from around the world who evaluate existing literature rather than conducting original research.</p> <p>The IPCC's work focuses on several core areas:</p> <ul style="list-style-type: none"> <li>• Understanding the scientific basis of climate change.</li> <li>• Assessing its environmental and socio-economic impacts.</li> <li>• Analysing and presenting viable mitigation and adaptation measures to address these impacts.</li> <li>• Informing global decision-making, helping governments understand the current state of climate science and its potential consequences.</li> </ul> <p>The IPCC's periodic <b>Assessment Reports</b> have become crucial tools for policymakers and have provided the foundation for international climate agreements. With 195 member countries, the IPCC acts as the authoritative body advising governments on climate change science, including methodologies like national greenhouse gas emission inventories.</p>

	<p>The IPCC has played an instrumental role in the global understanding of climate change and continues to be a key driver for climate action and policy worldwide.</p>
<p><b>Internal Climate Variability</b></p>	<p><b>Internal Climate Variability</b> refers to the natural fluctuations in the climate system that arise from internal processes, rather than external factors like changes in solar radiation or volcanic activity. These variations occur due to the interactions within the climate system, which includes the atmosphere, oceans, land surface, and ice masses.</p> <p>Examples of internal climate variability include:</p> <ul style="list-style-type: none"> <li>● <b>El Niño and La Niña</b> events, which involve fluctuations in ocean temperatures and atmospheric pressure in the tropical Pacific and significantly affect weather patterns globally.</li> <li>● <b>Decadal oscillations</b> such as the <b>Atlantic Multidecadal Oscillation (AMO)</b> or <b>Pacific Decadal Oscillation (PDO)</b>, which influence long-term regional climate patterns.</li> <li>● <b>Internal feedback mechanisms</b> within the climate system, such as changes in cloud cover, ocean currents, and ice-albedo feedback, which can amplify or dampen natural climate variability.</li> </ul> <p>These variations are an important part of understanding how the Earth's climate behaves over time, and they must be considered alongside human-induced climate change when assessing long-term climate trends.</p>
<p><b>International Emissions/Carbon/Energy Tax</b></p>	<p><b>International Emissions/Carbon/Energy Tax</b> refers to a tax levied on greenhouse gas emissions, carbon emissions, or energy consumption, which is imposed by an international body or organization. The goal of such a tax is to reduce carbon emissions and encourage the transition to cleaner energy sources by placing a financial burden on activities or industries that contribute to climate change.</p> <p>Key points about the international tax system:</p> <ul style="list-style-type: none"> <li>● <b>Specified Sources:</b> The tax is typically applied to certain sectors, industries, or activities that emit carbon dioxide (CO<sub>2</sub>) or other greenhouse gases (GHGs). This could include energy production, transportation, manufacturing, and other sectors heavily reliant on fossil fuels.</li> <li>● <b>Participating Countries:</b> Countries that are part of the international agreement or arrangement are subject to the tax. These taxes aim to ensure that all participating nations are working toward the same environmental goals and are held accountable for emissions.</li> <li>● <b>Revenue Distribution:</b> The revenue generated from the tax can be distributed among participating countries or used to fund global climate initiatives, such as clean energy projects, carbon capture technologies, and adaptation efforts in vulnerable regions.</li> <li>● <b>International Agency:</b> The tax is typically administered or coordinated by an international organization or agency (e.g., the United Nations, World Bank, or regional bodies) to ensure fairness and consistency across nations and to avoid competitive disadvantages.</li> </ul>

	Such international taxation schemes are part of broader climate policy strategies to incentivize emissions reductions and finance climate change mitigation and adaptation efforts on a global scale.
<b>Introduced Species</b>	<p><b>Introduced Species</b> are species that are found outside their natural or historical range due to human activity, either accidentally or intentionally. These species can be moved for various reasons, such as trade, agriculture, or as pets, and often end up in new habitats where they did not naturally evolve.</p> <p>Key characteristics of introduced species:</p> <ul style="list-style-type: none"> <li>● <b>Human Activity:</b> Introduced species are typically the result of human actions, whether it's through global trade, travel, or the movement of goods.</li> <li>● <b>New Habitats:</b> These species can thrive in new environments, sometimes at the expense of native species, leading to potential ecological imbalances.</li> <li>● <b>Accidental or Intentional:</b> While some species are intentionally introduced for purposes such as agriculture or landscaping, others are brought to new areas unintentionally, often during the transport of goods.</li> <li>● <b>Potential Impact:</b> Introduced species can become invasive, meaning they spread rapidly and cause harm to ecosystems, agricultural practices, or human health. However, not all introduced species become invasive.</li> </ul> <p>The movement of species beyond their natural range is a significant concern in biodiversity conservation and ecosystem management, as it can lead to the displacement of native species and disrupt the balance of local ecosystems.</p>
<b>Inundation</b>	<p><b>Inundation</b> refers to the flooding or submergence of land by water, often in a coastal or low-lying area. This phenomenon can occur due to various factors such as heavy rainfall, storm surges, sea-level rise, or the overflow of rivers.</p> <p>Key points about inundation:</p> <ul style="list-style-type: none"> <li>● <b>Flooding:</b> It involves the overflow of water over land that is typically dry, leading to temporary or prolonged submersion.</li> <li>● <b>Coastal Areas:</b> Inundation is commonly associated with coastal regions, where rising sea levels or storm surges can cause significant flooding, affecting ecosystems and human settlements.</li> <li>● <b>Causes:</b> It can result from extreme weather events like hurricanes or typhoons, as well as from more gradual processes like the rise in sea levels due to climate change.</li> <li>● <b>Impact:</b> Inundation can cause damage to infrastructure, disrupt ecosystems, lead to the displacement of populations, and affect agriculture.</li> </ul> <p>In coastal areas, inundation is a growing concern due to climate change, which is contributing to higher sea levels and more frequent extreme weather events.</p>

<b>Invasive Species</b>	<p><b>Invasive Species</b> are species that are introduced to a new habitat, either intentionally or accidentally, and rapidly spread, often causing harm to the environment, economy, or human health. These species are able to outcompete native species for resources, disrupt ecosystems, and alter habitats.</p> <p>Key characteristics of invasive species:</p> <ul style="list-style-type: none"> <li>● <b>Outcompete Native Species:</b> Invasive species often lack natural predators in the new environment, allowing them to grow unchecked and dominate over native species.</li> <li>● <b>Ecosystem Disruption:</b> They can alter food chains, degrade habitats, and affect biodiversity by displacing native species or changing the structure of ecosystems.</li> <li>● <b>Economic Impact:</b> Invasive species can cause significant damage to agriculture, fisheries, and infrastructure. For example, the spread of invasive plants can reduce crop yields, while invasive insects might harm timber industries.</li> <li>● <b>Health Concerns:</b> Some invasive species, particularly certain plants, insects, and microorganisms, can also pose a threat to human health by carrying diseases or causing allergic reactions.</li> </ul> <p>Examples of invasive species:</p> <ul style="list-style-type: none"> <li>● <b>Cane Toad (<i>Rhinella marina</i>):</b> Introduced in Australia to control pests, but it became invasive, poisoning native predators.</li> <li>● <b>Zebra Mussel (<i>Dreissena polymorpha</i>):</b> Native to Europe, it was introduced to North America and has clogged pipes, damaged boats, and outcompeted native aquatic species.</li> <li>● <b>Kudzu (<i>Pueraria montana</i>):</b> An invasive vine from Asia that has spread throughout the south-eastern United States, smothering native plants and trees.</li> </ul> <p>Efforts to manage invasive species often include prevention, early detection, and control measures to protect native ecosystems and biodiversity.</p>
<b>Investment Additionality</b>	<p><b>Investment Additionality</b> refers to the concept that a project or activity would not have been financially viable or would not have occurred without the additional financial incentive provided by the value of Emissions Reduction Units (ERUs) or Certified Emission Reduction Units (CERs). In other words, the revenue from carbon credits or emission reductions makes the project economically viable, enabling investments that would not otherwise have been made.</p> <p>Key aspects of <b>Investment Additionality</b>:</p> <ul style="list-style-type: none"> <li>● <b>Financial Incentive:</b> The financial benefit derived from the carbon credits (ERUs or CERs) plays a crucial role in making the project economically feasible. Without this additional income, the project might not be pursued.</li> </ul>



	<ul style="list-style-type: none"> <li>● <b>Commercial Viability:</b> The presence of carbon credits helps improve the commercial attractiveness of the project, enabling it to attract investments or be developed at all.</li> <li>● <b>Project Feasibility:</b> Projects that are not financially viable under normal circumstances may become feasible once carbon credit revenues are factored into the financial model.</li> </ul> <p>In the context of climate change mitigation and carbon markets, demonstrating investment additionality is important for ensuring that carbon credits represent real, additional environmental benefits. This is because the credits should reflect reductions in emissions that would not have occurred otherwise.</p>
<b>Joint Implementation</b>	<p><b>Joint Implementation (JI)</b> is a flexible, market-based mechanism established under the <b>Kyoto Protocol</b> to help countries with emission reduction or limitation commitments (Annex I countries) meet their climate targets in a cost-effective manner. Here's a more detailed explanation:</p> <ul style="list-style-type: none"> <li>● <b>JI allows developed countries to invest in emission-reducing projects</b> in other developed countries. These projects can be implemented in sectors such as energy, transportation, and industrial processes, and they aim to reduce greenhouse gas emissions.</li> <li>● By <b>investing in these projects</b>, the country making the investment earns <b>Emission Reduction Units (ERUs)</b>, which represent the reduction in emissions that the project has achieved. <b>ERUs can be used by the investing country to meet its own emissions reduction targets</b> or be traded with other countries as part of the international carbon market.</li> <li>● The goal of JI is to provide <b>cost-effective options</b> for meeting emission reduction targets. This is particularly beneficial because it allows countries to choose projects that are the <b>most economically efficient</b> in terms of reducing emissions.</li> <li>● JI projects are typically subject to <b>rigorous monitoring and verification processes</b> to ensure that the emission reductions are real and additional (i.e., they wouldn't have happened without the investment).</li> <li>● <b>A key feature of JI is its focus on developed countries.</b> Unlike the <b>Clean Development Mechanism (CDM)</b>, which allows developed countries to invest in developing countries, JI only permits investments between <b>developed countries</b> (Annex I countries).</li> <li>● <b>The financial and commercial viability of projects</b> is enhanced by the generation of ERUs, making JI a way to attract more investments in emission-reducing initiatives. This mechanism encourages collaboration between nations and fosters a global approach to tackling climate change.</li> </ul> <p>In essence, <b>Joint Implementation (JI)</b> encourages <b>international collaboration</b> and helps <b>reduce costs</b> of meeting climate targets by allowing countries to invest in emission-reducing projects abroad and earn credits that count towards their commitments.</p>
<b>Joint Liaison Group (JLG)</b>	<p><b>Joint Liaison Group (JLG)</b> is a collaborative body comprising representatives from the <b>UNFCCC (United Nations Framework Convention on Climate Change)</b>, <b>CBD (Convention on Biological Diversity)</b>, and <b>UNCCD (United Nations Convention to Combat Desertification)</b></p>

	<p>Secretariats. This group was established to explore and promote <b>synergistic actions</b> and <b>common activities</b> that address overlapping challenges related to <b>climate change</b>, <b>biodiversity loss</b>, and <b>desertification</b>.</p> <p><b>Key Functions and Objectives of JLG:</b></p> <ul style="list-style-type: none"> <li>● <b>Coordinating efforts:</b> JLG works to identify and coordinate actions that can simultaneously tackle issues in climate change, biodiversity, and desertification. This is essential because these challenges are often interlinked, and integrated approaches are needed to address them comprehensively.</li> <li>● <b>Promoting collaboration:</b> It serves as a platform for <b>collaborative dialogue</b> between the three conventions. This helps to align their respective goals and ensure that actions taken under one convention support the objectives of the others.</li> <li>● <b>Identifying common objectives:</b> The JLG focuses on identifying <b>shared objectives</b> between the conventions, ensuring that the outcomes of one convention do not undermine the progress of the others.</li> <li>● <b>Joint initiatives:</b> The group facilitates the development of <b>joint initiatives and programs</b> that leverage the strengths of each convention to more effectively address global environmental issues. For example, addressing the impacts of climate change on biodiversity and ecosystems, or promoting sustainable land management practices to combat desertification and reduce emissions.</li> <li>● <b>Informing policy:</b> JLG provides a <b>platform for policy coordination</b> and the exchange of information, helping to ensure that policies developed under one convention are informed by the objectives and findings of the others.</li> <li>● <b>Synergies in implementation:</b> The group explores ways to promote <b>synergies</b> in the implementation of national and international strategies, making sure that efforts to combat one issue also contribute to addressing the others.</li> </ul> <p><b>Importance of JLG:</b></p> <ul style="list-style-type: none"> <li>● <b>Holistic solutions:</b> The <b>Joint Liaison Group</b> plays a critical role in addressing the <b>interconnected nature of global environmental challenges</b>, helping to craft <b>holistic solutions</b> that benefit climate, biodiversity, and land health simultaneously.</li> <li>● <b>Strengthened international cooperation:</b> It strengthens cooperation among countries and international organizations, fostering a more <b>unified approach</b> to achieving sustainable development goals.</li> </ul> <p>By bringing together key international frameworks, the <b>Joint Liaison Group (JLG)</b> supports the alignment and integration of actions, ensuring a more effective and comprehensive global response to the overlapping challenges of climate change, biodiversity loss, and desertification.</p>
<b>Just transition</b>	<p><b>Just Transition</b> refers to the process of <b>shifting to a low-carbon economy</b> while ensuring that the <b>social and economic impacts</b> of this transition are <b>fairly managed</b>. As the world moves towards decarbonization to limit climate change, industries that rely on fossil fuels and</p>

other high-emission activities must undergo significant changes. This shift is necessary for addressing the climate crisis but also has important **implications for workers** and **communities** that depend on these industries for their livelihoods.

**Key Aspects of a Just Transition:**

**1. Social Protection for Workers:**

- **Protecting the rights** of workers who are employed in fossil fuel industries or other high-emission sectors is a central component. This involves ensuring that these workers do not bear the brunt of the economic shift without support.
- **Reskilling and upskilling** programs are crucial for helping workers transition to **new, low-carbon industries**. For example, workers in coal mining can be retrained to work in **renewable energy sectors**.

**2. Economic Diversification:**

- Communities dependent on carbon-intensive industries must be provided with **alternative economic opportunities**. This might involve investment in new industries, such as **renewable energy, sustainable agriculture, or green technologies**, to create sustainable jobs.
- **Diversification of local economies** helps reduce dependence on industries that are being phased out and supports long-term economic stability.

**3. Community Engagement and Support:**

- It is essential to include **community involvement** in the planning and implementation of the transition. This means actively engaging with **local communities** to understand their needs and ensure that the shift to a low-carbon economy benefits everyone, especially those most affected.
- Social support programs, such as **unemployment benefits, job placement assistance, and healthcare access**, are important to cushion the impact on workers and communities during the transition period.

**4. Equity and Inclusivity:**

- A **just transition** focuses on ensuring that the transition process is **inclusive** and does not disproportionately harm vulnerable groups, including **low-income communities, indigenous peoples, and minority groups**. It ensures that **equity** is prioritized in decision-making and implementation.
- **Gender equality** should also be considered, ensuring that women are not left behind in the emerging green economy.

**5. Environmental Sustainability:**

	<ul style="list-style-type: none"> <li>○ The <b>just transition</b> must also be <b>environmentally sustainable</b>. Transitioning to green jobs and sustainable industries should help mitigate climate change, preserve biodiversity, and reduce pollution, thus protecting both the environment and public health.</li> </ul> <p>6. <b>Government and Policy Support:</b></p> <ul style="list-style-type: none"> <li>○ Governments play a critical role in ensuring a <b>fair transition</b>. They can provide <b>financial incentives, policies, and infrastructure</b> to support job creation in sustainable sectors and protect workers' rights.</li> <li>○ International organizations, labor unions, businesses, and governments must collaborate to <b>design fair policies</b> that ensure the transition is <b>just for all workers and communities</b>.</li> </ul> <p><b>Importance of a Just Transition:</b></p> <ul style="list-style-type: none"> <li>● A <b>just transition</b> ensures that <b>climate action</b> does not come at the expense of social justice. It recognizes that the fight against climate change must be <b>fair, inclusive, and equitable</b>.</li> <li>● By focusing on <b>socio-economic fairness</b>, it helps prevent <b>social unrest</b> and fosters <b>public support</b> for necessary environmental policies, such as carbon pricing or phasing out fossil fuels.</li> <li>● A <b>just transition</b> helps ensure that the benefits of a low-carbon economy are <b>shared</b> and <b>widely distributed</b>, rather than creating winners and losers.</li> </ul> <p>In summary, a <b>just transition</b> is a critical element in <b>achieving climate goals</b> while ensuring that the shift to a low-carbon economy is <b>equitable, inclusive, and supports the welfare of workers and communities</b> affected by the changes.</p>
<b>Kigali Amendment</b>	<p>The <b>Kigali Amendment</b> is a significant modification to the <b>Montreal Protocol</b>, which was originally established in <b>1987</b> to protect the <b>ozone layer</b> by phasing out the use of <b>ozone-depleting substances (ODS)</b> like <b>chlorofluorocarbons (CFCs)</b> and <b>hydrochlorofluorocarbons (HCFCs)</b>.</p> <p><b>Key Features of the Kigali Amendment:</b></p> <ol style="list-style-type: none"> <li>1. <b>Objective:</b> <ul style="list-style-type: none"> <li>○ The <b>Kigali Amendment</b>, adopted in <b>2016</b> during a meeting in <b>Kigali, Rwanda</b>, aims to phase down the production and use of <b>hydrofluorocarbons (HFCs)</b>.</li> <li>○ <b>HFCs</b>, although not harmful to the ozone layer, are <b>potent greenhouse gases (GHGs)</b> and contribute significantly to <b>global warming</b>. The amendment targets reducing these gases to mitigate their <b>climate change impact</b>.</li> </ul> </li> <li>2. <b>Phasing Down HFCs:</b></li> </ol>

- The **Kigali Amendment** sets a schedule for **reducing HFC emissions**, with **developed countries** starting to reduce HFCs in **2019**, while **developing countries** will begin phasing down in **2024** (with some provisions for later phases for the least developed countries).
- The reduction targets are set to gradually decrease global production and consumption of HFCs by **80% to 85%** by **2047**.

### 3. **Climate Impact:**

- While HFCs were introduced as replacements for **CFCs** and **HCFCs** (substances that were harmful to the ozone layer), HFCs have a much **higher global warming potential**. The Kigali Amendment is expected to prevent an additional **0.5°C** of global warming by the end of the century.

### 4. **Global Cooperation:**

- The **Kigali Amendment** is a crucial example of global cooperation to address both **ozone depletion** and **climate change**. It brings together **developed and developing countries** to work together in reducing HFCs, creating a shared responsibility in protecting the environment.
- As of now, nearly **130 countries** have ratified the amendment, representing more than **90% of the world's HFC consumption**.

### 5. **Link to the Montreal Protocol:**

- The Kigali Amendment is an extension of the **Montreal Protocol**, which has been successful in phasing out over **98% of ozone-depleting substances**. The Montreal Protocol is regarded as one of the most **successful environmental agreements**.
- The Kigali Amendment ensures that the efforts to protect the ozone layer are aligned with the global **fight against climate change**, providing a dual benefit.

### **Importance of the Kigali Amendment:**

- **Climate Change Mitigation:** The amendment plays a pivotal role in **climate change mitigation** by addressing one of the **fastest-growing greenhouse gases** (HFCs). Its success could have a significant **impact on limiting global warming**.
- **Synergy with Climate Agreements:** The amendment complements the **Paris Agreement** by addressing a potent climate-forcing agent (HFCs), reinforcing the global commitment to limit **global temperature rise**.
- **Global Environmental Governance:** It underscores the importance of **international cooperation** and the **linkages between various environmental issues** like ozone protection and climate action.

In summary, the **Kigali Amendment** to the **Montreal Protocol** is a crucial step in the global effort to protect both the **ozone layer** and the **climate** by reducing the use of **HFCs**, a powerful greenhouse gas. Through its phased reduction schedule, it is expected to prevent significant global warming and contribute to the overall goal of **climate change mitigation**.

<b>Known Technological Options</b>	<p><b>Known Technological Options</b> refer to existing technologies that are already in operation or have been tested at the <b>pilot plant stage</b>. These technologies are currently available and do not require significant <b>technological breakthroughs</b> to be deployed. <b>Known technological options</b> play a crucial role in addressing current environmental and industrial challenges. They offer practical, reliable solutions that can be deployed with existing infrastructure, providing immediate and tangible benefits without the need for radical innovation. These technologies serve as a foundation for future developments and improvements in various fields.</p>
<b>Kyoto Mechanism</b>	<p><b>Kyoto Mechanism</b> refers to the <b>economic market-based mechanisms</b> established by the <b>Kyoto Protocol</b> to help <b>Parties (countries)</b> meet their greenhouse gas reduction targets in a cost-effective manner. These mechanisms allow for greater flexibility and efficiency in reducing global emissions. The key mechanisms include:</p> <ol style="list-style-type: none"> <li>1. <b>Joint Implementation (Article 6):</b> <ul style="list-style-type: none"> <li>○ This allows <b>industrialized countries</b> to invest in <b>emission reduction projects</b> in other industrialized countries (or in economies in transition) and <b>earn credits</b> for the reductions achieved, which can be used to meet their own targets.</li> </ul> </li> <li>2. <b>Clean Development Mechanism (CDM) (Article 12):</b> <ul style="list-style-type: none"> <li>○ This mechanism allows <b>industrialized countries</b> to invest in <b>emission reduction projects</b> in <b>developing countries</b>, and earn <b>Certified Emission Reduction (CER)</b> credits, which can be counted towards their emission reduction targets. This also promotes sustainable development in the host countries.</li> </ul> </li> <li>3. <b>Emissions Trading (Article 17):</b> <ul style="list-style-type: none"> <li>○ This allows countries to <b>buy and sell</b> emission allowances (credits) on the international market. Countries that have exceeded their emission reduction targets can sell their extra allowances to countries that are struggling to meet theirs.</li> </ul> </li> </ol>
<b>Kyoto Protocol</b>	<p>The <b>Kyoto Protocol</b> was an <b>international treaty</b> adopted in <b>1997</b> and entered into force in <b>2005</b> with the goal of <b>reducing global greenhouse gas emissions</b> to address climate change. It is considered one of the first global agreements with <b>legally binding targets</b> for emission reductions.</p> <p><b>Key Features of the Kyoto Protocol:</b></p> <ol style="list-style-type: none"> <li>1. <b>Binding Targets for Developed Countries:</b> <ul style="list-style-type: none"> <li>○ The protocol set binding emission-reduction targets for <b>industrialized countries</b>, reflecting their higher historical contributions to greenhouse gas emissions. These countries were required to <b>reduce emissions by an average of 5% below 1990 levels</b> over the commitment period <b>2008–2012</b>.</li> </ul> </li> <li>2. <b>Annex B:</b></li> </ol>

	<ul style="list-style-type: none"> <li>○ This annex lists the countries (mainly industrialized nations and economies in transition) that are legally obligated to meet their emissions targets.</li> </ul> <p>3. <b>Mechanisms for Flexibility:</b></p> <ul style="list-style-type: none"> <li>○ The Kyoto Protocol introduced market-based mechanisms, such as <b>Joint Implementation</b>, the <b>Clean Development Mechanism (CDM)</b>, and <b>Emissions Trading</b>, which provided flexibility to countries in how they achieved their emission reduction targets.</li> </ul> <p>4. <b>Progress and Criticism:</b></p> <ul style="list-style-type: none"> <li>○ While the protocol made significant strides in international climate governance, it was criticized for the <b>lack of binding commitments from developing countries</b> and for the <b>withdrawal of the United States</b>, which never ratified the treaty.</li> </ul> <p>5. <b>Superseded by the Paris Agreement:</b></p> <ul style="list-style-type: none"> <li>○ In <b>2015</b>, the <b>Kyoto Protocol</b> was succeeded by the <b>Paris Agreement</b>, which set a universal goal of limiting global warming to <b>well below 2°C</b> and <b>aiming for 1.5°C</b>. The Paris Agreement allows all countries, both developed and developing, to voluntarily set <b>nationally determined contributions (NDCs)</b> for emission reductions.</li> </ul> <p>In conclusion, the <b>Kyoto Protocol</b> was a pioneering agreement that sought to curb global emissions through binding commitments for industrialized countries and market-based mechanisms. While it laid the foundation for international climate action, the <b>Paris Agreement</b> now serves as the more inclusive and globally accepted framework for addressing climate change in the 21st century.</p>
<b>La Niña</b>	<p><b>La Niña</b> is the <b>opposite phase of El Niño</b> within the <b>El Niño-Southern Oscillation (ENSO)</b> cycle. While <b>El Niño</b> is characterized by <b>warmer-than-average sea surface temperatures</b> in the central and eastern Pacific Ocean, <b>La Niña</b> occurs when sea temperatures in the <b>central and eastern equatorial Pacific</b> become <b>cooler than average</b>.</p> <p><b>Key Features of La Niña:</b></p> <p>1. <b>Cooler Sea Temperatures:</b></p> <ul style="list-style-type: none"> <li>○ During <b>La Niña</b>, the <b>sea surface temperatures</b> in the <b>central and eastern Pacific Ocean</b> are significantly lower than the normal averages.</li> </ul> <p>2. <b>Impact on Global Weather Patterns:</b></p> <ul style="list-style-type: none"> <li>○ <b>La Niña</b> influences global weather patterns, often causing opposite effects to <b>El Niño</b>. For example: <ul style="list-style-type: none"> <li>■ <b>Increased rainfall</b> in <b>Southeast Asia</b> and <b>Australia</b>, leading to potential flooding.</li> <li>■ <b>Drier conditions</b> in the <b>eastern Pacific</b>, including the western coast of South America.</li> <li>■ <b>Cold winters</b> in the <b>northern United States</b> and <b>Canada</b>.</li> </ul> </li> </ul>

	<p>■ <b>Warmer and drier conditions</b> in the <b>southern United States</b>.</p> <p>3. <b>Atmospheric Pressure:</b></p> <ul style="list-style-type: none"> <li>○ La Niña is also associated with <b>high atmospheric pressure</b> in the eastern Pacific and <b>low pressure</b> in the western Pacific.</li> </ul> <p>4. <b>Global Climate Impacts:</b></p> <ul style="list-style-type: none"> <li>○ La Niña often results in <b>stronger trade winds</b> in the Pacific, which push warm water toward the western Pacific and cause upwelling in the eastern Pacific, contributing to the cooler sea temperatures.</li> </ul> <p><b>La Niña</b> is the cold phase of the <b>El Niño-Southern Oscillation (ENSO)</b>, characterized by <b>cooler-than-average sea temperatures</b> in the central and eastern Pacific. Like El Niño, it significantly alters weather patterns across the globe, affecting rainfall, atmospheric pressure, and temperature conditions.</p>
<b>Land Degradation</b>	<p><b>Land Degradation</b> is defined by the <b>United Nations Convention to Combat Desertification (UNCCD)</b> as the <b>reduction or loss of biological or economic productivity and complexity</b> of land in <b>arid, semiarid, and dry sub-humid</b> areas. This degradation occurs in <b>rain-fed cropland, irrigated cropland, rangeland, pastures, forests, and woodlands</b>.</p> <p><b>Key Causes of Land Degradation:</b></p> <ol style="list-style-type: none"> <li>1. <b>Soil Erosion:</b> <ul style="list-style-type: none"> <li>○ Erosion caused by <b>wind</b> and <b>water</b> can significantly degrade the soil, leading to the <b>loss of fertile topsoil</b> and reducing the ability of land to support vegetation and agriculture.</li> </ul> </li> <li>2. <b>Deterioration of Soil Properties:</b> <ul style="list-style-type: none"> <li>○ <b>Physical, chemical, and biological deterioration</b> of soil affects its productivity. This includes the depletion of <b>nutrients</b>, <b>compaction</b> of soil, and the <b>loss of soil structure</b>, all of which diminish the land's capacity to sustain crops and vegetation.</li> </ul> </li> <li>3. <b>Loss of Natural Vegetation:</b> <ul style="list-style-type: none"> <li>○ <b>Deforestation, overgrazing, and unsustainable land use</b> result in the <b>long-term loss of natural vegetation</b>, which is critical for maintaining soil health and biodiversity.</li> </ul> </li> </ol> <p><b>Human-Induced Processes:</b></p> <ul style="list-style-type: none"> <li>● <b>Agricultural practices, deforestation, urbanization, and overexploitation</b> of land are major contributors to land degradation, as they alter the natural processes and disturb the biophysical environment.</li> </ul> <p><b>Impact of Land Degradation:</b></p>



	<p>Land degradation leads to <b>diminished land productivity, biodiversity loss, and disruption of ecosystems</b>, affecting the <b>livelihoods</b> of people who depend on the land for food, water, and resources.</p> <p>In summary, land degradation is a <b>decline in the quality and productivity of land</b> due to a combination of <b>human activities</b> and <b>natural processes</b>, which leads to <b>economic and ecological loss</b>.</p>
<b>Land Pollution</b>	<p><b>Land Pollution</b> refers to the <b>degradation</b> of Earth's <b>land surfaces</b>, often caused by <b>human activities</b> and the <b>misuse of land resources</b>. It occurs when <b>waste</b> or <b>harmful substances</b> are improperly disposed of, leading to contamination of the soil, water, and air. Land pollution can significantly disrupt ecosystems, harm wildlife, and pose serious health risks to humans.</p> <p><b>Key Causes of Land Pollution:</b></p> <ol style="list-style-type: none"> <li><b>Improper Waste Disposal:</b> <ul style="list-style-type: none"> <li><b>Littering, illegal dumping</b>, and the <b>unregulated disposal of industrial and household waste</b> are primary contributors. When waste is not disposed of properly, it contaminates the soil and can lead to the spread of toxic substances.</li> </ul> </li> <li><b>Industrial Activities:</b> <ul style="list-style-type: none"> <li><b>Chemical waste</b> from factories, mining, and construction activities can pollute the land. <b>Heavy metals, plastics, and toxic chemicals</b> often leach into the soil, affecting its fertility and posing health risks.</li> </ul> </li> <li><b>Agricultural Practices:</b> <ul style="list-style-type: none"> <li><b>Excessive use of pesticides, fertilizers, and herbicides</b> in farming leads to <b>chemical runoff</b>, which can pollute the land and water systems, reducing soil quality and harming local ecosystems.</li> </ul> </li> <li><b>Deforestation:</b> <ul style="list-style-type: none"> <li><b>Clearing forests</b> for agriculture, urban development, or logging contributes to <b>land degradation</b> and <b>erosion</b>, which accelerates land pollution.</li> </ul> </li> <li><b>Urbanization:</b> <ul style="list-style-type: none"> <li>As cities grow, <b>construction waste, sewage, and hazardous materials</b> are often dumped improperly, leading to <b>soil contamination</b> and <b>pollution</b> of urban land.</li> </ul> </li> </ol> <p><b>Impacts of Land Pollution:</b></p> <ol style="list-style-type: none"> <li><b>Soil Degradation:</b> <ul style="list-style-type: none"> <li>The accumulation of <b>toxic chemicals</b> and <b>waste</b> in the soil can degrade its structure and fertility, reducing its ability to support plant growth.</li> </ul> </li> </ol>

	<p>2. <b>Health Hazards:</b></p> <ul style="list-style-type: none"> <li>○ <b>Land pollution</b> can lead to the <b>contamination of food sources</b> (such as crops grown in polluted soil) and drinking water, causing <b>diseases</b> like <b>respiratory illnesses</b>, <b>skin disorders</b>, and <b>cancer</b>.</li> </ul> <p>3. <b>Loss of Biodiversity:</b></p> <ul style="list-style-type: none"> <li>○ Pollutants in the soil can destroy <b>habitats</b> and disrupt ecosystems, leading to the <b>loss of plant and animal species</b> that depend on healthy land.</li> </ul> <p>4. <b>Economic Consequences:</b></p> <ul style="list-style-type: none"> <li>○ <b>Degraded lands</b> lose their productivity, affecting <b>agriculture</b>, <b>farming</b>, and <b>natural resources</b>, which can lead to <b>economic losses</b> for communities dependent on these resources.</li> </ul> <p><b>Solutions to Land Pollution:</b></p> <ul style="list-style-type: none"> <li>● <b>Proper waste management</b>, including recycling and composting, is crucial in reducing land pollution.</li> <li>● <b>Sustainable agricultural practices</b> can minimize the use of harmful chemicals.</li> <li>● <b>Awareness and education</b> on the environmental impact of pollution can help in reducing land degradation.</li> <li>● <b>Government regulations</b> and enforcement of environmental laws can play a key role in controlling land pollution.</li> </ul> <p>In conclusion, <b>land pollution</b> is a significant environmental issue that affects <b>soil quality</b>, <b>human health</b>, and <b>biodiversity</b>, and it requires collective efforts for proper waste disposal, sustainable practices, and stricter regulations to mitigate its harmful effects.</p>
<b>Land Tenure</b>	<p><b>Land Tenure</b> refers to the <b>legal regime</b> under which land is owned, used, and transferred. In many systems, particularly <b>common law systems</b>, land tenure describes the conditions under which an individual or entity "holds" land. This includes the <b>rights</b>, <b>responsibilities</b>, and <b>privileges</b> associated with owning or occupying land. The term also encompasses the various <b>legal frameworks</b> that govern how land is allocated, transferred, or leased between individuals, communities, or governments.</p> <p><b>Types of Land Tenure Systems:</b></p> <p>1. <b>Private Tenure:</b></p> <ul style="list-style-type: none"> <li>○ Land is owned and controlled by an individual or a private entity, who has the legal right to make decisions about its use, sale, or lease.</li> </ul> <p>2. <b>Public Tenure:</b></p> <ul style="list-style-type: none"> <li>○ The state or government owns the land and may grant usage rights to individuals or groups for a specific purpose, such as farming, development, or conservation.</li> </ul>

	<p>3. <b>Communal or Collective Tenure:</b></p> <ul style="list-style-type: none"> <li>○ Land is collectively owned or managed by a community or group, and decisions are made by the collective, often based on traditional systems of governance.</li> </ul> <p>4. <b>Customary Tenure:</b></p> <ul style="list-style-type: none"> <li>○ In many regions, especially in rural areas, <b>customary land tenure systems</b> operate based on the customs and traditions of local communities. These systems often prioritize communal ownership and rights over individual ownership.</li> </ul> <p><b>Importance of Land Tenure:</b></p> <ul style="list-style-type: none"> <li>● <b>Economic Stability:</b> Clear land tenure promotes <b>investment</b> in land and natural resources, enabling people to use the land for long-term agriculture or development projects.</li> <li>● <b>Social Justice:</b> Ensuring secure land tenure, particularly for marginalized communities, promotes equity and prevents land conflicts.</li> <li>● <b>Environmental Sustainability:</b> Well-managed land tenure systems can incentivize <b>sustainable land use</b> practices and the conservation of natural resources.</li> </ul> <p>In conclusion, <b>land tenure</b> is an essential element of both <b>social equity</b> and <b>economic development</b>, influencing how land is used, managed, and transferred. Secure and well-defined land tenure systems are critical for ensuring <b>stability</b> and <b>sustainability</b> in communities, while also addressing <b>legal, economic, and social</b> challenges.</p>
Land Use	<p><b>Land Use</b> refers to the <b>management</b> and <b>modification</b> of land for specific <b>social, economic, or environmental purposes</b>. It encompasses the <b>arrangements, activities, and inputs</b> undertaken within a given land cover type. Essentially, land use is a concept that describes how land is utilized by human beings and the activities that are carried out on it.</p> <p><b>Types of Land Use:</b></p> <ol style="list-style-type: none"> <li>1. <b>Agricultural Land Use:</b> <ul style="list-style-type: none"> <li>○ Land used for cultivating crops (e.g., wheat, rice, vegetables) or raising livestock (e.g., cattle, poultry).</li> <li>○ Includes both <b>commercial farming</b> and <b>subsistence agriculture</b>.</li> </ul> </li> <li>2. <b>Forestry Land Use:</b> <ul style="list-style-type: none"> <li>○ Land dedicated to growing and managing forests for timber, fuelwood, and other forest products.</li> <li>○ Includes <b>commercial forestry</b> and <b>community-based forest management</b>.</li> </ul> </li> <li>3. <b>Urban Land Use:</b></li> </ol>

- Land used for building infrastructure, such as **residential**, **commercial**, **industrial**, and **recreational** spaces.
- Involves urban planning, zoning laws, and **land development** projects.

#### 4. **Conservation Land Use:**

- Land managed for the preservation of biodiversity, protection of ecosystems, or maintenance of natural habitats.
- Includes **national parks**, **nature reserves**, **wetlands**, and other protected areas.

#### 5. **Recreational Land Use:**

- Land designated for public recreation, including parks, sports fields, trails, and nature reserves.
- It can support tourism, outdoor activities, and community well-being.

#### 6. **Transportation and Infrastructure Land Use:**

- Land used for roads, highways, railways, airports, and other essential infrastructure.

#### **Land Use vs. Land Cover:**

- **Land Use** refers to the **purpose** or **function** for which land is managed (e.g., agriculture, forestry, urbanization).
- **Land Cover** refers to the physical characteristics of the land surface (e.g., forests, grasslands, urban areas).

While **land cover** describes the **state** of the land, **land use** involves **human interactions** with the land and reflects the intended **purposes** for the land's management.

#### **Importance of Land Use:**

##### 1. **Environmental Sustainability:**

- **Sustainable land use** helps maintain ecosystem services, such as **water filtration**, **carbon sequestration**, and **biodiversity** protection.

##### 2. **Resource Management:**

- Proper land use ensures efficient **resource allocation**, such as land for **agriculture**, **housing**, or **conservation**.

##### 3. **Climate Change Mitigation:**

- Certain land uses, such as **forestry** or **agroforestry**, can play an important role in **carbon sequestration**, helping mitigate climate change.

##### 4. **Social Equity:**

	<ul style="list-style-type: none"> <li>○ Fair and equitable land use planning ensures that all individuals and communities have access to land for housing, agriculture, or recreation.</li> </ul> <p><b>5. Economic Development:</b></p> <ul style="list-style-type: none"> <li>○ Effective land use contributes to <b>economic growth</b>, including supporting industries like agriculture, mining, or tourism.</li> </ul> <p><b>Challenges in Land Use:</b></p> <ol style="list-style-type: none"> <li><b>1. Conflicting Interests:</b> <ul style="list-style-type: none"> <li>○ Competing demands for land from agriculture, urban development, conservation, and recreation can lead to conflicts in land use planning.</li> </ul> </li> <li><b>2. Overexploitation:</b> <ul style="list-style-type: none"> <li>○ Overuse or unsustainable land management practices (e.g., overgrazing, deforestation, or urban sprawl) can degrade land quality and reduce its capacity to support future generations.</li> </ul> </li> <li><b>3. Land Tenure Insecurity:</b> <ul style="list-style-type: none"> <li>○ Insecure land tenure can hinder long-term investments in land management, leading to degradation or inefficient land use.</li> </ul> </li> <li><b>4. Climate Change:</b> <ul style="list-style-type: none"> <li>○ Changing climatic conditions, such as <b>droughts, flooding, and temperature variations</b>, can impact land productivity and affect land use patterns.</li> </ul> </li> </ol> <p><b>Land use</b> plays a crucial role in shaping economic, social, and environmental outcomes. Proper management of land resources is essential for achieving <b>sustainable development</b>. By balancing the various needs of society, land use planning can help ensure that land remains productive and beneficial for current and future generations.</p>
<b>Land Use Change</b>	<p><b>Land Use Change</b> refers to the <b>alteration</b> in the way land is <b>managed</b> or <b>utilized</b> by humans, which can result in a corresponding change in <b>land cover</b>. This change can occur due to a variety of human activities such as <b>urbanization, agriculture, deforestation, mining, or infrastructure development</b>. The impact of land use change extends beyond local environments, influencing broader aspects of the <b>climate system</b>.</p> <p><b>Key Points About Land Use Change:</b></p> <ol style="list-style-type: none"> <li><b>1. Definition:</b> <ul style="list-style-type: none"> <li>○ <b>Land Use Change</b> is the <b>modification</b> of the <b>use</b> or <b>management</b> of land by humans, leading to a potential transformation in <b>land cover</b>. For instance, converting a forest into agricultural land, or transforming wetlands into urban areas.</li> </ul> </li> </ol>

- These changes can affect the **biophysical** characteristics of the land, such as its **vegetation, soil composition, or hydrological features**.

## 2. Impact on Climate:

- **Albedo:** The **reflectivity** of the Earth's surface, which can change with land use changes. For example, forests, with their dark green canopy, absorb more sunlight, while agricultural fields or urban areas (with lighter surfaces like concrete) may reflect more sunlight, affecting local and global temperatures.
- **Evapotranspiration:** The process by which water is transferred from the land surface to the atmosphere. Different land uses have varying rates of evapotranspiration, which can influence **local precipitation patterns** and **regional climates**.
- **Greenhouse Gas Sources and Sinks:** Land use changes can impact the amount of greenhouse gases (GHGs) emitted or sequestered by the land. For example, **deforestation** releases carbon stored in trees, while **reforestation** or **afforestation** can act as carbon sinks.
- **Biodiversity:** Changes in land use can result in habitat loss, impacting biodiversity and ecosystem services, which in turn may have cascading effects on the climate.

## 3. Types of Land Use Change:

- **Urbanization:** Expansion of cities and towns leads to the conversion of natural land into built-up areas, affecting local climate, air quality, and the carbon cycle.
- **Agricultural Expansion:** Turning forests, wetlands, or grasslands into agricultural land increases emissions of methane (from rice paddies or livestock) and nitrous oxide (from fertilizers).
- **Deforestation:** The removal of trees for timber, agriculture, or development contributes to **carbon release**, loss of **biodiversity**, and changes in **water cycles**.
- **Reforestation and Afforestation:** Planting new forests or restoring degraded land can help absorb carbon, **mitigate climate change**, and restore ecosystems.
- **Land Conservation:** Setting aside areas for conservation or sustainable management can help preserve ecosystems and reduce emissions from land degradation.

## 4. Global and Local Climate Impacts:

- **Global Impacts:** Land use changes can influence the **global climate** through changes in the Earth's **radiative balance** (energy input and output), **carbon cycle**, and atmospheric composition. For instance, large-scale deforestation in the Amazon may contribute significantly to global warming by releasing stored carbon.

- **Local Impacts:** Land use changes can create **microclimates** in specific regions. For example, converting forests into agricultural land may alter the local temperature and humidity, leading to changes in precipitation patterns and air quality.

#### 5. Drivers of Land Use Change:

- **Population Growth:** As human populations grow, there is greater demand for land for housing, agriculture, and infrastructure.
- **Economic Development:** Industrialization and urbanization can lead to significant changes in land use, often at the expense of natural habitats.
- **Technological Advancements:** Advances in agriculture, mining, and construction technology can make it more feasible to transform land for human use.
- **Policy and Governance:** Land use policies and regulations, such as subsidies for certain industries or deforestation incentives, can drive land use change.
- **Climate Change:** Ironically, climate change itself can alter land use patterns, as changing weather conditions may push farmers to adapt by shifting crops, or migrating communities may alter settlement patterns.

#### 6. Consequences of Land Use Change:

- **Climate Change:** Major shifts in land use contribute to the **accumulation of greenhouse gases**, thus enhancing the greenhouse effect and **global warming**.
- **Biodiversity Loss:** Land use changes can lead to habitat destruction, forcing species into smaller or fragmented areas, which may lead to extinction or reduced biodiversity.
- **Soil Degradation:** Intensive agricultural activities or deforestation may lead to **soil erosion, desertification, and reduced agricultural productivity**.
- **Water Cycle Disruption:** Land use changes, such as deforestation or urbanization, can alter the **local water cycle**, affecting **water availability** and **flood risk**.

#### 7. Sustainability and Mitigation:

- **Sustainable Land Management:** Aiming for practices that allow land to be used for economic activities while maintaining or enhancing its **ecological integrity**.
- **Conservation Efforts:** Protecting natural areas through legal frameworks like **protected areas, national parks, and sustainable forestry**.

	<ul style="list-style-type: none"> <li>○ <b>Reforestation and Afforestation:</b> Planting trees or restoring ecosystems to absorb <b>carbon dioxide</b> and enhance <b>biodiversity</b>.</li> <li>○ <b>Agroforestry:</b> Combining <b>agriculture</b> and <b>forestry</b> practices to reduce land degradation, increase biodiversity, and improve carbon sequestration.</li> <li>○ <b>Urban Green Infrastructure:</b> Incorporating green spaces into urban areas can reduce the impact of land use changes by helping with carbon sequestration, temperature regulation, and improving air quality.</li> </ul> <p><b>Land use change</b> is a significant factor in shaping the <b>climate system</b>, influencing everything from <b>local weather patterns</b> to <b>global temperature</b>. Managing land use in a sustainable way is crucial to mitigating climate change, conserving biodiversity, and ensuring that land resources continue to provide for future generations. Effective land use planning and management are essential to strike a balance between human development needs and the preservation of natural ecosystems.</p>
<b>Land Use Planning</b>	<p><b>Land Use Planning</b> is a critical process where <b>public authorities</b> assess, evaluate, and decide on various ways to manage land use. This process takes into account long-term <b>economic, social, and environmental objectives</b>, while also considering the <b>implications</b> for different <b>communities</b> and <b>interest groups</b>. The outcome of land use planning is the creation of plans that describe the <b>permitted</b> or <b>acceptable uses</b> of land.</p> <p><b>Objectives of Land Use Planning:</b></p> <ul style="list-style-type: none"> <li>● <b>Economic Development:</b> Facilitating the growth of communities and industries while ensuring optimal use of available land and resources.</li> <li>● <b>Social Welfare:</b> Promoting equitable access to land resources for all communities, ensuring that land use supports housing, infrastructure, and services.</li> <li>● <b>Environmental Sustainability:</b> Ensuring that land use minimizes environmental harm, supports biodiversity, and maintains ecosystem services like clean air, water, and fertile soil.</li> <li>● <b>Risk Mitigation:</b> Reducing the risk of natural disasters, such as floods, earthquakes, and landslides, by guiding development away from <b>hazard-prone</b> areas.</li> </ul> <p><b>Land Use Planning and Climate Change:</b></p> <ul style="list-style-type: none"> <li>● <b>Adaptation:</b> Proper land use planning can help communities <b>adapt</b> to the impacts of climate change by reducing the vulnerability of <b>infrastructure</b> and <b>housing</b> to climate-related disasters like storms, heatwaves, and flooding.</li> <li>● <b>Mitigation:</b> Land use planning can also play a role in <b>mitigating climate change</b> by promoting <b>green infrastructure, afforestation, and sustainable agriculture</b> that sequester carbon and reduce greenhouse gas emissions.</li> </ul>



	<ul style="list-style-type: none"> <li>● <b>Ecosystem Services:</b> Planning for green spaces, wetlands, and other natural areas can help maintain important ecosystem services like <b>carbon storage</b>, <b>water filtration</b>, and <b>climate regulation</b>.</li> </ul> <p><b>Land use planning</b> is a crucial tool for managing land in a way that balances the <b>economic</b>, <b>social</b>, and <b>environmental</b> needs of current and future generations. It helps ensure that land is used sustainably, protects vulnerable areas, and mitigates the risks of natural disasters. A well-designed land use plan can provide the foundation for resilient, sustainable, and thriving communities while minimizing adverse environmental impacts.</p>
<b>Land Use, Land Use Change and Forestry (LULUCF)</b>	<p><b>Land Use, Land Use Change and Forestry (LULUCF)</b> refers to a specific sector in the <b>greenhouse gas (GHG) inventory</b> that includes emissions and removals of greenhouse gases resulting from human activities related to land use, land use change, and forestry. This sector plays a significant role in both <b>carbon sequestration</b> and <b>emission reduction</b> efforts in addressing <b>climate change</b>.</p> <p>LULUCF is considered a part of the broader <b>GHG inventory</b> as established under the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b>. Countries must report emissions and removals in this sector, which is essential for tracking overall climate progress.</p> <p><b>Impact on Climate Change:</b></p> <ul style="list-style-type: none"> <li>● <b>Positive Impact:</b> Forests and other land uses that increase carbon sequestration can help mitigate climate change by absorbing more CO<sub>2</sub> than they release, thus <b>offsetting emissions</b> from other sectors.</li> <li>● <b>Negative Impact:</b> Deforestation and land-use changes can lead to significant emissions of CO<sub>2</sub> and other greenhouse gases like <b>methane (CH<sub>4</sub>)</b> and <b>nitrous oxide (N<sub>2</sub>O)</b>, accelerating global warming.</li> </ul> <p><b>LULUCF and International Climate Agreements:</b></p> <ul style="list-style-type: none"> <li>● Under the <b>Paris Agreement</b>, countries are encouraged to include LULUCF actions in their <b>Nationally Determined Contributions (NDCs)</b>. These actions contribute to countries' efforts to meet their climate targets and <b>reduce net emissions</b>.</li> <li>● The <b>Kyoto Protocol</b> also included LULUCF as part of countries' emissions reduction obligations. However, the rules for accounting for LULUCF emissions and removals under the <b>Kyoto Protocol</b> and <b>Paris Agreement</b> differ.</li> </ul> <p><b>Synergies with Sustainable Development:</b></p> <ul style="list-style-type: none"> <li>● LULUCF activities have significant <b>co-benefits</b> for <b>biodiversity</b> conservation, <b>ecosystem services</b>, and <b>livelihoods</b> in rural communities. By improving land management practices, countries can simultaneously address climate goals, protect biodiversity, and enhance food security.</li> </ul> <p><b>Examples of LULUCF Strategies:</b></p> <ul style="list-style-type: none"> <li>● <b>Agroforestry:</b> Integrating trees into agricultural systems to improve carbon sequestration and provide multiple ecosystem services.</li> <li>● <b>Forest Conservation:</b> Protecting existing forests to prevent deforestation and degradation, which is a critical source of emissions.</li> </ul>

	<ul style="list-style-type: none"> <li>● <b>Sustainable Agriculture:</b> Implementing farming practices that reduce emissions from land use, such as reducing tillage, improving soil health, and using more efficient irrigation techniques.</li> </ul> <p><b>Land Use, Land Use Change, and Forestry (LULUCF)</b> is a key sector in addressing climate change, as it encompasses both emissions and removals of greenhouse gases due to human activities. Effective management of LULUCF activities, such as reforestation and sustainable land use, is crucial for reducing carbon emissions, enhancing carbon sequestration, and contributing to global climate mitigation efforts. As such, LULUCF plays a dual role: it can both exacerbate climate change through deforestation and degradation, or help mitigate it by fostering carbon storage and sustainable land practices.</p>
<b>Landfill</b>	<p><b>Landfill</b> refers to a <b>waste disposal site</b> where waste is typically placed in layers, compacted to minimize its volume, and covered with a fresh layer of soil on a daily basis. It is one of the most common methods of waste management, though it poses environmental challenges, especially related to soil and water contamination, as well as greenhouse gas emissions like methane.</p> <p><b>Key Points about Landfills:</b></p> <ol style="list-style-type: none"> <li>1. <b>Functioning:</b> <ul style="list-style-type: none"> <li>○ Waste is carefully <b>spread</b> in thin layers to allow for efficient compaction.</li> <li>○ <b>Compaction</b> helps reduce the volume of waste and prevent air pockets.</li> <li>○ Each layer of waste is then covered with a fresh layer of <b>soil</b> or other materials to limit odours, prevent the spread of disease, and reduce fire hazards.</li> </ul> </li> <li>2. <b>Types of Waste in Landfills:</b> <ul style="list-style-type: none"> <li>○ Landfills accept a variety of <b>solid waste</b>, including household garbage, construction debris, industrial waste, and sometimes even hazardous materials.</li> <li>○ The types of waste may vary by landfill type (e.g., <b>sanitary landfills</b> for non-hazardous waste, and specialized landfills for hazardous waste).</li> </ul> </li> <li>3. <b>Environmental Concerns:</b> <ul style="list-style-type: none"> <li>○ <b>Methane Emissions:</b> As organic waste decomposes anaerobically (without oxygen), it produces <b>methane</b> (CH<sub>4</sub>), a potent <b>greenhouse gas</b>.</li> <li>○ <b>Leachate:</b> <b>Leachate</b>, which is liquid formed when rainwater filters through waste, can contaminate soil and groundwater if not properly managed.</li> </ul> </li> </ol>

	<ul style="list-style-type: none"> <li>○ <b>Land Use:</b> Over time, landfills take up large areas of land, which could be used for other purposes such as agriculture or recreation.</li> </ul> <p>4. <b>Modern Landfills (Sanitary Landfills):</b></p> <ul style="list-style-type: none"> <li>○ Modern landfills are designed with <b>linings</b> and <b>leachate collection systems</b> to reduce environmental harm.</li> <li>○ <b>Gas collection systems</b> are used to capture methane and prevent it from being released into the atmosphere. The captured gas can sometimes be used for energy generation.</li> <li>○ Properly managed landfills minimize the risk of <b>water contamination</b> and manage methane production more effectively.</li> </ul> <p>5. <b>Alternatives to Landfills:</b></p> <ul style="list-style-type: none"> <li>○ <b>Recycling and Composting:</b> Reducing the amount of waste sent to landfills by reusing materials and composting organic waste.</li> <li>○ <b>Waste-to-Energy:</b> Converting non-recyclable waste into energy (electricity or heat), which can reduce landfill dependence.</li> <li>○ <b>Waste Reduction:</b> Encouraging less waste generation by industries and consumers.</li> </ul> <p>6. <b>Closure and Aftercare:</b></p> <ul style="list-style-type: none"> <li>○ Once a landfill reaches its capacity, it is <b>closed</b>, and the site is covered with soil to prevent exposure to the waste beneath.</li> <li>○ <b>Aftercare</b> is required to monitor and maintain the site, especially in terms of methane emissions and leachate management, for several years.</li> </ul> <p>7. <b>Landfill Gas Recovery:</b></p> <ul style="list-style-type: none"> <li>○ <b>Landfill gas</b>, primarily composed of methane and carbon dioxide, is sometimes captured and used as a renewable energy source.</li> <li>○ This process not only helps reduce greenhouse gas emissions but also provides a sustainable energy source.</li> </ul> <p><b>Landfills</b> are a common waste disposal method that, while effective in managing waste, pose significant environmental challenges, particularly in terms of methane emissions, leachate contamination, and land use. Modern, well-managed landfills incorporate technology to mitigate these impacts, but reducing waste through recycling, composting, and other alternatives remains a priority for minimizing reliance on landfills and addressing environmental concerns.</p>
<b>Landscape</b>	<p><b>Landscape</b> refers to the visible features of a land area, encompassing both natural and human-made elements. It is a comprehensive concept that includes physical, biological, and cultural aspects that shape a region's appearance and character.</p>

## Key Components of Landscape:

### 1. Physical Elements:

- **Landforms:** Natural features such as mountains, hills, valleys, plains, and plateaus.
- **Water Bodies:** Rivers, lakes, seas, and wetlands that shape the land and support ecosystems.
- **Soil Types:** Different soil compositions that affect vegetation, agriculture, and water flow.

### 2. Living Elements:

- **Vegetation:** Natural or indigenous plants and trees that make up the land cover, including forests, grasslands, and wetlands.
- **Wildlife:** The animals that inhabit and interact with the landscape, contributing to ecological balance.

### 3. Human Elements:

- **Land Use:** How humans utilize the land, including agriculture, urban development, industrial areas, and conservation efforts.
- **Buildings and Structures:** Human-made infrastructure such as homes, commercial buildings, roads, bridges, and dams.
- **Cultural Landscapes:** Human interventions that reflect cultural values and history, such as heritage sites and agricultural terraces.

### 4. Transitory Elements:

- **Lighting:** The way light changes across the day, influencing the visual appearance of the landscape (e.g., sunrise, sunset, or seasonal changes).
- **Weather Conditions:** Rain, snow, fog, or clear skies that can dramatically alter the landscape's appearance and character.

### 5. Human Impact:

- **Urbanization and Industrialization:** Human development that alters or transforms the landscape through construction, deforestation, or land conversion.
- **Agricultural Practices:** Farming, forestry, and grazing that reshape the natural landscape to meet human needs.
- **Conservation and Restoration:** Efforts to protect and restore landscapes, such as creating national parks, wildlife reserves, or reforestation areas.

### 6. Ecological Functions:

	<ul style="list-style-type: none"> <li>○ <b>Ecosystem Services:</b> The landscape provides services like water purification, carbon sequestration, biodiversity support, and soil formation, which are vital for human survival.</li> <li>○ <b>Cultural Significance:</b> Certain landscapes have cultural, religious, or historical value, serving as sources of identity and heritage for communities.</li> </ul> <p>A <b>landscape</b> is a dynamic and multifaceted entity shaped by both natural processes and human activity. It reflects the interactions between the physical environment, biological systems, and human influences. Understanding landscapes is essential for effective land management, conservation, and urban planning, ensuring a balance between development and the preservation of natural resources.</p>
<b>Landslide</b>	<p><b>Landslide</b> refers to the movement of a mass of soil, rock, debris, or other materials down a slope, primarily driven by gravity. The process can be accelerated by factors such as water saturation, steep slopes, and the type of materials present. Landslides can occur in a variety of environments, including mountainous regions, coastal cliffs, and even urban areas built on unstable terrain.</p> <p><b>Key Characteristics of a Landslide:</b></p> <ol style="list-style-type: none"> <li><b>Types of Material:</b> <ul style="list-style-type: none"> <li>○ <b>Soil:</b> Loose earth and vegetation that can slide when wet.</li> <li>○ <b>Rock:</b> Solid rock that may break apart and slide down slopes.</li> <li>○ <b>Debris:</b> A mix of soil, rock, and organic material that moves together.</li> </ul> </li> <li><b>Causes:</b> <ul style="list-style-type: none"> <li>○ <b>Gravity:</b> The primary driving force that causes the material to move downhill.</li> <li>○ <b>Water Saturation:</b> Rain, snowmelt, or rising groundwater can reduce friction and increase the likelihood of a landslide, especially in loose or porous materials.</li> <li>○ <b>Earthquakes:</b> Seismic activity can trigger landslides by shaking loose materials or disrupting the stability of slopes.</li> <li>○ <b>Human Activities:</b> Construction, mining, deforestation, and road building can destabilize slopes and increase the risk of landslides.</li> <li>○ <b>Volcanic Activity:</b> Eruptions and the subsequent melting of snow and ice can trigger landslides, especially in volcanic regions.</li> </ul> </li> <li><b>Types of Landslides:</b> <ul style="list-style-type: none"> <li>○ <b>Rockfalls:</b> Fast-moving masses of rock that detach from cliffs or steep slopes.</li> <li>○ <b>Debris Flows:</b> A mix of water, soil, and debris that flows rapidly downhill, often resembling a mudflow.</li> </ul> </li> </ol>

	<ul style="list-style-type: none"> <li>○ <b>Slumps:</b> Occur when a section of landslides down a slope in a rotational manner, often forming a curved or stepped appearance.</li> <li>○ <b>Creeps:</b> Slow, gradual movements of soil or rock over time, typically not noticeable but leading to long-term land degradation.</li> <li>○ <b>Slides:</b> A large mass of material moving along a defined slip surface.</li> </ul> <p>4. <b>Impacts of Landslides:</b></p> <ul style="list-style-type: none"> <li>○ <b>Human Loss:</b> Landslides can cause fatalities, injuries, and property damage in densely populated areas.</li> <li>○ <b>Environmental Impact:</b> Can result in the destruction of habitats, loss of vegetation, and disruption of natural waterways.</li> <li>○ <b>Infrastructure Damage:</b> Roads, railways, buildings, and bridges can be damaged or destroyed by landslides.</li> <li>○ <b>Economic Costs:</b> Landslides often require costly mitigation measures, clean-up efforts, and rebuilding of infrastructure.</li> </ul> <p>5. <b>Prevention and Mitigation:</b></p> <ul style="list-style-type: none"> <li>○ <b>Slope Stabilization:</b> Techniques such as terracing, vegetation planting, or rock bolting to reinforce slopes.</li> <li>○ <b>Water Management:</b> Reducing water infiltration through proper drainage systems and land use practices.</li> <li>○ <b>Early Warning Systems:</b> Monitoring rainfall, soil conditions, and seismic activity to predict potential landslides.</li> <li>○ <b>Land Use Planning:</b> Avoiding construction in high-risk areas, particularly near steep slopes or in regions prone to landslides.</li> </ul> <p>A <b>landslide</b> is a natural phenomenon with the potential to cause significant damage to life, property, and the environment. Understanding the causes, types, and impacts of landslides, as well as implementing appropriate prevention and mitigation strategies, is essential for minimizing risks, especially in vulnerable regions.</p>
<b>Latitude</b>	<p><b>Latitude</b> refers to the geographic coordinate that specifies a location's position <b>north or south</b> of the <b>equator</b>, which is designated as <b>0 degrees latitude</b>. Latitude is measured in <b>degrees (°), minutes (')</b>, and <b>seconds (")</b>, ranging from <b>0° at the equator to 90° at the North and South Poles</b>. Latitude is a fundamental geographic concept that helps in understanding climate patterns, navigation, and Earth's hemispheric divisions. By determining how far north or south a location is from the equator, latitude plays a crucial role in shaping environmental conditions and human activities worldwide.</p>
<b>Leakage</b>	<p><b>Leakage</b> refers to the unintended shift of greenhouse gas (GHG) emissions from <b>one region or sector to another</b>, undermining the effectiveness of emissions reduction efforts. This occurs when emissions reductions achieved in a <b>regulated region</b> lead to an <b>increase in emissions elsewhere</b>, often in regions with weaker or no climate policies.</p> <p><b>Types of Leakage:</b></p>

	<p><b>1. Industrial Relocation:</b></p> <ul style="list-style-type: none"> <li>○ <b>Energy-intensive industries</b> may move from countries with <b>strict emission regulations (Annex B countries)</b> to regions with <b>weaker or no constraints</b>, leading to an overall increase in emissions.</li> <li>○ Example: A <b>steel manufacturing plant</b> relocating from Europe (which has strict carbon regulations) to a country with <b>laxer emissions policies</b>.</li> </ul> <p><b>2. Fossil Fuel Price Effects:</b></p> <ul style="list-style-type: none"> <li>○ If regulated countries <b>reduce fossil fuel consumption</b>, global demand drops, leading to a <b>fall in fossil fuel prices</b>.</li> <li>○ As a result, <b>non-regulated countries</b> may increase their fossil fuel use due to lower costs, <b>offsetting emissions reductions</b>.</li> </ul> <p><b>3. Income and Trade Effects:</b></p> <ul style="list-style-type: none"> <li>○ When stringent climate policies improve the <b>terms of trade</b> for regulated regions, economic shifts can lead to <b>higher energy consumption and emissions elsewhere</b>.</li> </ul> <p><b>4. Carbon Sequestration Leakage:</b></p> <ul style="list-style-type: none"> <li>○ Carbon sequestration projects (e.g., <b>tree plantations</b>) may lead to <b>deforestation or land-use changes</b> elsewhere, negating the benefits.</li> <li>○ Example: If <b>forests are protected in one country</b>, it may lead to <b>increased deforestation in another country</b> to meet timber demand.</li> </ul> <p><b>Impact of Leakage:</b></p> <ul style="list-style-type: none"> <li>● <b>Reduces the effectiveness of climate policies</b> by shifting rather than eliminating emissions.</li> <li>● <b>Weakens carbon pricing mechanisms</b> if industries move to regions without carbon taxes.</li> <li>● <b>Challenges global climate action</b>, as emissions reductions in one region may be negated by increases elsewhere.</li> </ul> <p>Leakage is a major challenge in climate policy, highlighting the <b>need for global coordination</b> to prevent unintended increases in emissions. Addressing leakage requires <b>strong international policies, economic incentives, and monitoring systems</b> to ensure genuine and sustained emissions reductions worldwide.</p>
<b>Least Developed Countries</b>	<p><b>Least Developed Countries (LDCs)</b> are <b>nations that face severe structural barriers to sustainable development</b>, exhibiting the <b>lowest socioeconomic indicators</b> and <b>Human Development Index (HDI) scores</b> globally. The <b>United Nations (UN)</b> classifies LDCs based on specific criteria that assess economic vulnerability, income levels, and human development.</p> <p><b>Criteria for LDC Classification (UN Guidelines):</b></p>

	<p>A country is designated as an LDC based on the following three key factors:</p> <ol style="list-style-type: none"> <li>1. <b>Income Criterion:</b> <ul style="list-style-type: none"> <li>○ A <b>low gross national income (GNI) per capita</b>, below a certain threshold set by the UN.</li> </ul> </li> <li>2. <b>Human Assets Index (HAI):</b> <ul style="list-style-type: none"> <li>○ Indicators measuring <b>health, education, and nutrition</b>, such as: <ul style="list-style-type: none"> <li>■ <b>Undernourishment rates</b></li> <li>■ <b>Child mortality rates</b></li> <li>■ <b>Literacy and school enrollment rates</b></li> </ul> </li> </ul> </li> <li>3. <b>Economic and Environmental Vulnerability Index (EVI):</b> <ul style="list-style-type: none"> <li>○ Measures <b>exposure to economic shocks</b>, such as: <ul style="list-style-type: none"> <li>■ <b>High dependence on agriculture or commodity exports</b></li> <li>■ <b>Susceptibility to natural disasters</b></li> <li>■ <b>Instability in exports and production</b></li> </ul> </li> </ul> </li> </ol> <p><b>Key Challenges Faced by LDCs:</b></p> <ul style="list-style-type: none"> <li>● <b>Extreme Poverty:</b> LDCs have <b>low-income levels</b> and <b>high inequality</b>, making it difficult to invest in essential services.</li> <li>● <b>Weak Infrastructure:</b> Limited access to <b>roads, electricity, clean water, and healthcare</b>.</li> <li>● <b>Climate Vulnerability:</b> Many LDCs are <b>highly susceptible to climate change</b>, facing <b>floods, droughts, and rising sea levels</b>.</li> <li>● <b>Economic Instability:</b> Heavy dependence on <b>agriculture, natural resources, or external aid</b>, making them vulnerable to <b>global market fluctuations</b>.</li> <li>● <b>Limited Industrialization:</b> Most LDCs <b>lack technological advancement</b>, slowing economic growth and employment opportunities.</li> </ul>
<p><b>Least Developed Countries Expert Group (LEG)</b></p>	<p>The <b>Least Developed Countries Expert Group (LEG)</b> is a <b>panel of 12 experts</b> established under the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b>. Its primary role is to <b>advise Least Developed Countries (LDCs)</b> on the <b>preparation and implementation of National Adaptation Programmes of Action (NAPAs)</b> and other climate adaptation strategies.</p> <p><b>Key Functions of LEG:</b></p> <p><b>Support for National Adaptation Plans (NAPs):</b></p> <ul style="list-style-type: none"> <li>● Assists LDCs in <b>developing, updating, and implementing</b> their National Adaptation Plans of Action (NAPAs).</li> </ul>



	<ul style="list-style-type: none"> <li>Provides <b>technical guidance</b> on integrating <b>climate resilience into national policies</b>.</li> </ul> <p><b>Capacity Building &amp; Technical Assistance:</b></p> <ul style="list-style-type: none"> <li>Helps <b>strengthen institutional frameworks</b> for climate adaptation.</li> <li>Enhances LDCs' ability to <b>access international climate finance</b>. <b>Facilitating International Support:</b></li> <li>Engages with international organizations, donors, and <b>climate funds</b> such as the <b>Green Climate Fund (GCF)</b> to secure financial and technical assistance for LDCs.</li> </ul> <p><b>Monitoring and Evaluation:</b></p> <ul style="list-style-type: none"> <li>Reviews <b>progress of adaptation actions</b> and provides recommendations for improvement.</li> <li>Identifies <b>best practices and lessons learned</b> from LDC experiences.</li> </ul> <p><b>Why is LEG Important?</b></p> <p><b>Addresses Climate Vulnerability:</b> LDCs are <b>highly vulnerable to climate change</b>, experiencing <b>rising sea levels, extreme weather events, and food insecurity</b>. LEG provides the necessary <b>support for adaptation planning</b>.</p> <p><b>Supports Access to Climate Finance:</b> Many LDCs <b>struggle to access funds</b> for adaptation projects. LEG helps them <b>navigate funding mechanisms</b> like the <b>Least Developed Countries Fund (LDCF)</b>.</p> <p><b>Enhances Long-Term Climate Resilience:</b> By assisting LDCs in <b>mainstreaming climate adaptation into national policies</b>, LEG helps them <b>prepare for future climate challenges</b>.</p> <p>The <b>Least Developed Countries Expert Group (LEG)</b> plays a <b>crucial role in strengthening LDCs' resilience to climate change</b>. By providing <b>technical support, facilitating access to climate finance, and promoting knowledge sharing</b>, LEG helps LDCs <b>implement effective adaptation strategies</b> and <b>build a sustainable future</b>.</p>
<b>Least Developed Country Fund (LDCF)</b>	<p>The <b>Least Developed Countries Fund (LDCF)</b> is a <b>specialized climate adaptation fund</b> established under the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> to support <b>Least Developed Countries (LDCs)</b> in addressing their unique climate challenges.</p> <p><b>Key Features of LDCF:</b></p> <p><b>Established to Support Climate Adaptation in LDCs:</b></p> <ul style="list-style-type: none"> <li>Specifically designed to assist <b>Least Developed Country Parties (LDCs)</b>.</li> <li>Focuses on <b>adaptation efforts</b> rather than mitigation.</li> </ul> <p><b>Supports National Adaptation Programmes of Action (NAPAs):</b></p>

	<ul style="list-style-type: none"> <li>• Funds the <b>preparation and implementation</b> of <b>National Adaptation Programmes of Action (NAPAs)</b>, which outline <b>urgent and immediate adaptation needs</b>.</li> <li>• Helps LDCs <b>develop climate resilience strategies</b> tailored to their vulnerabilities.</li> </ul> <p><b>Operated by the Global Environment Facility (GEF):</b></p> <ul style="list-style-type: none"> <li>• The <b>Global Environment Facility (GEF)</b> is <b>entrusted to manage</b> the LDCF.</li> <li>• Provides <b>technical assistance, financial grants, and capacity-building support</b>.</li> </ul> <p><b>Prioritizes Vulnerable Sectors:</b></p> <ul style="list-style-type: none"> <li>• Focuses on <b>agriculture, water resources, coastal zones, and disaster risk reduction</b>.</li> <li>• Aims to <b>enhance food security, water availability, and disaster preparedness</b> in LDCs.</li> </ul> <p><b>Encourages Country-Driven Approaches:</b></p> <ul style="list-style-type: none"> <li>• Ensures that <b>LDC governments lead adaptation planning</b>.</li> <li>• Promotes <b>inclusive decision-making</b> involving <b>local communities, indigenous groups, and vulnerable populations</b>.</li> </ul> <p><b>Why is LDCF Important?</b></p> <p><b>Addresses Climate Vulnerability in LDCs:</b> LDCs face <b>severe climate risks</b> such as <b>droughts, floods, cyclones, and sea-level rise</b>, making adaptation funding critical.</p> <p><b>Facilitates Access to Climate Finance:</b> Many LDCs <b>lack financial resources</b> to implement adaptation projects. The LDCF helps <b>bridge this gap</b> by providing <b>grants and technical support</b>.</p> <p><b>Strengthens Climate Resilience:</b> The fund supports <b>projects that enhance ecosystem protection, food security, and disaster preparedness</b>, improving LDCs' ability to cope with climate change.</p> <p>The <b>Least Developed Countries Fund (LDCF)</b> plays a <b>vital role in supporting LDCs' climate adaptation efforts</b>. By <b>financing adaptation projects, strengthening institutional capacities, and promoting community-based resilience</b>, the LDCF helps LDCs <b>safeguard their people, economies, and ecosystems from the adverse effects of climate change</b>.</p>
<b>Livelihood</b>	<p>A <b>livelihood</b> refers to the <b>capabilities, assets, and activities</b> necessary to secure the means of living. It encompasses:</p> <ul style="list-style-type: none"> <li>• <b>Capabilities</b> – Skills, knowledge, and the ability to utilize resources effectively.</li> <li>• <b>Assets</b> – Tangible and intangible resources, including land, tools, financial capital, social networks, and access to markets.</li> <li>• <b>Activities</b> – Economic and social actions undertaken to sustain life, such as farming, fishing, trading, or wage employment.</li> </ul> <p><b>Why Do Livelihoods Matter?</b></p>

	<ul style="list-style-type: none"> <li>• <b>Key to Poverty Alleviation</b> – Ensuring access to sustainable livelihoods is critical for social and economic development.</li> <li>• <b>Linked to Climate Resilience</b> – Climate change affects traditional livelihoods (e.g., agriculture, fisheries), requiring adaptation strategies.</li> <li>• <b>Influences Migration and Mobility</b> – Secure livelihoods reduce forced displacement and support community stability</li> </ul> <p>A well-supported livelihood system enhances <b>economic security, environmental sustainability, and community resilience</b>, contributing to overall <b>human well-being and sustainable development</b>.</p>
<b>Livelihood Assets</b>	<p><b>Livelihood assets</b> refer to the <b>resources and capabilities</b> that individuals, households, or communities <b>possess or have access to</b>, which they use to secure a livelihood. These assets form the foundation of people's ability to <b>survive, adapt, and thrive</b> in different environments.</p> <p><b>Types of Livelihood Assets (The Sustainable Livelihoods Framework)</b> – Livelihood assets are categorized into five key types, often represented as the "Pentagon of Livelihood Assets":</p> <ul style="list-style-type: none"> <li>• <b>Human Capital</b> – Skills, knowledge, education, health, and labor capacity.</li> <li>• <b>Natural Capital</b> – Natural resources that support livelihoods.</li> <li>• <b>Social Capital</b> – Networks, relationships, and social structures that provide support.</li> <li>• <b>Physical Capital</b> – Infrastructure, tools, and equipment that enhance productivity.</li> <li>• <b>Financial Capital</b> – Monetary resources available to invest in livelihoods.</li> </ul> <p>Why Are Livelihood Assets Important?</p> <ul style="list-style-type: none"> <li>• <b>Enhance resilience to shocks and stresses</b> (e.g., climate change, economic downturns).</li> <li>• <b>Enable people to generate sustainable income and escape poverty.</b></li> <li>• <b>Contribute to overall well-being, economic security, and environmental sustainability.</b></li> </ul> <p>A strong livelihood asset base empowers individuals and communities to <b>achieve economic stability, adapt to challenges, and build sustainable futures</b>. Policies that enhance <b>access to and protection of these assets</b> are crucial for inclusive development and climate resilience.</p>
<b>Livelihood Outcome</b>	<p><b>Livelihood outcomes</b> refer to the <b>results or achievements</b> of livelihood strategies. They represent the <b>positive or negative changes</b> in people's well-being, economic stability, and environmental sustainability based on how they utilize their <b>livelihood assets</b>. A successful <b>livelihood outcome</b> should lead to <b>improved living standards, economic security, and environmental sustainability</b>. Governments, NGOs, and local communities must work together to <b>strengthen livelihood assets and create enabling conditions</b> for positive livelihood outcomes.</p>
<b>Livelihood Strategies</b>	<p><b>Livelihood strategies</b> refer to the diverse ways individuals, households, and communities <b>use their assets and capabilities</b> to sustain and improve their living conditions. These strategies include <b>productive activities, investment decisions, and reproductive choices</b> that</p>

	<p>contribute to income generation and well-being. A <b>well-planned livelihood strategy</b> enables individuals and communities to <b>adapt to changing conditions, improve their quality of life, and ensure long-term sustainability</b>. Governments, NGOs, and policymakers play a crucial role in <b>supporting livelihood strategies</b> by providing access to <b>resources, skills, and economic opportunities</b>.</p>
<b>Local Adaptation Plan of Action (LAPA)</b>	<p>A <b>Local Adaptation Plan of Action (LAPA)</b> is a community-driven approach to climate resilience, enabling local populations to <b>understand, plan, and implement adaptation measures</b> in response to climate change.</p> <p><b>Key Features of LAPA:</b></p> <p><b>Community Participation:</b> Ensures local stakeholders are actively engaged in identifying climate risks and solutions.</p> <p><b>Flexibility &amp; Responsiveness:</b> Adaptation strategies are designed to be <b>dynamic and responsive</b> to evolving climate conditions.</p> <p><b>Integration with Development Planning:</b> Aligns with <b>village, district, and national-level</b> development strategies.</p> <p><b>Sectoral Coordination:</b> Encourages <b>collaboration between different sectors</b>, such as agriculture, water, forestry, and disaster management.</p> <p><b>Implementation of Climate-Resilient Plans:</b> Empowers communities to <b>execute sustainable adaptation measures</b> that enhance resilience.</p> <p>LAPAs play a crucial role in <b>enhancing climate resilience at the grassroots level</b>, ensuring that adaptation measures are <b>locally relevant, inclusive, and sustainable</b>. By incorporating <b>community knowledge and priorities</b>, LAPAs help <b>build adaptive capacity and foster climate-resilient development</b>.</p>
<b>Local Adaptive Capacity</b>	<p><b>Local Adaptive Capacity (LAC)</b> refers to the ability of a local system—such as a community, ecosystem, or governance structure—to <b>adjust to climate change, including climate variability and extremes</b>. This adjustment helps to:</p> <p><b>Moderate potential damages</b> from climate-related hazards</p> <p><b>Take advantage of opportunities</b> arising from changing conditions</p> <p><b>Cope with the consequences</b> of climate change impacts</p> <p>Enhancing <b>local adaptive capacity</b> is crucial for <b>climate-resilient development</b>. It requires a combination of <b>resources, knowledge, institutional support, and community engagement</b> to ensure that local systems can <b>withstand and adapt to climate change effectively</b>.</p>
<b>Local Communities</b>	<p>A <b>local community</b> is a group of people living in a shared geographical area who interact with one another and their environment. These communities often share <b>common interests, resources, beliefs, needs, and risks</b>, which shape their identity and cohesion.</p> <p>Local communities play a vital role in <b>sustainable development, cultural preservation, and climate adaptation</b>. Strengthening <b>community engagement, participation, and governance</b> is essential for fostering resilient and thriving local systems.</p>

<b>Local Institutions</b>	<p><b>Local institutions</b> are established <b>customs, practices, relationships, or behavioural patterns</b> that play a significant role in shaping the social, economic, and political life of a community or society. They include <b>formal and informal structures</b> that govern interactions, resource management, and decision-making at the local level.</p> <p>Local institutions serve as the backbone of <b>community governance, development, and resilience</b>. Strengthening them through <b>capacity-building, policy support, and community engagement</b> is crucial for fostering sustainable and inclusive local development.</p>
<b>Longwave Radiation</b>	<p><b>Longwave radiation</b> refers to the <b>infrared energy emitted by the Earth and its atmosphere</b> at wavelengths greater than <b>4 micrometres (µm)</b>. It plays a crucial role in the <b>Earth's energy balance and climate system</b>.</p> <p><b>Key Characteristics</b></p> <ul style="list-style-type: none"> <li>• <b>Source</b> – Emitted by the Earth's surface, clouds, and atmosphere.</li> <li>• <b>Contrast with Shortwave Radiation</b> – Unlike shortwave solar radiation (which has higher energy and comes from the Sun), longwave radiation is <b>lower in energy</b> and mainly originates from the <b>Earth itself</b>.</li> <li>• <b>Wavelength Range</b> – Typically between <b>4 to 100 µm</b>, with peak emissions around <b>10 µm</b>.</li> </ul> <p><b>Role in the Greenhouse Effect</b></p> <ul style="list-style-type: none"> <li>• <b>Absorption &amp; Re-radiation</b> – Greenhouse gases like <b>CO<sub>2</sub>, CH<sub>4</sub>, and H<sub>2</sub>O vapor</b> absorb and re-radiate longwave radiation, <b>trapping heat in the atmosphere</b>.</li> <li>• <b>Energy Balance</b> – The balance between <b>incoming shortwave solar radiation and outgoing longwave radiation</b> determines <b>Earth's temperature</b>.</li> </ul> <p><b>Types of Longwave Radiation</b></p> <ul style="list-style-type: none"> <li>• <b>Upwelling Longwave Radiation</b> – Emitted <b>upward</b> from the Earth's surface toward space.</li> <li>• <b>Downwelling Longwave Radiation</b> – Emitted <b>downward</b> by clouds and greenhouse gases, warming the surface.</li> </ul> <p><b>Importance of Longwave Radiation</b></p> <ul style="list-style-type: none"> <li>• <b>Regulates Earth's Climate</b> – Controls <b>surface temperature</b> and weather patterns.</li> <li>• <b>Influences Climate Change</b> – Changes in <b>longwave radiation balance</b> contribute to <b>global warming</b>.</li> <li>• <b>Affects Atmospheric Circulation</b> – Helps drive <b>ocean currents and wind patterns</b>.</li> </ul> <p>Longwave radiation is a <b>critical component of the Earth's climate system</b>, influencing <b>temperature regulation, greenhouse effects, and climate variability</b>. Understanding its behavior helps scientists predict and mitigate <b>climate change</b> impacts.</p>
<b>Loss and damage</b>	<p><b>Loss and damage</b> in the context of <b>UN climate negotiations</b> refers to the <b>irreversible impacts of climate change</b> that cannot be mitigated or adapted to. These include:</p>

	<ul style="list-style-type: none"> <li>• <b>Destruction of homes</b> due to extreme flooding or severe weather</li> <li>• <b>Loss of lives</b> from climate-induced disasters</li> <li>• <b>Environmental degradation</b>, including infertile land and disappearing habitats</li> <li>• <b>Economic losses</b> such as declining agricultural yields and lost livelihoods</li> <li>• <b>Non-economic losses</b>, like <b>cultural heritage, indigenous knowledge, and biodiversity</b></li> </ul> <p><b>Addressing Loss and Damage</b></p> <ul style="list-style-type: none"> <li>• <b>Loss and Damage Fund</b> – Established at COP27 to support climate-vulnerable nations.</li> <li>• <b>Insurance &amp; Financial Mechanisms</b> – Proposals for climate risk insurance, debt relief, and direct compensation.</li> <li>• <b>Recognition in the Paris Agreement</b> – Acknowledged under Article 8, though financial commitments remain debated.</li> </ul> <p>Loss and damage highlight the human and environmental cost of climate change. While adaptation and mitigation are crucial, some losses are unavoidable, making compensation and financial support essential for climate justice.</p>
<b>Loss and Damage Fund</b>	<p><b>The Loss and Damage Fund (LDF)</b> was established at COP27 (2022) to provide financial assistance to developing nations suffering from the irreversible impacts of climate change—those that cannot be mitigated or adapted to. At COP29, the Loss and Damage Fund was fully operationalized, a significant step for developing nations facing climate change impacts, particularly those most vulnerable like small island states, least developed countries, and African nations.</p> <p><b>The Loss and Damage Fund represents a major step toward climate justice</b>, recognizing that adaptation alone is not enough for communities suffering severe, irreversible climate impacts. However, sustained financial support, clear governance, and equitable distribution are essential for its success.</p>
<b>Magnitude</b>	<p><b>Magnitude</b>, in the context of the environment and climate change, refers to the <b>extent, severity, or scale of climate-related changes and impacts</b>—whether they are small, moderate, or large. It helps in quantifying and assessing the intensity of global warming, extreme weather events, greenhouse gas emissions, biodiversity loss, and environmental degradation. The magnitude of environmental and climate change impacts is crucial for assessing risks and designing effective policies. Whether measuring <b>CO<sub>2</sub> emissions, sea level rise, or biodiversity loss</b>, understanding magnitude helps in determining <b>the urgency and scale of response</b> needed for climate mitigation and adaptation.</p>
<b>Maladaptation</b>	<p>Maladaptation refers to changes in natural or human systems that unintentionally <b>increase vulnerability</b> to climatic stimuli rather than reducing it. While these actions, policies, or interventions are often undertaken with the intention of <b>adapting to climate change</b>, they can lead to adverse consequences, such as <b>exacerbating existing risks, creating new vulnerabilities, or increasing dependency on unsustainable practices</b>.</p>

	Maladaptation can arise due to <b>short-term, sectoral, or poorly integrated responses</b> that fail to consider broader social, environmental, and economic implications.
<b>Market Impact</b>	<p><b>Market Impact</b> refers to economic effects that arise from changes in market transactions, influencing a country's <b>gross domestic product (GDP)</b> and national accounts. These impacts are typically <b>monetary in nature</b> and involve shifts in supply, demand, and pricing mechanisms across various sectors.</p> <p>For example, in the agricultural sector, <b>climate change-induced variations in rainfall patterns, temperature, and extreme weather events</b> can lead to fluctuations in <b>crop yields</b>, causing changes in <b>supply levels and pricing</b>. A reduction in crop production may drive <b>higher prices</b> due to scarcity, affecting consumers and businesses that rely on agricultural inputs. Conversely, an <b>excess supply</b> due to favourable conditions can lead to price drops, affecting farmers' incomes.</p> <p>Market impacts are not limited to agriculture; they extend to <b>energy markets, manufacturing, and trade</b>. For instance, disruptions in <b>water availability</b> can impact <b>hydropower generation</b>, influencing electricity costs and industrial production. Similarly, supply chain disruptions—caused by climate events, geopolitical instability, or policy shifts—can affect the <b>cost of raw materials and consumer goods</b>, ultimately influencing inflation rates and GDP growth.</p>
<b>Marrakesh Account</b>	<p>The <b>Marrakesh Account</b> refers to the set of principles outlined in the Accords, which regulate how <b>Land Use, Land Use Change, and Forestry (LULUCF)</b> activities contribute to <b>carbon sequestration</b> and emissions reduction while preventing loopholes or misrepresentation of data. These principles emphasize the importance of using sound scientific approaches and maintaining consistent methodologies, while also highlighting the need to conserve biodiversity. Additionally, they stipulate that naturally occurring carbon removals, including those resulting from indirect human activities, should not be included in the system. Furthermore, any re-emission of greenhouse gases, such as those caused by forest fires, must be promptly recorded and accounted for. These principles include:</p> <ol style="list-style-type: none"> <li>1. <b>Scientific Credibility and Consistency</b></li> <li>2. <b>Biodiversity Conservation and Ecosystem Integrity</b></li> <li>3. <b>Exclusion of Naturally Occurring and Indirect Anthropogenic Removals</b></li> <li>4. <b>Accounting for Re-Release of Greenhouse Gases</b></li> </ol> <p>The <b>Marrakesh Accords</b>, adopted in <b>2001</b> during the <b>seventh Conference of the Parties (COP 7) to the UNFCCC</b>, established detailed rules for implementing the <b>Kyoto Protocol</b>. One of the key aspects of these accords was the framework for <b>LULUCF</b> activities, ensuring that their inclusion in emissions accounting does not undermine the <b>environmental integrity</b> of climate commitments.</p>
<b>Mean Sea Level</b>	<b>Mean Sea Level (MSL)</b> is the <b>average height of the sea surface</b> over a defined period, such as a <b>month, year, or multiple years</b> , measured relative to a fixed reference point (datum). This averaging process helps to smooth out temporary fluctuations caused by <b>tides, waves, atmospheric pressure changes, and seasonal variations</b> , providing a more stable measurement of sea level changes over time.

	<p>Several natural and anthropogenic factors contribute to variations in MSL, including: <b>tidal influences, atmospheric pressure and wind patterns, thermal expansion of ocean water, melting of glaciers and ice sheets, land subsidence and uplift.</b></p> <p><b>Trends in Global Mean Sea Level</b></p> <ul style="list-style-type: none"> <li>• According to the <b>Intergovernmental Panel on Climate Change (IPCC)</b>, global sea levels rose by <b>approximately 20 cm between 1901 and 2018</b>, with projections indicating continued rise throughout the 21st century.</li> <li>• Observations from <b>satellite altimetry (e.g., TOPEX/Poseidon, Jason missions)</b> and <b>tide gauges</b> show that <b>global mean sea level has been rising at an accelerated rate</b> in recent decades due to climate change.</li> </ul> <p>MSL is a fundamental metric in oceanography and climate science, providing insights into long-term <b>sea level trends, coastal dynamics, and global climate change impacts</b>. Continuous monitoring and accurate measurements of MSL are essential for informed <b>policy decisions, disaster preparedness, and sustainable coastal development</b>.</p>
<b>Meeting of Parties</b>	<p>The <b>Meeting of the Parties (MOP)</b> is the main <b>governing body</b> responsible for overseeing the implementation of the <b>Kyoto Protocol</b>, an international treaty adopted in <b>1997</b> to set legally binding targets for reducing greenhouse gas (GHG) emissions. The MOP operates under the framework of the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> but is distinct from the <b>Conference of the Parties (COP)</b>, which governs the broader UNFCCC process.</p> <p>The <b>COP</b>, which includes all member countries of the UNFCCC, also serves as the <b>MOP</b>, but only those nations that have ratified the Kyoto Protocol have the authority to participate in its decision-making processes. This ensures that discussions and resolutions under the MOP are directly relevant to the parties bound by the Protocol's commitments.</p> <p>The MOP reviews compliance with Kyoto's targets, evaluates reports submitted by participating nations, and adopts necessary amendments or mechanisms to improve the effectiveness of the treaty. However, the MOP can only convene officially once the Kyoto Protocol has entered into force. Before that, discussions related to its implementation take place within the COP framework. The MOP plays a crucial role in global climate governance by ensuring accountability and progress in emission reduction efforts.</p>
<b>Megacities</b>	<p><b>Megacities</b> are metropolitan areas with a population exceeding <b>10 million residents</b>. These massive urban centers serve as economic, cultural, and political hubs, often playing a crucial role in global trade, innovation, and development. As of today, several megacities exist worldwide, including <b>Tokyo, Delhi, Shanghai, São Paulo, and New York City</b>, among others.</p> <p><b>Characteristics of Megacities include:</b></p> <ol style="list-style-type: none"> <li>1. <b>High Population Density:</b> Due to their vast populations, megacities experience extreme congestion, with millions living and working in close proximity.</li> <li>2. <b>Economic Powerhouses:</b> Many megacities contribute significantly to national and global economies, hosting major industries, multinational corporations, and financial institutions.</li> </ol>



	<ol style="list-style-type: none"> <li>3. <b>Infrastructure Challenges:</b> These cities face immense pressure on housing, transportation, sanitation, and public services, requiring continuous urban planning and investment.</li> <li>4. <b>Environmental Concerns:</b> High levels of pollution, waste generation, and greenhouse gas emissions make sustainable development a critical issue.</li> <li>5. <b>Cultural Diversity:</b> Megacities attract people from various backgrounds, making them melting pots of cultures, languages, and traditions.</li> </ol>
<b>Mesoscale</b>	<p><b>Mesoscale</b> refers to an intermediate scale in meteorology, typically covering distances ranging from a <b>few miles to a few hundred miles</b> (approximately <b>2–500 km</b>). It is crucial for understanding and predicting localized weather phenomena, including <b>winds, thunderstorms, tornadoes, and sea breezes</b>.</p> <p><b>Characteristics of Mesoscale Weather Systems:</b></p> <ol style="list-style-type: none"> <li>1. <b>Spatial Scale:</b> Mesoscale weather events are larger than microscale phenomena (such as turbulence) but smaller than synoptic-scale systems like extratropical cyclones.</li> <li>2. <b>Temporal Duration:</b> These systems can last from <b>minutes to several hours or days</b>, depending on the type of weather event.</li> <li>3. <b>Influence of Local Geography:</b> Unlike large-scale weather patterns governed by jet streams, mesoscale systems are <b>strongly influenced by terrain, coastlines, and urban landscapes</b>.</li> <li>4. <b>Convective Activity:</b> Many mesoscale events, such as thunderstorms and squall lines, are driven by <b>convection</b>, where warm air rises and interacts with cooler air.</li> <li>5. <b>Role in Severe Weather:</b> Tornadoes, flash floods, and derechos (long-lived windstorms) are often associated with mesoscale meteorological processes, making them critical for weather forecasting and disaster preparedness.</li> </ol> <p>To study mesoscale phenomena, meteorologists use advanced tools such as <b>Doppler radar, satellite imagery, and numerical weather models</b>, enabling better predictions and early warnings for extreme weather events.</p>
<b>Meteorology</b>	<p><b>Meteorology</b> is the <b>interdisciplinary scientific study of the atmosphere</b>, focusing on weather processes, atmospheric phenomena, and climate patterns. It involves the observation, analysis, and prediction of atmospheric conditions that affect both short-term weather and long-term climatic trends.</p> <p><b>Key Areas of Meteorology:</b></p> <ol style="list-style-type: none"> <li>1. <b>Weather Forecasting:</b> Meteorologists analyze atmospheric data from satellites, radar, and weather stations to predict daily and seasonal weather patterns.</li> </ol>

	<ul style="list-style-type: none"><li>2. <b>Climatology:</b> This branch studies long-term atmospheric trends and variations, including climate change, global warming, and historical weather patterns.</li><li>3. <b>Severe Weather Events:</b> Meteorology plays a crucial role in understanding and forecasting extreme events like hurricanes, tornadoes, thunderstorms, and blizzards.</li><li>4. <b>Atmospheric Physics and Chemistry:</b> This includes studying air pressure, temperature, humidity, and the composition of gases that influence weather and climate.</li><li>5. <b>Hydrometeorology:</b> Focuses on the relationship between weather and water, including precipitation, floods, and droughts.</li></ul> <p>Meteorology integrates environmental science, geography, physics, and mathematics to understand complex atmospheric processes. It has applications in aviation, agriculture, disaster management, and even space exploration, making it essential for modern society.</p>
<b>Methane</b>	<p><b>Methane (CH<sub>4</sub>)</b> is a colourless, odorless, and highly flammable gas that plays a significant role in climate change. It is the <b>second most abundant greenhouse gas (GHG) after carbon dioxide (CO<sub>2</sub>)</b> but is <b>over 25 times more effective</b> at trapping heat in the atmosphere over a 100-year period. Although methane represents about <b>8% of total U.S. greenhouse gas emissions</b>, it has a much greater short-term warming potential.</p> <p><b>Major Sources of Methane Emissions:</b></p> <ul style="list-style-type: none"><li>1. <b>Biogenic Sources:</b><ul style="list-style-type: none"><li>○ <b>Livestock Digestive Systems (Enteric Fermentation):</b> Ruminant animals like cows, sheep, and goats produce methane during digestion, releasing it through burping.</li><li>○ <b>Landfills:</b> Organic waste decomposes anaerobically (without oxygen) in landfills, generating methane emissions.</li><li>○ <b>Wetlands and Rice Paddies:</b> Naturally occurring microbial activity in wetlands and flooded rice fields produces methane.</li></ul></li><li>2. <b>Anthropogenic (Human-Induced) Sources:</b><ul style="list-style-type: none"><li>○ <b>Biomass and Wood Burning:</b> Burning wood in <b>stoves, fireplaces, and wildfires</b> releases methane along with other pollutants.</li><li>○ <b>Oil and Natural Gas Industry:</b> Methane leaks occur during the extraction, processing, and transportation of fossil fuels.</li><li>○ <b>Coal Mining:</b> Underground coal seams naturally release methane, known as <b>coal mine methane (CMM)</b>.</li></ul></li></ul> <p><b>Impact of Methane on Climate and Mitigation Strategies:</b></p> <ul style="list-style-type: none"><li>• <b>Methane has a shorter atmospheric lifespan (~12 years)</b> compared to CO<sub>2</sub> but contributes significantly to global warming.</li></ul>

	<ul style="list-style-type: none"> <li>• <b>Mitigation measures</b> include <b>reducing leaks from oil and gas infrastructure</b>, promoting <b>sustainable livestock practices</b>, capturing landfill methane for energy use, and improving agricultural practices such as rice cultivation and manure management.</li> </ul> <p>Due to its high warming potential, reducing methane emissions is a critical strategy for <b>slowing climate change and improving air quality</b>.</p>
<b>Metric Ton</b>	<p>A <b>metric ton (tonne)</b> is a commonly used <b>international unit of measurement</b> for <b>quantifying greenhouse gas (GHG) emissions</b> and other large-scale environmental and industrial outputs. It is defined as <b>1,000 kilograms (kg)</b> or <b>2,204.62 pounds (lbs)</b>, making it slightly heavier than a <b>short ton (U.S. ton)</b>, which is <b>2,000 lbs</b>.</p> <p><b>Use in Greenhouse Gas Accounting:</b></p> <ul style="list-style-type: none"> <li>• The metric ton is the standard unit used in <b>climate reporting, carbon markets, and emissions inventories</b> worldwide.</li> <li>• Greenhouse gas emissions from industries, transportation, agriculture, and energy production are typically reported in <b>metric tons of CO<sub>2</sub>-equivalent (MTCO<sub>2</sub>e)</b>, which accounts for the different global warming potentials of various gases.</li> </ul> <p><b>Conversions and Comparisons:</b></p> <ul style="list-style-type: none"> <li>• <b>1 metric ton = 1.1 U.S. short tons</b></li> <li>• <b>1 metric ton = 0.98 long tons (UK measurement)</b></li> <li>• <b>1 metric ton of CO<sub>2</sub> is roughly the amount emitted by burning 113 gallons of gasoline.</b></li> </ul> <p>Metric tons are widely used in <b>carbon pricing systems, emission reduction targets, and international agreements like the Paris Agreement</b>. Understanding this unit is essential for tracking progress in <b>climate action and sustainability efforts</b>.</p>
<b>Microclimate</b>	<p>A <b>microclimate</b> is a <b>localized atmospheric zone</b> where the climate differs from the surrounding area's climate. It occurs at or near the <b>Earth's surface</b> and is influenced by various environmental factors such as <b>topography, vegetation, water bodies, urban structures, and human activities</b>. These small-scale atmospheric conditions can exist in <b>gardens, forests, valleys, cities, or even within individual buildings</b>.</p> <p><b>Key Characteristics of Microclimates:</b></p> <ol style="list-style-type: none"> <li>1. <b>Limited Spatial Scale:</b> Microclimates can range in size from a <b>few square meters to several kilometres</b>, affecting a specific area differently from its surroundings.</li> <li>2. <b>Temperature Variability:</b> Urban areas with concrete and asphalt surfaces tend to be <b>warmer</b> than nearby rural areas, a phenomenon known as the <b>Urban Heat Island (UHI) effect</b>.</li> <li>3. <b>Influence of Natural Features:</b> <ul style="list-style-type: none"> <li>○ <b>Forests</b> create cooler, humid microclimates by providing shade and retaining moisture.</li> </ul> </li> </ol>

	<ul style="list-style-type: none"> <li>○ <b>Lakes and rivers</b> moderate temperatures by absorbing and releasing heat slowly.</li> <li>○ <b>Mountains and valleys</b> create wind patterns and temperature inversions, affecting local weather.</li> </ul> <p><b>Examples of Microclimates:</b></p> <ul style="list-style-type: none"> <li>• <b>City Parks:</b> Cooler and more humid than surrounding urban areas.</li> <li>• <b>Greenhouses:</b> Controlled microclimates optimized for plant growth.</li> <li>• <b>Coastal Areas:</b> Milder temperatures due to the ocean's influence on heat retention.</li> <li>• <b>Shaded Areas:</b> Cooler microclimates under dense tree canopies compared to open spaces.</li> </ul> <p>Understanding microclimates is essential for <b>agriculture, urban planning, architecture, and climate adaptation</b>, as they influence <b>crop growth, energy consumption, biodiversity, and human comfort</b>.</p>
<b>Micron</b>	<p>A <b>micron</b>, also known as a <b>micrometre (µm)</b>, is a unit of length equal to <b>one millionth of a meter (10<sup>-6</sup> m)</b> or <b>one-thousandth of a millimetre (0.001 mm)</b>. A <b>2.5-micron particle</b> is about <b>1/30th the width of a human hair</b>, making it invisible to the naked eye. Due to its extremely small size, it is commonly used to measure microscopic objects, including <b>bacteria, dust particles, and airborne pollutants</b>.</p> <p><b>Role of Microns in Air Quality and Health:</b></p> <ul style="list-style-type: none"> <li>• <b>Particulate Matter (PM):</b> Air pollution is categorized based on particle size: <ul style="list-style-type: none"> <li>○ <b>PM10 (≤10 µm):</b> Particles small enough to be inhaled but usually trapped in the upper respiratory tract.</li> <li>○ <b>PM2.5 (≤2.5 µm):</b> Fine particulate matter capable of penetrating deep into the lungs and even entering the bloodstream, leading to serious health issues.</li> </ul> </li> <li>• <b>Sources of Micron-Sized Pollutants:</b> These include <b>vehicle emissions, industrial processes, wildfires, construction dust, and household combustion</b>.</li> </ul> <p>Due to their significance, regulatory agencies like the <b>World Health Organization (WHO)</b> and the <b>U.S. Environmental Protection Agency (EPA)</b> monitor and set limits on airborne micron-sized pollutants to protect public health.</p>
<b>Migration</b>	<p><b>Migration</b> refers to the movement of people from one place to another, either within a country (<b>internal migration</b>) or across international borders (<b>international migration</b>). While migration has historically been driven by factors such as economic opportunities, conflicts, and social conditions, <b>climate change is emerging as a major driver of displacement worldwide</b>.</p> <p>As climate change causes rising sea levels and intensifies extreme weather events like floods, heatwaves, and droughts, a growing number of people worldwide are forced to leave their homes in search of safer and more sustainable living conditions. This phenomenon, known</p>

	as <b>climate migration</b> , is expected to rise significantly in the coming decades as global temperatures continue to increase and climate-related impacts worsen.
<b>Millennium Development Goals (MDGs)</b>	<p>The <b>Millennium Development Goals (MDGs)</b> were a set of <b>eight global objectives</b> established at the <b>United Nations (UN) Millennium Summit in 2000</b> to address some of the world's most pressing challenges, including <b>poverty, hunger, health, education, gender equality, and environmental sustainability</b>. These goals were <b>time-bound and measurable</b>, with a target deadline of <b>2015</b>. In <b>2015</b>, the MDGs transitioned into the <b>Sustainable Development Goals (SDGs)</b>, expanding the framework to <b>17 goals</b> with a broader focus on <b>sustainability, equity, and long-term global development</b> (Agenda 2030).</p> <p><b>8 Millennium Development Goals:</b></p> <ol style="list-style-type: none"> <li>1. <b>Eradicate Extreme Poverty and Hunger</b></li> <li>2. <b>Achieve Universal Primary Education</b></li> <li>3. <b>Promote Gender Equality and Empower Women</b></li> <li>4. <b>Reduce Child Mortality</b></li> <li>5. <b>Improve Maternal Health</b></li> <li>6. <b>Combat HIV/AIDS, Malaria, and Other Diseases</b></li> <li>7. <b>Ensure Environmental Sustainability</b></li> <li>8. <b>Develop a Global Partnership for Development</b></li> </ol>
<b>Mist</b>	<p><b>Mist</b> is a meteorological phenomenon in which <b>tiny water droplets</b> remain <b>suspended in the air</b>, reducing visibility but not as significantly as fog. It commonly forms when <b>moist air cools down</b>, causing water vapor to condense into fine droplets that float near the Earth's surface.</p> <p><b>How Mist Forms:</b></p> <ul style="list-style-type: none"> <li>• <b>Temperature Differences:</b> Mist often occurs when <b>cool air meets warmer water surfaces</b>, such as lakes, rivers, or the ocean.</li> <li>• <b>Humidity Levels:</b> When air is nearly <b>saturated with moisture</b>, even a slight temperature drop can lead to condensation, forming mist.</li> <li>• <b>Exhaled Air in Cold Weather:</b> When people breathe out in cold conditions, the <b>warm, moist breath condenses</b>, creating a mist-like effect.</li> <li>• <b>Rain-Induced Mist:</b> Light rain can also contribute to mist formation when <b>raindrops evaporate into cooler air near the ground</b>.</li> </ul> <p><b>Mist vs. Fog:</b></p>

	<ul style="list-style-type: none"> <li>• <b>Mist and fog are similar</b>, but the key difference is <b>visibility</b>.</li> <li>• In mist, visibility is <b>between 1 km (0.62 miles) and 5 km (3.1 miles)</b>.</li> <li>• In fog, visibility is <b>less than 1 km</b>, making it denser and more disruptive for transportation.</li> </ul> <p>While mist is <b>harmless</b>, it can create <b>hazardous driving conditions</b> and is an essential factor in <b>weather forecasting, aviation, and climate studies</b>.</p>
<b>Mitigation</b>	<p>In the context of <b>climate change</b>, <b>mitigation</b> refers to <b>human actions aimed at avoiding and reducing the sources of greenhouse gas (GHG) emissions or enhancing carbon sinks</b> to limit global warming. It involves strategies to <b>prevent, minimize, or remove</b> the causes of climate change by transitioning to <b>low-carbon technologies and sustainable practices</b>. By limiting GHG emissions, mitigation helps to stabilize the climate system and reduce the risks associated with rising global temperatures.</p> <p><b>Mitigation measures</b> encompass engineering techniques and hazard-resistant construction as well as improved environmental policies and public awareness, it also includes:</p> <ul style="list-style-type: none"> <li>• <b>Energy Efficiency:</b> Optimizing <b>industrial processes, transportation, and electricity use</b> to reduce fossil fuel consumption.</li> <li>• <b>Renewable Energy Adoption:</b> Shifting from <b>coal, oil, and natural gas</b> to <b>solar, wind, hydro, and geothermal</b> power.</li> <li>• <b>Improved Building Insulation:</b> Reducing energy demand for heating and cooling, thereby lowering emissions.</li> <li>• <b>Carbon Sequestration:</b> Expanding <b>forests, wetlands, and soil carbon storage</b> to absorb more <b>carbon dioxide (CO<sub>2</sub>)</b> from the atmosphere.</li> </ul> <p>In <b>climate policy</b>, mitigation is defined as the <b>direct reduction of emissions</b>, as seen in international agreements like the <b>Paris Agreement</b>, which sets targets for emission reductions through <b>Nationally Determined Contributions (NDCs)</b>. While <b>adaptation</b> focuses on managing climate impacts, <b>mitigation tackles the root cause</b>, making it essential for a sustainable future.</p>
<b>Mitigation Option</b>	<p>A <b>mitigation option</b> refers to any strategy, technology, or practice aimed at reducing greenhouse gas (GHG) emissions or enhancing carbon sinks to counter climate change. In particular, mitigation options that focus on <b>maintaining existing carbon stocks or carbon pools</b> play a crucial role in preventing further emissions from deforestation, land-use changes, and industrial activities. These options ensure that stored carbon remains sequestered in natural or artificial reservoirs, thus mitigating the impact of human-induced climate change.</p> <p><b>Types of Mitigation Options for Maintaining Carbon Stocks:</b></p> <ol style="list-style-type: none"> <li>1. <b>Forest Conservation and Afforestation</b></li> <li>2. <b>Soil Carbon Management</b></li> <li>3. <b>Wetland and Peatland Protection</b></li> </ol>

	<p>4. <b>Sustainable Land Use and Ecosystem Management</b></p> <p>5. <b>Carbon Capture and Storage (CCS)</b></p>
<b>Mitigation potential</b>	<p><b>Mitigation potential</b> refers to the total amount of greenhouse gas (GHG) emissions that can be reduced, avoided, or sequestered through various mitigation measures over a specific period. It serves as a key indicator in assessing the feasibility and effectiveness of different climate actions, particularly in high-emission sectors like energy, transportation, industry, and land use.</p> <p>In the context of climate change mitigation, <b>mitigation potential represents the gap between what is technically and economically feasible and what has already been implemented</b>. It highlights opportunities for further reductions in emissions through improved policies, technologies, and behavioural changes.</p>
<b>Mitigative Capacity</b>	<p><b>Mitigative capacity</b> refers to the ability of a society, organization, or country to effectively implement climate change mitigation measures. It encompasses the <b>social, political, economic, and institutional structures and conditions</b> that enable the adoption of low-carbon technologies, sustainable practices, and emission reduction policies. A higher mitigative capacity allows for <b>faster, more efficient, and broader implementation of climate solutions</b>, while a lower mitigative capacity can hinder progress despite the availability of mitigation options.</p>
<b>Modified Natural Forest</b>	<p>A <b>modified natural forest</b> is a forest or other wooded land predominantly composed of <b>naturally regenerated native species</b>, but it has been visibly altered by <b>human activities</b>. These modifications may result from logging, agriculture, fire, or other land-use changes that impact the forest's structure, composition, and ecological processes. Unlike primary forests, which remain undisturbed, modified natural forests have undergone changes but still retain much of their ecological integrity.</p> <p>These forests play a crucial role in <b>carbon sequestration, biodiversity conservation, and ecosystem services</b> like water regulation and soil protection. They exist in various forms, including <b>logged-over forests, regenerating agricultural lands, and fire-affected woodlands</b>.</p> <p>Despite their importance, modified natural forests face threats like <b>deforestation, conversion to plantations, and invasive species</b>. Proper management strategies, such as <b>sustainable logging, reforestation, and legal protections</b>, can help restore and conserve these ecosystems. With effective conservation efforts, these forests have the potential to recover and continue supporting climate change mitigation and ecological balance.</p>
<b>Monitoring, Reporting and Verification (MRV)</b>	<p><b>Monitoring, Reporting, and Verification (MRV)</b> is a systematic framework used to track, document, and validate environmental and climate-related data, ensuring transparency, accuracy, and accountability in policy implementation. MRV systems are essential for <b>assessing greenhouse gas (GHG) emissions, evaluating climate actions, and tracking compliance</b> with national and international commitments such as the <b>Paris Agreement</b> and <b>Nationally Determined Contributions (NDCs)</b>.</p> <p>MRV can require Parties to monitor, report, and verify data related to environmental compliance. These measures help States track their adherence to specific MRV frameworks. The level of formality and reporting methodologies varies across different systems. With</p>

	<p>technological advancements, compliance-related information systems utilizing computerized databases are increasingly employed to collect, organize, and process data. These systems offer several benefits, including enhanced transparency, streamlined data analysis and verification, improved efficiency, better organization, and faster data compilation.</p> <p><b>Key Components of MRV:</b></p> <ol style="list-style-type: none"> <li><b>Monitoring</b> <ul style="list-style-type: none"> <li>Refers to the <b>continuous or periodic measurement and collection of data</b> related to environmental compliance, GHG emissions, or mitigation activities.</li> <li>Can involve <b>direct measurements, remote sensing, satellite observations, and modelling</b>.</li> <li>Example: Tracking CO<sub>2</sub> emissions from power plants using automated sensors.</li> </ul> </li> <li><b>Reporting</b> <ul style="list-style-type: none"> <li>Involves the <b>documentation and submission of monitored data</b> to relevant authorities or international bodies.</li> <li>Reporting formats and methodologies vary based on regulatory requirements and reporting obligations.</li> <li>Example: Countries submit <b>Biennial Transparency Reports (BTRs)</b> under the Paris Agreement to disclose their climate actions.</li> </ul> </li> <li><b>Verification</b> <ul style="list-style-type: none"> <li>Ensures the <b>accuracy, consistency, and credibility</b> of reported data through <b>independent assessments, audits, or third-party reviews</b>.</li> <li>Helps prevent errors, inconsistencies, or intentional misreporting.</li> <li>Example: Independent verification of carbon offset projects under the <b>Clean Development Mechanism (CDM)</b>.</li> </ul> </li> </ol>
<b>Monsoon</b>	<p>A <b>monsoon</b> is a large-scale seasonal weather pattern characterized by a <b>reversal in wind direction and associated changes in precipitation</b>, primarily affecting tropical and subtropical regions. Monsoons are driven by the differential heating of land and ocean, creating pressure variations that cause shifts in wind patterns and significant seasonal rainfall. This climatic phenomenon plays a crucial role in shaping regional weather patterns, ecosystems, and agricultural activities. Monsoons are most commonly associated with South and Southeast Asia, but they also occur in other parts of the world, including Africa, Australia, and the Americas.</p> <p><b>Regional Variations:</b></p> <ul style="list-style-type: none"> <li><b>Indian Monsoon:</b> Affects India, Bangladesh, and Nepal (June–September).</li> <li><b>East Asian Monsoon:</b> Impacts China, Korea, and Japan.</li> <li><b>North American Monsoon:</b> Affects the southwestern U.S. and Mexico (July–September).</li> </ul>



	<ul style="list-style-type: none"> <li>• <b>West African Monsoon:</b> Brings rains to the Sahel region.</li> </ul> <p><b>In India Monsoon is broadly classified into two categories:</b></p> <ol style="list-style-type: none"> <li>1. <b>Southwest Monsoon (Summer Monsoon)</b> <ul style="list-style-type: none"> <li>○ Occurs from <b>June to September</b>.</li> <li>○ Characterized by the movement of moist winds from the <b>Indian Ocean</b> toward the <b>Indian subcontinent</b>.</li> <li>○ Responsible for nearly <b>75-80% of India's annual rainfall</b>.</li> <li>○ Essential for <b>agriculture</b>, replenishing reservoirs, and maintaining biodiversity.</li> </ul> </li> <li>2. <b>Northeast Monsoon (Winter Monsoon)</b> <ul style="list-style-type: none"> <li>○ Occurs from <b>October to December</b>.</li> <li>○ Affects the eastern coast of India, especially <b>Tamil Nadu, Andhra Pradesh, and parts of Odisha</b>.</li> <li>○ Brings rainfall as dry winds from the <b>Himalayas</b> pick up moisture from the Bay of Bengal.</li> </ul> </li> </ol>
<b>Montreal Protocol</b>	<p>The <b>Montreal Protocol on Substances that Deplete the Ozone Layer</b> is a landmark international environmental agreement designed to protect the Earth's ozone layer by regulating and eventually eliminating the production and use of <b>ozone-depleting substances (ODS)</b>. Adopted on <b>September 16, 1987</b>, in <b>Montreal, Canada</b>, the Protocol has been hailed as one of the most successful global environmental treaties. It entered into force on <b>January 1, 1989</b>, and has undergone several amendments and adjustments to strengthen its effectiveness.</p> <p>The <b>Montreal Protocol on Substances that Deplete the Ozone Layer</b> is a global environmental treaty established in <b>1987</b> to safeguard the ozone layer by systematically eliminating the production and consumption of <b>ozone-depleting substances (ODS)</b>. These include <b>chlorofluorocarbons (CFCs)</b> and <b>hydrochlorofluorocarbons (HCFCs)</b>, which are widely used in <b>refrigeration and air conditioning</b>. These chemicals contribute to ozone depletion, reducing the Earth's natural shield against the harmful <b>ultraviolet (UV) radiation</b> from the sun. The most alarming evidence was the discovery of the <b>Antarctic ozone hole</b> in the 1980s. Unchecked ozone depletion could have led to increased cases of <b>skin cancer, cataracts, weakened immune systems, and environmental disruptions</b>. The <b>Montreal Protocol</b> is widely recognized as one of the most successful international environmental agreements. Research suggests that, without its implementation, the <b>ozone layer</b> could have faced severe depletion, potentially leading to its collapse by <b>2050</b>.</p> <p><b>Adjustments and Amendments</b></p> <p>The Protocol has been strengthened through several amendments, including:</p> <ul style="list-style-type: none"> <li>• <b>London (1990):</b> Accelerated phase-out schedules for key substances.</li> <li>• <b>Copenhagen (1992):</b> Strengthened controls and financial mechanisms.</li> <li>• <b>Vienna (1995), Montreal (1997), and Beijing (1999):</b> Expanded controls and added new substances.</li> </ul>

<b>Mount Pinatubo</b>	<p><b>Mount Pinatubo</b>, a <b>stratovolcano</b> in the <b>Philippines</b>, erupted on <b>June 15, 1991</b>, in one of the <b>largest eruptions of the 20th century</b>. The explosion released <b>massive amounts of ash, sulfur dioxide (SO<sub>2</sub>), and aerosols</b> into the stratosphere, reaching up to <b>35 km (22 miles) in altitude</b>. These sulfate aerosols reflected sunlight, reducing the amount of <b>solar radiation</b> reaching Earth's surface. This led to a <b>temporary global cooling</b> of about <b>0.5°C (0.9°F) between 1992 and 1994</b>, offsetting some of the warming trends observed in the <b>1980s and early 1990s</b>. The eruption also caused <b>severe local impacts</b>, displacing <b>over 200,000 people</b> and triggering <b>lahars (mudflows)</b>. The event provided valuable scientific insights into <b>volcanic climate impacts</b> and helped improve climate models, particularly in understanding how <b>aerosols influence global temperatures</b> and potential applications for <b>climate geoengineering</b> strategies.</p>
<b>Multi-model Ensemble</b>	<p>A <b>Multi-Model Ensemble (MME)</b> is an approach used in <b>climate science, weather forecasting, and environmental modelling</b>, where multiple independent models are combined to improve the reliability and accuracy of simulations. Instead of relying on a <b>single model</b>, MMEs integrate outputs from <b>several models</b>, each developed using different assumptions, physical parameterizations, and numerical techniques. This approach helps account for <b>model uncertainties and biases</b>, leading to more comprehensive and reliable forecasts.</p> <p><b>Applications of Multi-Model Ensembles</b></p> <ul style="list-style-type: none"> <li>• <b>Climate Projections:</b> Used in <b>Intergovernmental Panel on Climate Change (IPCC) reports</b> to project <b>global temperature changes, sea-level rise, and extreme weather patterns</b>.</li> <li>• <b>Weather Forecasting:</b> Employed by meteorological agencies to improve <b>short- and long-term weather predictions</b>.</li> <li>• <b>Disaster Risk Assessment:</b> Helps in <b>predicting natural disasters</b> such as hurricanes, droughts, and floods with greater confidence.</li> </ul>
<b>Municipal Solid Waste (MSW)</b>	<p><b>Municipal Solid Waste (MSW)</b> refers to the everyday waste generated from <b>households, businesses, institutions, and some non-hazardous industrial activities</b>. It includes a wide variety of materials such as <b>food scraps, packaging, paper, plastics, glass, metals, textiles, and garden waste</b>. Increasing urbanization and consumption patterns have led to <b>higher MSW generation</b>, posing challenges like <b>landfill overflow, pollution, and greenhouse gas emissions</b>. Generally, MSW sent to municipal landfills for disposal, proper MSW management is crucial for environmental sustainability, public health, and resource conservation.</p>
<b>Nano</b>	<p>The term "<b>Nano</b>" originates from the <b>Greek word "nanos," meaning "dwarf"</b> and refers to the <b>nanometer (nm)</b>, which is <b>one-billionth of a meter (10<sup>-9</sup> m) or one hundred-thousandth of a millimeter</b>. To put this into perspective, a <b>human hair is approximately 80,000 to 100,000 nanometers wide</b>, and a <b>red blood cell is about 7,000 nm in diameter</b>. The nanoscale is the <b>dimension at which materials exhibit unique physical, chemical, and biological properties</b>, making it an essential field of study in <b>nanotechnology</b>.</p> <p><b>Applications of Nano in Science and Technology</b></p> <p>The nanoscale has revolutionized multiple fields, including:</p>

	<ul style="list-style-type: none"> <li>• <b>Nanotechnology:</b> Manipulating materials at the atomic and molecular level for advanced applications.</li> <li>• <b>Medicine:</b> Nano-based drug delivery systems for targeted therapy (e.g., cancer treatment).</li> <li>• <b>Electronics:</b> Development of nanoscale transistors and chips for high-performance computing.</li> <li>• <b>Energy:</b> Enhancing solar cell efficiency and battery performance using nanomaterials.</li> <li>• <b>Environmental Science:</b> Nano-filters for water purification and air pollution control.</li> </ul>
<b>National (Nepal) Biodiversity Strategy</b>	<p>The <b>Nepal Biodiversity Strategy (NBS)</b> is a <b>comprehensive national framework</b> developed to conserve, sustainably use, and equitably share the benefits of <b>Nepal's rich biodiversity</b>. Formulated under the <b>Biodiversity Conservation Project</b> of the <b>Ministry of Forests and Soil Conservation (MFSC)</b>, the strategy aligns with Nepal's commitments to <b>global biodiversity conservation efforts</b>. It is supported by the <b>Global Environment Facility (GEF)</b> and the <b>United Nations Development Programme (UNDP)</b>.</p> <p>The development of the <b>NBS</b> is the result of significant contributions and support from numerous <b>scientists, policymakers, and organizations</b> who willingly shared their expertise and data. This strategy document reflects the <b>collective efforts</b> of various <b>government agencies, non-governmental organizations, and individual stakeholders</b>, demonstrating a collaborative approach to biodiversity conservation.</p> <p>Nepal's <b>diverse landscapes</b>, from the <b>Himalayan mountains</b> to the <b>Terai plains</b>, host <b>globally significant biodiversity</b>. The strategy provides a <b>long-term vision</b> for conservation while ensuring sustainable livelihoods for <b>communities dependent on natural resources</b>. The <b>NBS serves as a guiding document</b> for biodiversity-related policies and projects, strengthening Nepal's environmental commitments on both <b>national and international levels</b>.</p>
<b>National Accounting System</b>	<p>The <b>National Accounting System (NAS)</b> refers to a structured framework used by governments and statistical agencies to <b>measure, record, and analyze</b> a country's overall <b>economic activities</b>. It provides a <b>comprehensive and consistent set of accounts</b> that reflect the economic performance of a nation, often referred to as <b>social accounts</b> when incorporating broader societal aspects. NAS serves as the foundation for understanding <b>national income, production, consumption, investment, and trade flows</b>.</p> <p><b>Components of the National Accounting System</b></p> <ol style="list-style-type: none"> <li>1. <b>Gross Domestic Product (GDP):</b> The total value of goods and services produced within a country.</li> <li>2. <b>Gross National Income (GNI):</b> GDP plus net income received from abroad.</li> <li>3. <b>Household and Business Accounts:</b> Measuring consumption, savings, and investments.</li> <li>4. <b>Government Accounts:</b> Tracking public sector revenues and expenditures.</li> <li>5. <b>External Sector Accounts:</b> Recording trade balance, foreign investments, and remittances.</li> </ol>

<b>National Action Plan</b>	<p>A <b>National Action Plan (NAP)</b> is a <b>comprehensive policy document</b> developed by a government to outline a structured approach for addressing <b>pressing national issues</b> related to <b>human development, economic growth, environmental sustainability, and social challenges</b>. The plan provides <b>clear objectives, strategies, and implementation mechanisms</b> to guide national efforts in tackling specific problems.</p> <p>A <b>National Action Plan</b> serves as a <b>strategic blueprint</b> for a country's progress, providing a <b>structured, goal-oriented, and inclusive approach</b> to addressing national challenges. Its success depends on <b>effective implementation, stakeholder collaboration, and continuous monitoring</b>, ensuring sustainable and impactful outcomes. It helps countries align their strategies with <b>global commitments</b>, such as the <b>United Nations Sustainable Development Goals (SDGs)</b> and international environmental agreements.</p>
<b>National Programmes of Action (NAPAs)</b>	<p><b>National Adaptation Programmes of Action (NAPAs)</b> are <b>policy documents</b> developed by <b>Least Developed Countries (LDCs)</b> to identify and prioritize <b>urgent and immediate actions</b> needed to adapt to the <b>adverse effects of climate change</b>. These programs focus on <b>short-term, high-priority adaptation measures</b>, particularly in <b>vulnerable sectors such as agriculture, water resources, coastal management, and disaster risk reduction</b>. NAPAs are submitted to the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> and presented to <b>international donors</b> for financial and technical support to start adapting to current and projected adverse effects of climate change.</p> <p><b>Purpose and Objectives of NAPAs</b></p> <ul style="list-style-type: none"> <li>• <b>Identify and prioritize adaptation needs</b> that require urgent attention.</li> <li>• <b>Enhance climate resilience</b> in LDCs with minimal resources.</li> <li>• <b>Support communities dependent on climate-sensitive sectors</b> such as agriculture, fisheries, and forestry.</li> <li>• <b>Facilitate access to international funding</b> for climate adaptation projects.</li> <li>• <b>Strengthen institutional capacities</b> for long-term adaptation planning.</li> </ul>
<b>National Communication</b>	<p>A <b>National Communication (NC)</b> is an official document submitted by countries under the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> and its related agreements, such as the <b>Kyoto Protocol</b> and the <b>Paris Agreement</b>. It serves as a <b>comprehensive report</b> on the actions taken by a country to address <b>climate change</b>, including efforts to <b>reduce greenhouse gas (GHG) emissions, adapt to climate impacts, and implement climate policies</b>. The NC serves as a key mechanism for transparency and international cooperation in tackling climate change.</p> <p><b>Who Submits National Communications?</b></p> <p>All <b>Parties to the UNFCCC</b> are required to submit NCs, but the frequency and content differ based on their classification:</p> <ul style="list-style-type: none"> <li>• <b>Annex I Countries</b> (developed nations and economies in transition) submit NCs every <b>four years</b>.</li> </ul>

		<ul style="list-style-type: none"> <li>• <b>Non-Annex I Countries</b> (developing nations) submit NCs based on support received from developed countries, usually every <b>four to five years</b>.</li> </ul> <p><b>India's National Communication</b></p> <p>India, as a <b>non-annex I</b> country, has submitted three NCs to the UNFCCC:</p> <ol style="list-style-type: none"> <li>1. <b>First National Communication (2004)</b></li> <li>2. <b>Second National Communication (2012)</b></li> <li>3. <b>Third National Communication (2023)</b></li> </ol> <p>The preparation of India's NC is coordinated by the <b>Ministry of Environment, Forest and Climate Change (MoEFCC)</b>, with technical support from various institutions. It plays a crucial role in showcasing India's climate strategies, particularly its commitment to the <b>Paris Agreement</b> and its <b>Nationally Determined Contributions (NDCs)</b>.</p>
<b>National Strategy</b>	<b>Conservation</b>	<p>The <b>National Conservation Strategy</b> serves as a fundamental framework for integrating environmental considerations into a nation's economic and social development processes. The National Conservation Strategy is formulated to establish guidelines that seamlessly integrate environmental considerations into the core of our national development and daily life. It reflects our commitment to realigning policies and actions in harmony with environmental sustainability.</p> <p>It aims to ensure that environmental sustainability is not treated as an isolated concern but rather as an essential component of national planning and decision-making.</p> <p>The National Conservation Strategy is an expression of a nation's commitment to <b>reorienting policies and actions</b> in alignment with environmental sustainability. It seeks to create a roadmap for <b>equitable and sustainable growth</b>, ensuring that future generations inherit a resilient and thriving environment.</p>
<b>National Disaster Risk Reduction</b>	<b>Platform for</b>	<p>A <b>national platform for disaster risk reduction</b> is a multi-sectoral and interdisciplinary coordination mechanism that provides policy guidance on disaster resilience. It serves as a key mechanism for integrating <b>environmental sustainability and climate change adaptation</b> into national disaster risk management strategies. It involves the participation of <b>public, private, and civil society stakeholders</b>, ensuring collaboration among all relevant entities within a country. Effective disaster risk reduction (DRR) relies on the <b>knowledge, capacities, and contributions of various sectors and organizations</b>, including, where applicable, <b>United Nations agencies operating at the national level</b>. Since most sectors are directly or indirectly impacted by disasters and many holds specific responsibilities related to risk management, national platforms serve as a crucial framework for strengthening disaster resilience. These platforms play a key role in <b>enhancing national efforts to reduce disaster risks</b> and act as the primary mechanism for implementing the <b>International Strategy for Disaster Reduction (ISDR)</b>.</p>

<b>National Sovereignty</b>	<p><b>National sovereignty</b> refers to a nation’s supreme authority over its <b>natural resources, environmental policies, and climate action strategies</b> within its territorial boundaries. It encompasses the right of a country to make independent decisions regarding <b>environmental governance, climate adaptation, and sustainable development</b>, while also balancing international commitments.</p> <p>In the era of <b>climate change and environmental challenges</b>, <b>national sovereignty</b> plays a pivotal role in shaping policies that balance <b>economic development, ecological integrity, and international climate commitments</b> while upholding the autonomy of nations in decision-making.</p>
<b>National Target Programme (NTP)</b>	<p>The <b>National Target Programme (NTP)</b> is Viet Nam’s key policy framework addressing <b>climate change impacts and risks</b>, outlining <b>priority actions</b> to enhance national resilience and sustainability. It serves as a strategic roadmap for integrating <b>climate adaptation, mitigation, and disaster risk reduction</b> into national development planning.</p> <p>The <b>NTP serves as Viet Nam’s blueprint</b> for building <b>climate resilience, reducing greenhouse gas emissions, and safeguarding ecosystems</b>, ensuring a sustainable and adaptive future.</p>
<b>Nationally Appropriate Mitigation Action</b>	<p><b>Nationally Appropriate Mitigation Action (NAMA)</b> refers to a set of <b>policies and measures</b> that countries implement to <b>reduce greenhouse gas (GHG) emissions</b>, aligning with their national priorities and capacities. It acknowledges that <b>climate action should be equitable and tailored to each country's socio-economic context</b>, following the principle of <b>Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC)</b>. It also highlights the importance of <b>financial support from developed nations</b> to assist <b>developing countries in reducing emissions</b> and transitioning to low-carbon economies.</p> <p><b>NAMA serves as a critical mechanism</b> for advancing <b>climate mitigation efforts</b>, ensuring that <b>developing nations receive the necessary support</b> while transitioning toward <b>sustainable and low-carbon economies</b>.</p>
<b>Nationally Determined Contributions (NDCs)</b>	<p>As part of the <b>2015 Paris Agreement</b>, countries are required to develop and submit their <b>national plans</b> outlining efforts to <b>reduce greenhouse gas emissions and enhance climate resilience</b>. These commitments, known as <b>Nationally Determined Contributions (NDCs)</b>, serve as the foundation for global climate action.</p> <p><b>Key Aspects:</b></p> <ul style="list-style-type: none"> <li>• <b>Emission Reduction and Climate Adaptation Plans</b> – Each country outlines specific <b>mitigation and adaptation strategies</b> tailored to its national priorities.</li> <li>• <b>Five-Year Update Cycle</b> – NDCs are submitted <b>every five years</b>, with each successive submission expected to be <b>more ambitious</b> than the previous one, following the <b>“ratchet mechanism.”</b></li> <li>• <b>Collective Global Effort</b> – The combined implementation of NDCs contributes to <b>limiting global temperature rise</b> and reducing the severity of <b>climate change impacts</b>.</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Alignment with Long-Term Goals</b> – Supports the global objective of <b>keeping temperature rise well below 2°C</b>, with efforts to limit it to <b>1.5°C above pre-industrial levels</b>.</li> </ul>
<b>Natural Capital</b>	<p><b>Natural capital</b> refers to the <b>stock of natural resources and ecosystems</b> that provide essential goods and services necessary for livelihood, human well-being, economic growth, and environmental sustainability. These resources include <b>land, water, air, biodiversity, forests, wildlife, minerals, and other environmental assets</b> that sustain life and support livelihoods. <b>Natural capital is the foundation of all life and economic systems.</b></p>
<b>Natural Disaster</b>	<p>A <b>natural disaster</b> occurs when a <b>natural hazard</b>—such as a <b>flood, cyclone, hurricane, drought, wildfire, earthquake, volcanic eruption, or landslide</b>—results in <b>significant environmental, financial, and human losses</b>. The severity of the impact depends on the <b>vulnerability and resilience</b> of the affected population and ecosystem. This concept is summarized by the principle: <b>“Disasters occur when hazards meet vulnerability.”</b> A <b>natural hazard alone does not become a disaster</b> unless it affects communities, infrastructure, or ecosystems that lack the capacity to withstand its impact. For example, a <b>strong earthquake in an uninhabited area</b> does not lead to a disaster, whereas the same event in a densely populated region can have devastating consequences.</p> <p><b>Key Factors Influencing Natural Disasters:</b></p> <ul style="list-style-type: none"> <li>• <b>Vulnerability:</b> The degree to which people, infrastructure, and ecosystems are at risk.</li> <li>• <b>Resilience:</b> The ability to prepare for, withstand, and recover from disasters.</li> <li>• <b>Climate Change Link:</b> Rising global temperatures are increasing the <b>frequency and intensity of extreme weather events</b>, making disaster risk reduction essential.</li> </ul>
<b>Natural Ecosystem</b>	<p>A <b>natural ecosystem</b> is a <b>self-sustaining biological system</b> where <b>living organisms (plants, animals, and microorganisms)</b> interact with their <b>non-living environment</b>, including <b>air, water, soil, and sunlight</b>. It functions as a balanced unit, where <b>biotic (living) and abiotic (non-living) components</b> work together to sustain life and maintain ecological stability.</p> <p><b>Natural ecosystems play a critical role in climate regulation</b> by <b>absorbing carbon dioxide, maintaining water cycles, and protecting biodiversity</b>. Preserving them is essential for <b>climate resilience, disaster risk reduction, and sustainable development</b>.</p> <p><b>Examples of Natural Ecosystems:</b></p> <ul style="list-style-type: none"> <li>• <b>Forests</b> – Provide oxygen, store carbon, and support diverse wildlife.</li> <li>• <b>Wetlands</b> – Act as natural water filters and flood buffers.</li> <li>• <b>Oceans</b> – Regulate climate and support marine biodiversity.</li> <li>• <b>Grasslands</b> – Preserve soil health and sustain herbivorous species.</li> </ul>

<b>Natural Gas</b>	<p><b>Natural gas</b> is a <b>hydrocarbon-based fossil fuel</b> found in <b>underground reservoirs</b>, composed primarily of <b>methane (CH<sub>4</sub>) (50–90%)</b>, along with smaller amounts of 0-20% <b>heavier hydrocarbons</b> such as <b>ethane, propane (C<sub>3</sub>H<sub>8</sub>) and butane (C<sub>4</sub>H<sub>10</sub>)</b>. It is a <b>cleaner-burning energy source</b> compared to coal and oil, widely used for <b>electricity generation, heating, and industrial processes</b>.</p> <p><b>Formation and Extraction:</b></p> <p>Natural gas is found in <b>underground reservoirs</b>, often trapped within <b>porous rock formations</b> or alongside oil deposits. It is extracted through <b>drilling and hydraulic fracturing (fracking)</b> and can be processed into different forms, including <b>Liquefied Natural Gas (LNG) and Compressed Natural Gas (CNG)</b> for storage and transport and it serves as a key energy source for <b>electricity generation, heating, cooking, and industrial applications</b>.</p>
<b>Natural Hazard</b>	<p>A <b>natural hazard</b> is a <b>natural process or event</b> that has the potential to cause <b>loss of life, injury, property damage, economic disruption, and environmental degradation</b>. These hazards include <b>earthquakes, hurricanes, floods, droughts, wildfires, and landslides</b>.</p> <p>Natural hazards vary in <b>magnitude, intensity, speed of onset, duration, and geographic extent</b>. Some, like <b>earthquakes and tsunamis</b>, occur suddenly and affect localized areas, while others, such as <b>droughts and desertification</b>, develop gradually and impact larger regions. Hazards can also be <b>interconnected</b>, such as <b>hurricanes triggering floods or earthquakes causing tsunamis</b>.</p> <p><b>Examples of Natural Hazards:</b></p> <ul style="list-style-type: none"> <li>• <b>Geophysical Hazards:</b> Earthquakes, volcanic eruptions, landslides.</li> <li>• <b>Meteorological Hazards:</b> Hurricanes, tornadoes, extreme heat.</li> <li>• <b>Hydrological Hazards:</b> Floods, tsunamis, storm surges.</li> <li>• <b>Climatological Hazards:</b> Droughts, wildfires, glacial retreat.</li> <li>• <b>Biological Hazards:</b> Pandemics, locust infestations.</li> </ul> <p>With <b>climate change</b>, the <b>frequency and intensity</b> of many natural hazards are increasing. Rising temperatures contribute to <b>stronger storms, prolonged droughts, and sea-level rise</b>, heightening disaster risks.</p> <p>Mitigating natural hazards requires <b>early warning systems, climate adaptation strategies, resilient infrastructure, and sustainable land-use planning</b> to <b>reduce vulnerability and protect communities and ecosystems</b>.</p>
<b>Natural Regeneration</b>	<p><b>Natural regeneration</b> is a <b>self-sustaining ecological process</b> in which vegetation <b>recolonizes degraded or deforested land</b>, restoring ecosystems without direct human intervention. Through <b>natural succession</b>, plant species gradually establish themselves, improving <b>soil fertility, carbon sequestration, and biodiversity recovery</b>.</p> <p><b>Key Environmental and Climate Benefits:</b></p>



	<ul style="list-style-type: none"> <li>• <b>Carbon Sequestration:</b> Naturally regenerating forests <b>absorb atmospheric CO<sub>2</sub></b>, helping <b>mitigate climate change</b>.</li> <li>• <b>Biodiversity Conservation:</b> Restores <b>habitats for wildlife</b>, promoting <b>ecosystem resilience</b>.</li> <li>• <b>Soil and Water Protection:</b> Reduces <b>soil erosion</b>, enhances <b>water retention</b>, and prevents <b>land degradation</b>.</li> <li>• <b>Climate Adaptation:</b> Strengthens <b>ecosystem resilience</b> against <b>droughts, extreme temperatures, and shifting rainfall patterns</b>.</li> </ul> <p>Encouraging <b>natural regeneration</b> through <b>sustainable land management, rewilding efforts, and community-led conservation</b> is a <b>cost-effective climate solution</b> that supports <b>global reforestation and land restoration goals</b>.</p>
<b>Natural Variability</b>	<p><b>Natural variability</b> refers to <b>fluctuations in the climate system</b> over different <b>time and spatial scales</b>, beyond individual weather events. These variations affect <b>temperature, precipitation patterns, and extreme weather occurrences</b> and are driven by <b>internal climate processes</b> and <b>external influences</b>.</p> <p><b>Internal climate system processes</b>, such as <b>El Niño and La Niña</b>, alter global weather patterns, influencing <b>ocean temperatures, monsoons, and drought cycles</b>. <b>External factors</b>, including <b>volcanic eruptions and solar radiation variations</b>, also contribute to natural shifts in climate.</p> <p>While <b>natural variability</b> has always influenced climate patterns, <b>human-induced climate change is amplifying extreme weather events and disrupting historical climate cycles</b>. Understanding <b>natural climate fluctuations</b> is crucial for distinguishing <b>long-term anthropogenic climate trends</b> from <b>short-term natural shifts</b>, aiding in <b>climate modelling, adaptation, and mitigation efforts</b>.</p>
<b>Nature-based solutions</b>	<p><b>Nature-based solutions (NbS)</b> leverage <b>ecosystem protection, conservation, and restoration</b> to <b>mitigate climate change, enhance adaptation, and reduce loss and damage</b>. The <b>International Union for Conservation of Nature (IUCN)</b> defines NbS as <b>actions that protect, manage, and restore natural or modified ecosystems to address societal challenges while promoting human well-being and biodiversity</b>. Examples include <b>wildlife and marine conservation, ecosystem restoration, blue carbon initiatives, and reforestation efforts</b>.</p> <p>In a climate context, NbS play a crucial role in <b>carbon sequestration and climate adaptation</b>. These solutions focus on safeguarding <b>biodiversity, key ecosystems, and natural carbon sinks</b> to build <b>climate resilience</b> while benefiting both people and nature. For instance, <b>mangrove forests</b> not only act as <b>carbon sinks</b> but also <b>shield coastal communities from storm surges and erosion</b>. By integrating NbS into climate policies, countries can achieve <b>sustainable development, disaster risk reduction, and ecosystem resilience</b>.</p>
<b>Nested Approach</b>	<p>The <b>nested approach</b> is a <b>flexible mechanism to reduce emissions from deforestation and forest degradation (REDD+)</b>, integrating <b>both national and sub-national efforts</b>. This approach allows <b>forest conservation projects</b> to operate at the <b>sub-national level</b>, while aligning with broader <b>national climate policies</b> to ensure consistency in <b>carbon accounting and crediting</b>.</p> <p><b>Key Features of the Nested Approach:</b></p> <ul style="list-style-type: none"> <li>• <b>Hybrid Structure</b> – Combines <b>national and sub-national approaches</b> to address deforestation.</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Mandatory Transition</b> – Requires eventual <b>integration into a national framework</b>, ensuring <b>long-term sustainability</b>.</li> <li>• <b>Dual-Level Accounting</b> – Enables <b>carbon crediting at both national and sub-national levels</b>, ensuring <b>transparent emission reductions</b>.</li> <li>• <b>Climate Change Mitigation</b> – Supports <b>carbon sequestration and forest conservation</b>, contributing to <b>global climate goals</b>.</li> </ul> <p>By balancing <b>local project incentives</b> with <b>national climate commitments</b>, the <b>nested approach strengthens REDD+ implementation</b>, <b>enhances forest governance</b>, and <b>promotes sustainable land-use practices</b>.</p>
<b>Net Biome Production</b>	<p><b>Net Biome Production (NBP)</b> represents the <b>net carbon balance</b> of a region, accounting for both <b>carbon uptake and losses</b>. It is calculated as <b>Net Ecosystem Production (NEP)</b> minus <b>carbon losses</b> resulting from <b>disturbances</b> such as <b>wildfires, deforestation, and land-use changes</b>.</p> <p><b>Key Climate and Environmental Relevance:</b></p> <ul style="list-style-type: none"> <li>• <b>Indicator of Carbon Sequestration:</b> A <b>positive NBP</b> indicates that an ecosystem is a <b>carbon sink</b>, absorbing more CO<sub>2</sub> than it emits, while a <b>negative NBP</b> signifies a <b>carbon source</b>, contributing to atmospheric emissions.</li> <li>• <b>Impact of Disturbances:</b> Events like <b>forest fires, logging, and land degradation</b> reduce NBP, weakening an ecosystem's ability to store carbon.</li> <li>• <b>Role in Climate Mitigation:</b> Enhancing <b>Forest conservation, afforestation, and land restoration</b> improves NBP, supporting <b>climate goals and carbon neutrality efforts</b>.</li> </ul> <p>Monitoring <b>NBP trends</b> is crucial for understanding <b>ecosystem resilience, carbon cycle dynamics, and the effectiveness of climate mitigation strategies</b>.</p>
<b>Net Carbon Dioxide Emissions</b>	<p><b>Net carbon dioxide (CO<sub>2</sub>) emissions</b> refer to the <b>balance between CO<sub>2</sub> released into the atmosphere (sources) and CO<sub>2</sub> absorbed by natural and artificial sinks</b> over a specific period and region. <b>Sources</b> include <b>fossil fuel combustion, deforestation, and industrial activities</b>, while <b>sinks</b> encompass <b>forests, oceans, and carbon capture technologies</b>.</p> <p>Reducing <b>net CO<sub>2</sub> emissions</b> is critical for <b>climate change mitigation</b>, as excess atmospheric CO<sub>2</sub> contributes to <b>global warming and extreme weather events</b>. Achieving <b>carbon neutrality</b> requires enhancing <b>carbon sequestration</b> through <b>reforestation, soil conservation, and carbon capture technologies</b>, while simultaneously <b>reducing emissions from human activities</b>. Monitoring and managing <b>net CO<sub>2</sub> emissions</b> is essential for meeting <b>global climate targets</b> such as those set by the <b>Paris Agreement</b>.</p>
<b>Net Ecosystem Production (NEP):</b>	<p><b>Net Ecosystem Production (NEP)</b> represents the <b>net carbon balance of an ecosystem</b>, indicating whether it functions as a <b>carbon sink or source</b>. It is calculated as the <b>difference between Net Primary Production (NPP) and carbon losses from heterotrophic respiration</b>—the process by which microbes and decomposers release CO<sub>2</sub> into the atmosphere.</p>

	<p>A <b>positive NEP</b> means the ecosystem <b>absorbs more CO<sub>2</sub> than it emits</b>, contributing to <b>carbon sequestration and climate change mitigation</b>. Conversely, a <b>negative NEP</b> indicates that the ecosystem <b>releases more CO<sub>2</sub></b>, often due to <b>deforestation, soil degradation, or climate-driven disturbances</b>. Enhancing <b>NEP through afforestation, soil conservation, and ecosystem restoration</b> is crucial for strengthening <b>carbon sinks and achieving global climate goals</b>.</p>
<b>Net Emission</b>	<p><b>Net emission</b> refers to the <b>total amount of a substance released into the environment</b>, considering both its <b>sources and sinks</b>. In the context of <b>climate change</b>, it primarily relates to <b>greenhouse gas (GHG) emissions</b>, such as <b>carbon dioxide (CO<sub>2</sub>)</b>, <b>methane (CH<sub>4</sub>)</b>, and <b>nitrous oxide (N<sub>2</sub>O)</b>, released from <b>fossil fuel combustion, industrial activities, and deforestation</b>.</p> <p>The concept of <b>net emissions</b> acknowledges that while emissions are generated, they can also be counteracted by <b>carbon sinks</b>—natural systems like <b>forests, wetlands, and oceans</b>, as well as technological solutions such as <b>carbon capture, utilization, and storage (CCUS)</b>. When the <b>amount of GHGs removed from the atmosphere equals the amount emitted</b>, a state of <b>net-zero emissions</b> is achieved, which is essential for <b>climate stabilization</b>.</p> <p>Reducing <b>net emissions</b> is critical for <b>limiting global warming and mitigating climate change impacts</b>. Strategies such as <b>renewable energy adoption, afforestation, and carbon sequestration</b> play a key role in achieving <b>net-zero emissions</b>, a fundamental goal of the <b>Paris Agreement and global climate action</b>.</p> <p><b>How to Calculate Net Emissions</b></p> <p>Net emissions are calculated by determining the <b>total greenhouse gas (GHG) emissions</b> from various sources and subtracting the <b>amount removed or offset</b> by natural or artificial carbon sinks. The formula can be expressed as:</p> <p>Net Emissions = Total Emissions – Total Removals</p> <p>Total Emissions = Scope 1 + Scope 2 + Scope 3</p> <p>Total Removals = Carbon Sequestration + Technological Offsets</p>
<b>Net Primary Production (NPP)</b>	<p><b>Net Primary Production (NPP)</b> measures the <b>net accumulation of carbon or plant biomass</b> within an ecosystem over a given period. It represents the amount of <b>carbon absorbed through photosynthesis</b> that remains available for <b>plant growth, soil carbon storage, and food webs</b>, after accounting for <b>carbon losses through autotrophic respiration</b>—the process by which plants release CO<sub>2</sub> during metabolism.</p> <p>NPP is a key indicator of <b>ecosystem productivity and carbon sequestration</b>, influencing <b>global carbon cycles and climate regulation</b>. Higher NPP levels enhance <b>carbon sinks</b>, helping to <b>mitigate climate change</b> by reducing atmospheric CO<sub>2</sub>. However, factors such as <b>deforestation, land degradation, and climate stressors (e.g., rising temperatures, droughts)</b> can reduce NPP, weakening an ecosystem’s ability to store carbon. Promoting <b>sustainable land-use practices, afforestation, and biodiversity conservation</b> can enhance NPP, supporting <b>climate resilience and ecosystem sustainability</b>.</p>

<b>Net zero</b>	<p><b>Net zero</b> refers to a state where the <b>total greenhouse gas (GHG) emissions</b> released into the atmosphere are <b>balanced by the amount removed</b>, achieving <b>climate neutrality</b>. This balance is essential for <b>limiting global warming and mitigating climate change impacts</b>.</p> <p>In <b>2018</b>, the <b>Intergovernmental Panel on Climate Change (IPCC)</b> emphasized that achieving <b>net zero by 2050</b> is <b>crucial</b> to keeping global temperature rise below <b>1.5°C</b>, in line with the <b>Paris Agreement</b>. According to a report by <b>Net Zero Tracker</b>, around <b>128 countries and territories</b>, including <b>the UK, the United States, India, and China</b>, have committed to <b>net-zero targets</b>. Additionally, <b>more than one-third of the world's largest public companies</b> have pledged to achieve <b>net zero</b>.</p> <p>However, <b>many governments and corporations</b> have been criticized for <b>lacking clear and actionable pathways</b> to meet their targets. Achieving <b>true net zero</b> requires <b>rapid emissions reductions, enhanced carbon sequestration, and robust climate policies</b> to ensure meaningful progress toward a <b>sustainable, low-carbon future</b>.</p>
<b>Nitrogen Cycle</b>	<p>The <b>nitrogen cycle</b> is the <b>natural circulation of nitrogen</b> among the <b>atmosphere, soil, water, plants, animals, and microorganisms</b>. It plays a crucial role in <b>ecosystem functioning, soil fertility, and agricultural productivity</b>. Throughout the cycle, nitrogen transforms into different <b>chemical forms</b>, including <b>nitrous oxide (N<sub>2</sub>O)</b> and <b>nitrogen oxides (NO<sub>x</sub>)</b>, which have significant <b>climate and environmental impacts</b>.</p> <ul style="list-style-type: none"> <li>• <b>Nitrous oxide (N<sub>2</sub>O)</b> is a <b>potent greenhouse gas</b>, contributing to <b>global warming and ozone depletion</b>.</li> <li>• <b>Nitrogen oxides (NO<sub>x</sub>)</b> contribute to <b>air pollution</b>, leading to <b>smog formation and acid rain</b>, which harms ecosystems and human health.</li> <li>• <b>Human activities, such as industrial agriculture, fossil fuel combustion, and deforestation, disrupt the nitrogen cycle</b>, increasing nitrogen pollution in air and water.</li> </ul> <p>Enhancing <b>sustainable agricultural practices, reducing fertilizer overuse, and improving nitrogen management</b> can help <b>mitigate climate change impacts and protect environmental health</b>.</p>
<b>Nitrogen Oxide (NO<sub>x</sub>)</b>	<p><b>Nitrogen oxides (NO<sub>x</sub>)</b> are <b>air pollutants and potent greenhouse gases</b> that include <b>nitric oxide (NO)</b> and <b>nitrogen dioxide (NO<sub>2</sub>)</b>. These gases are primarily released from <b>vehicle exhaust, industrial emissions, and power plants</b>.</p> <ul style="list-style-type: none"> <li>• <b>NO<sub>2</sub></b> is a <b>major contributor to air pollution</b>, leading to the formation of <b>photochemical smog (ozone)</b>, which <b>reduces air quality and visibility</b>.</li> <li>• It has a <b>global warming potential (GWP) 298 times higher than CO<sub>2</sub> over a 100-year period</b>, making it a <b>significant climate forcer</b>.</li> <li>• <b>Exposure to NO<sub>2</sub> poses severe health risks</b>, including <b>respiratory diseases, cardiovascular issues, and lung inflammation</b>.</li> <li>• <b>NO<sub>x</sub> emissions contribute to acid rain</b>, which <b>damages ecosystems, soil fertility, and water quality</b>.</li> </ul> <p><b>Reducing NO<sub>x</sub> emissions</b> through <b>clean energy adoption, stricter vehicle emission standards, and improved industrial processes</b> is essential for <b>climate change mitigation and public health protection</b>.</p>

<b>Nitrous Oxide (N<sub>2</sub>O)</b>	<p><b>Nitrous oxide (N<sub>2</sub>O)</b> is a <b>potent greenhouse gas</b> and a <b>major contributor to climate change and stratospheric ozone depletion</b>. It has a <b>global warming potential (GWP) 298 times higher than carbon dioxide (CO<sub>2</sub>) over a 100-year period</b>, making it one of the <b>six greenhouse gases regulated under the Kyoto Protocol</b>.</p> <ul style="list-style-type: none"> <li>• <b>Key sources of N<sub>2</sub>O emissions</b> include <b>agriculture (nitrogen fertilizers, livestock waste), fossil fuel combustion, biomass burning, and industrial processes (e.g., nitric acid production)</b>.</li> <li>• <b>Natural emissions</b> arise from <b>microbial activity in soils and oceans</b>, where bacteria break down nitrogen compounds.</li> <li>• <b>N<sub>2</sub>O contributes to ozone layer depletion</b>, impacting global climate regulation.</li> <li>• It is <b>primarily removed from the atmosphere through chemical reactions in the stratosphere</b> and by <b>soil bacteria</b> in specific conditions.</li> </ul> <p><b>Reducing N<sub>2</sub>O emissions</b> requires <b>sustainable agricultural practices, optimized fertilizer use, improved waste management, and cleaner energy solutions to mitigate climate change and protect the ozone layer</b>.</p>
<b>No Regrets Options</b>	<p><b>No regrets options</b> refer to <b>technologies and strategies that reduce greenhouse gas (GHG) emissions while offering additional economic, environmental, or social benefits</b>, making them <b>worth implementing regardless of climate policies</b>. These solutions improve <b>energy efficiency, lower costs, and enhance sustainability</b>, ensuring a <b>win-win approach</b> for both climate action and economic growth.</p> <ul style="list-style-type: none"> <li>• They provide <b>immediate benefits</b> beyond emissions reduction, such as <b>lower energy costs, improved air quality, and enhanced energy security</b>.</li> <li>• An example is <b>Combined-Cycle Gas Turbines (CCGTs)</b>, which <b>increase power plant efficiency by up to 70%</b> by utilizing both <b>steam and gas turbines</b> for electricity generation.</li> <li>• <b>No regrets strategies can drive industrial innovation</b>, making businesses more competitive while supporting <b>long-term climate resilience</b>.</li> </ul> <p><b>Investing in no regrets options</b> accelerates the <b>transition to a low-carbon economy</b> while delivering <b>economic and environmental advantages</b>, even in the absence of strict climate regulations.</p>
<b>No regrets policy</b>	<p><b>No regrets policy</b> refers to a <b>strategy or policy that delivers net social and economic benefits regardless of the extent of climate change impacts</b>. These policies are designed to <b>enhance sustainability, resilience, and economic efficiency</b>, making them <b>valuable investments even in the absence of climate-related regulations</b>.</p> <ul style="list-style-type: none"> <li>• Such policies focus on measures that <b>improve energy efficiency, reduce pollution, and promote sustainable resource management</b>, benefiting both the economy and the environment.</li> </ul>

		<ul style="list-style-type: none"> <li>• Examples include investments in renewable energy, water conservation, afforestation, and disaster preparedness, all of which support long-term resilience while driving economic growth.</li> <li>• No regrets policies help reduce vulnerability to climate change while enhancing public health, job creation, and energy security.</li> </ul> <p>By adopting <b>no regrets policies</b>, governments and businesses can <b>proactively address climate challenges while ensuring immediate and long-term benefits for society and the economy.</b></p>
<b>Non-Annex B Countries /Parties</b>		<p><b>Non-Annex B countries/parties</b> refer to nations that are not listed under Annex B of the Kyoto Protocol, meaning they <b>do not have binding greenhouse gas (GHG) reduction targets</b> under this agreement. These countries, primarily <b>developing nations</b>, play a crucial role in <b>global climate action through voluntary mitigation efforts, adaptation strategies, and participation in international climate mechanisms.</b></p> <ul style="list-style-type: none"> <li>• Unlike Annex B countries, <b>Non-Annex B nations are not obligated to specific emission reduction targets</b> but are encouraged to adopt <b>low-carbon development strategies.</b></li> <li>• They benefit from international climate finance, technology transfer, and capacity-building programs to support their sustainable development and climate resilience.</li> <li>• Many Non-Annex B countries participate in mechanisms like the Clean Development Mechanism (CDM) to contribute to <b>global emission reductions while fostering economic growth.</b></li> </ul> <p>Ensuring <b>climate justice and equity</b>, Non-Annex B nations advocate for <b>stronger financial and technological support from developed countries to strengthen their climate resilience and transition to sustainable economies.</b></p>
<b>Non-Annex Countries/Parties</b>	<b>I</b>	<p><b>Non-Annex I countries/parties</b> are nations that have ratified or acceded to the United Nations Framework Convention on Climate Change (UNFCCC) but are not listed under Annex I. These countries, primarily <b>developing nations</b>, have <b>no binding greenhouse gas (GHG) reduction targets</b> but are actively involved in <b>global climate action through mitigation, adaptation, and sustainable development efforts.</b></p> <ul style="list-style-type: none"> <li>• <b>Non-Annex I countries focus on climate adaptation and sustainable growth</b>, while receiving <b>financial, technological, and capacity-building support</b> from developed nations.</li> <li>• They contribute to global climate efforts through voluntary emission reduction strategies, such as <b>Nationally Determined Contributions (NDCs)</b>, the Clean Development Mechanism (CDM), and renewable energy initiatives.</li> <li>• These countries emphasize climate justice, advocating for stronger commitments from developed nations to support their climate resilience and low-carbon transition.</li> </ul> <p>Enhancing <b>international cooperation and equitable climate finance</b> is essential to help <b>Non-Annex I nations strengthen their climate action and achieve sustainable development goals.</b></p>

<b>Non-Conventional Energy</b>	<p><b>Non-conventional energy</b> refers to <b>renewable and alternative energy sources that serve as sustainable substitutes for fossil fuels</b>, playing a crucial role in <b>climate change mitigation and energy transition</b>. These sources include <b>solar, wind, tidal, hydrogen (produced via solar or nuclear routes), and fuel cell technology</b>.</p> <ul style="list-style-type: none"> <li>• <b>Non-conventional energy reduces dependence on fossil fuels</b>, lowering <b>greenhouse gas (GHG) emissions</b> and mitigating <b>global warming</b>.</li> <li>• <b>It enhances energy security by diversifying energy sources</b>, reducing reliance on imported fuels.</li> <li>• <b>Technologies like hydrogen storage, fuel cells, and tidal energy offer innovative solutions for clean energy generation and long-term sustainability</b>.</li> <li>• <b>Investments in non-conventional energy drive green jobs, economic growth, and environmental protection</b>, supporting the <b>global shift toward a low-carbon economy</b>.</li> </ul> <p>Accelerating the <b>adoption of non-conventional energy</b> is essential to achieving <b>net zero goals, energy resilience, and sustainable development worldwide</b>.</p>
<b>Non-Governmental Organization</b>	<p><b>Non-Governmental Organizations (NGOs)</b> are <b>independent, non-profit entities that operate outside institutionalized political structures</b> to advance <b>social, environmental, and climate-related objectives</b>. They play a crucial role in <b>global climate action, advocacy, and sustainable development</b>.</p> <ul style="list-style-type: none"> <li>• <b>Environmental NGOs work on climate change mitigation, conservation, pollution control, and community resilience</b> through policy advocacy, awareness campaigns, and grassroots initiatives.</li> <li>• <b>They bridge gaps between governments, businesses, and local communities</b>, ensuring <b>inclusive climate solutions and sustainable practices</b>.</li> <li>• <b>NGOs contribute to climate policy by engaging in global platforms like the UNFCCC</b>, influencing <b>climate negotiations and environmental governance</b>.</li> <li>• <b>Many NGOs focus on climate justice</b>, ensuring <b>vulnerable communities receive financial and technological support for adaptation and resilience-building</b>.</li> </ul>
<b>Non-linearity</b>	<p><b>Non-linearity</b> refers to <b>climate and environmental processes where the relationship between cause and effect is not proportional or predictable</b>. Small changes in one factor can <b>trigger disproportionate or unexpected impacts</b>, making climate systems <b>highly complex and sensitive</b>.</p> <ul style="list-style-type: none"> <li>• <b>Climate change exhibits non-linearity</b>, as <b>gradual increases in greenhouse gas emissions can lead to sudden and irreversible tipping points</b>, such as <b>ice sheet collapse or coral reef die-offs</b>.</li> </ul>

		<ul style="list-style-type: none"> <li>• <b>Ecosystem responses to environmental stressors are often non-linear</b>, meaning <b>minor disturbances can lead to drastic biodiversity loss or habitat shifts</b>.</li> </ul> <p>Understanding <b>non-linearity in climate systems</b> is crucial for <b>predicting extreme events, designing effective mitigation strategies, and ensuring long-term environmental resilience</b>.</p>
<b>Non-Market Impacts</b>		<p><b>Non-market impacts</b> refer to <b>environmental and climate-related effects that influence ecosystems and human well-being but are not directly measured through market transactions</b>. These impacts often involve <b>social, ecological, and health-related consequences</b> that lack a clear monetary value but are <b>critical for sustainability and climate resilience</b>.</p> <ul style="list-style-type: none"> <li>• <b>Examples include biodiversity loss, ecosystem degradation, air and water pollution, and climate-induced health risks</b> such as <b>heat stress, respiratory diseases, and increased mortality rates</b>.</li> <li>• <b>Rising temperatures, extreme weather events, and habitat destruction disrupt livelihoods and food security</b>, imposing significant social and environmental costs.</li> <li>• <b>Non-market impacts highlight the need for comprehensive climate policies</b> that consider <b>human and ecological well-being beyond economic metrics</b>.</li> </ul> <p>Addressing <b>non-market impacts</b> through <b>stronger environmental regulations, climate adaptation strategies, and ecosystem conservation</b> is essential for <b>building sustainable and resilient societies</b>.</p>
<b>Non-Methane Organic (NMVOCs)</b>	<b>Volatile Compounds</b>	<p><b>Non-Methane Volatile Organic Compounds (NMVOCs)</b> are <b>organic chemicals, excluding methane, that contribute to atmospheric photochemical reactions and air pollution</b>. They play a significant role in <b>climate change, air quality degradation, and ecosystem health</b>.</p> <ul style="list-style-type: none"> <li>• <b>NMVOCs originate from both natural and human-made sources</b>, including <b>vehicle emissions, industrial processes, solvent use, and biomass burning</b>.</li> <li>• <b>These compounds contribute to ground-level ozone (smog) formation</b>, which negatively impacts <b>air quality, human health, and plant productivity</b>.</li> <li>• Certain NMVOCs act as <b>precursors to secondary organic aerosols (SOAs)</b>, influencing <b>atmospheric chemistry and radiative forcing</b>, which affect <b>climate patterns</b>.</li> <li>• <b>Reducing NMVOC emissions through cleaner technologies, sustainable industrial practices, and stricter air quality regulations is crucial for mitigating climate change and improving environmental health</b>.</li> </ul> <p>Controlling <b>NMVOC emissions</b> is essential for <b>reducing air pollution, protecting ecosystems, and minimizing climate-related risks</b>.</p>



<b>Non-Structural Measures</b>	<p><b>Non-structural measures</b> refer to <b>strategies that do not involve physical construction but rely on policies, regulations, knowledge, and community engagement to reduce environmental and climate-related risks</b>. These measures play a crucial role in <b>enhancing resilience, disaster preparedness, and sustainable development</b>.</p> <ul style="list-style-type: none"> <li>• <b>Unlike structural measures</b> (e.g., dams, flood barriers, earthquake-resistant buildings), non-structural measures focus on governance, education, and public awareness to mitigate climate and disaster risks.</li> <li>• Examples include <b>building codes, land-use planning laws, early warning systems, risk assessments, and environmental policies</b> that promote <b>sustainable resource management</b>.</li> <li>• <b>Public awareness campaigns, capacity-building programs, and climate education initiatives empower communities to adapt to climate change and extreme weather events</b>.</li> <li>• <b>Effective implementation of non-structural measures strengthens climate resilience, ensuring long-term sustainability and risk reduction</b> in vulnerable regions.</li> </ul> <p>Integrating <b>non-structural approaches with structural solutions</b> is essential for <b>comprehensive climate adaptation and disaster risk management</b>.</p>
<b>Nuclear Energy</b>	<p><b>Nuclear energy</b> is a <b>key non-carbon energy source</b> that plays a significant role in <b>reducing greenhouse gas (GHG) emissions</b> while ensuring a <b>stable and large-scale energy supply</b>. It is generated through <b>nuclear fission</b>, where atomic nuclei split to release energy, producing <b>electricity without direct carbon emissions</b> making it an essential tool for <b>climate change mitigation</b>. Nuclear.</p> <p><b>Environmental &amp; Climate Benefits</b></p> <ul style="list-style-type: none"> <li>• <b>Low Carbon Footprint</b> – Unlike fossil fuels, <b>nuclear power plants do not emit CO<sub>2</sub> during electricity generation</b>, making them a <b>vital option for mitigating climate change</b>.</li> <li>• <b>High Energy Density</b> – A <b>small amount of uranium</b> can produce <b>large amounts of energy</b>, making nuclear power <b>highly efficient</b> compared to fossil fuels.</li> <li>• <b>Reliable &amp; Continuous Power Supply</b> – Unlike <b>solar or wind energy</b>, <b>nuclear power plants operate 24/7</b>, ensuring a <b>stable electricity grid</b> and <b>reducing dependence on intermittent renewables</b>.</li> </ul> <p>Many experts advocate for <b>nuclear energy as a transition technology</b> to help <b>reduce carbon emissions</b> while expanding <b>renewable energy infrastructure</b>. Advanced nuclear technologies, including <b>small modular reactors (SMRs) and fusion energy research</b>, aim to make <b>nuclear power safer, more efficient, and more sustainable</b> in the future.</p> <p>As the world moves towards <b>net-zero goals</b>, a <b>balanced approach integrating nuclear energy with renewable sources</b> could provide a <b>reliable and climate-friendly energy mix</b>.</p>

<b>Ocean Acidification</b>	<p><b>Ocean acidification</b> refers to the ongoing decrease in ocean pH levels due to the absorption of excess atmospheric carbon dioxide (CO<sub>2</sub>). <b>Ocean acidification</b> occurs as the oceans absorb approximately 30% of the carbon dioxide (CO<sub>2</sub>) released into the atmosphere, leading to chemical changes that increase seawater acidity. As atmospheric CO<sub>2</sub> levels rise, more of it dissolves in seawater, forming carbonic acid, which lowers ocean pH that disrupt marine ecosystems and biodiversity.</p> <ul style="list-style-type: none"> <li>• <b>Acidification weakens the ability of calcifying organisms, such as corals, molluscs, algae, and crustaceans, to build and maintain their shells and skeletons</b>, threatening marine food chains.</li> <li>• <b>Rising acidity affects the survival, growth, and reproduction of marine species</b>, impacting fisheries, coastal economies, and global food security.</li> <li>• <b>Ocean acidification also alters marine carbon cycles and reduces the ocean's capacity to absorb CO<sub>2</sub></b>, exacerbating climate change effects.</li> </ul> <p>Mitigating ocean acidification requires urgent action to reduce CO<sub>2</sub> emissions, promote marine conservation, and enhance ecosystem resilience to safeguard ocean health.</p>
<b>Organization for Economic Co-operation and Development (OECD) Countries</b>	<p>The <b>Organization for Economic Co-operation and Development (OECD)</b>, established in 1961, is an international body that promotes policies to enhance global economic and social well-being. It serves as a platform for governments to collaborate, share best practices, and develop solutions to common challenges, including those related to climate change, sustainability, and environmental governance.</p> <ul style="list-style-type: none"> <li>• <b>OECD countries play a crucial role in global climate action</b> by setting environmental policies, promoting green growth, and advancing clean technologies.</li> <li>• The organization supports climate resilience, sustainable resource management, and carbon reduction strategies through research, policy recommendations, and international cooperation.</li> <li>• <b>OECD reports and guidelines influence global climate negotiations</b>, helping nations align with Paris Agreement goals and implement climate-friendly economic policies.</li> </ul> <p>By fostering international cooperation and sustainable development, OECD countries contribute to shaping a low-carbon future and addressing global environmental challenges.</p>
<b>Offset</b>	<p>A <b>carbon offset</b> refers to a measurable reduction in greenhouse gas (GHG) emissions that is undertaken to compensate for emissions produced elsewhere. Offsets are quantified in metric tons of carbon dioxide-equivalent (CO<sub>2</sub>e) and can include reductions in any of the six primary greenhouse gases.</p> <ul style="list-style-type: none"> <li>• <b>Each carbon offset represents the reduction of one metric ton of CO<sub>2</sub> or its equivalent</b> in gases such as methane (CH<sub>4</sub>) or nitrous oxide (N<sub>2</sub>O).</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Offset projects</b> can include reforestation, renewable energy development, energy efficiency improvements, and methane capture from landfills.</li> <li>• <b>Carbon offsetting</b> is a key strategy for businesses, governments, and individuals to achieve net-zero emissions goals, complementing direct emission reduction efforts.</li> </ul> <p>While <b>carbon offsets contribute to climate action</b>, they must be <b>credible, verifiable, and additional</b> to ensure real climate benefits and avoid <b>greenwashing</b>.</p>
<b>Open Access</b>	<p><b>Open access</b> refers to the <b>unrestricted availability of natural resources</b>, allowing anyone to use and exploit them without regulatory limitations. This can include <b>common-pool resources</b> such as <b>air, oceans, forests, and fisheries</b>, which are often shared by multiple stakeholders. Promoting <b>responsible resource use, equitable distribution, and climate resilience</b> ensures that <b>open-access resources remain available for future generations while supporting global sustainability goals</b>.</p>
<b>Opportunity Cost</b>	<p>Opportunity cost in the context of <b>environment and climate change</b> refers to the <b>trade-offs involved in resource allocation</b> for sustainability initiatives. A fundamental concept in economics, it highlights the trade-off between “scarcity and choice”. When policymakers, businesses, or communities choose one environmental action over another, they <b>forgo the benefits</b> of the next-best alternative.</p> <p>For example, <b>investing in renewable energy</b> may mean fewer resources for immediate industrial expansion, but it ensures <b>long-term climate resilience</b>. Similarly, prioritizing <b>forest conservation</b> over infrastructure development preserves <b>carbon sinks</b> but may limit short-term economic gains.</p> <p>Opportunity cost is crucial in balancing <b>economic growth, environmental protection, and climate action</b> for sustainable decision-making.</p>
<b>Organic Aerosol</b>	<p><b>Organic aerosols (OAs)</b> are <b>airborne particles primarily composed of organic compounds</b>, including <b>carbon (C), hydrogen (H), and oxygen (O)</b>, with smaller amounts of other elements. These aerosols originate from <b>natural sources</b> (such as plant emissions and wildfires) and <b>human activities</b> (such as fossil fuel combustion and industrial processes).</p> <p>Organic aerosols play a significant role in <b>atmospheric chemistry, air quality, and climate change</b>, influencing <b>radiative forcing, cloud formation, and human health</b>. Their impact on <b>global warming and pollution</b> highlights the need for <b>effective mitigation strategies</b> to reduce emissions from anthropogenic sources.</p>
<b>Output Based Payment</b>	<p><b>Output-Based Payment (OBP)</b> is a <b>performance-driven financing mechanism</b> that ties payments to the <b>successful delivery of environmental or climate-related services</b>. Under this system, <b>service providers (SPs) receive compensation based on verified outputs</b>, ensuring <b>efficiency, transparency, and accountability</b> in resource allocation.</p>

	<p>In the context of <b>climate action and sustainability</b>, OBP is widely used in projects such as <b>renewable energy deployment, water conservation, waste management, and carbon reduction initiatives</b>. By focusing on <b>measurable environmental outcomes</b>, OBP encourages <b>cost-effective solutions</b> and enhances the impact of <b>green investments</b>.</p>
<b>Oxidize</b>	<p><b>Oxidation</b> is a <b>chemical process in which a substance reacts with oxygen</b>, leading to its <b>transformation and potential environmental impact</b>. This reaction plays a crucial role in <b>atmospheric chemistry, pollution control, and climate dynamics</b>.</p> <p>For example, in the atmosphere, pollutants such as <b>volatile organic compounds (VOCs) and sulphur dioxide (SO<sub>2</sub>) oxidize</b>, contributing to <b>smog formation and acid rain</b>. Similarly, the oxidation of <b>methane (CH<sub>4</sub>) and other greenhouse gases</b> influences their <b>lifespan and effect on global warming</b>. Understanding oxidation processes is essential for <b>mitigating air pollution, managing carbon cycles, and developing sustainable climate strategies</b>.</p>
<b>Ozone</b>	<p><b>Ozone (O<sub>3</sub>)</b> is a <b>triatomic form of oxygen (O<sub>3</sub>)</b>, that plays a <b>dual role in Earth's atmosphere</b>, with contrasting effects depending on its location. It plays a <b>critical role in air quality, climate regulation, and environmental health</b>.</p> <ul style="list-style-type: none"> <li>• <b>Tropospheric Ozone (Ground-Level Ozone)</b>: Formed through <b>photochemical reactions</b> involving <b>nitrogen oxides (NO<sub>x</sub>) and volatile organic compounds (VOCs)</b>—emitted from sources such as <b>fossil fuel combustion, industrial activities, and household products</b>. It is a major component of <b>smog</b> and acts as a <b>greenhouse gas</b>, contributing to <b>global warming</b>. In <b>high concentrations</b>, it poses <b>serious health risks</b> to humans, animals, and vegetation.</li> <li>• <b>Stratospheric Ozone (Ozone Layer)</b>: Located <b>6 to 25 miles above the Earth's surface</b>, this ozone layer is formed by the interaction of <b>solar ultraviolet (UV) radiation with molecular oxygen (O<sub>2</sub>)</b>. It serves as a <b>protective shield</b>, blocking <b>95-99% of the sun's harmful UV-B radiation</b>, thereby preventing <b>skin cancer, cataracts, and ecological damage</b>. However, <b>ozone depletion</b>, driven by chemicals like <b>chlorofluorocarbons (CFCs)</b> and influenced by <b>climate change</b>, has led to <b>an increased influx of UV radiation</b>, with severe environmental consequences.</li> </ul> <p>Understanding ozone's <b>dual nature</b> is important for <b>air quality management, climate mitigation, and safeguarding public health</b>.</p>
<b>Ozone Depleting Substance (ODS)</b>	<p><b>Ozone-Depleting Substances (ODS)</b> are a group of <b>human-made chemical compounds</b> that contribute to the <b>destruction of the stratospheric ozone layer</b>. These substances include <b>chlorofluorocarbons (CFCs), bromo fluorocarbons (halons), methyl chloroform, carbon tetrachloride, methyl bromide, and hydrochlorofluorocarbons (HCFCs)</b>.</p> <p>When released into the atmosphere, ODS break down under <b>ultraviolet (UV) radiation</b>, releasing <b>chlorine and bromine atoms</b> that <b>catalytically destroy ozone molecules</b>. This leads to <b>ozone layer depletion</b>, increasing <b>harmful UV radiation exposure</b>, which in turn contributes to <b>higher risks of skin cancer, cataracts, and ecosystem damage</b>.</p> <p>To combat ozone depletion, global agreements such as the <b>Montreal Protocol</b> have been implemented to <b>phase out ODS</b>, promoting the use of <b>environmentally friendly alternatives</b> to protect the ozone layer and mitigate <b>climate change impacts</b>.</p>

<b>Ozone forming potential</b>	<p><b>Ozone forming potential</b> refers to the <b>ability of a chemical compound to contribute to ozone formation</b> when it reacts with other atmospheric pollutants. It is a measure of a substance's <b>reactivity in the presence of precursors</b> such as <b>nitrogen oxides (NO<sub>x</sub>)</b> and <b>volatile organic compounds (VOCs)</b>, which undergo <b>photochemical reactions</b> to produce <b>ground-level ozone (smog)</b>.</p> <p>Understanding the <b>ozone forming potential</b> of different compounds is essential for <b>air quality management</b>, helping to regulate emissions from <b>industrial processes, transportation, and chemical products</b> to reduce <b>harmful tropospheric ozone pollution</b> and its impacts on <b>human health and climate</b>.</p>
<b>Ozone Layer</b>	<p>The <b>ozone layer</b> is a <b>protective stratospheric layer</b> that absorbs <b>harmful ultraviolet (UV) radiation</b> from the sun, shielding life on Earth. It extends from approximately <b>12 to 40 km above the Earth's surface</b>, with <b>peak ozone concentration between 20 and 25 km</b> (about <b>10 parts per million by volume</b>).</p> <p>Ozone levels naturally fluctuate due to <b>seasonal stratospheric circulation, volcanic eruptions, and solar activity</b>. However, <b>human activities</b>, particularly the emission of <b>chlorine and bromine-containing substances</b> such as <b>chlorofluorocarbons (CFCs)</b> and <b>halons</b>, have significantly <b>depleted the ozone layer</b>. This depletion is most severe over <b>Antarctica during the Southern Hemisphere spring</b>, creating what is known as the <b>ozone hole</b>.</p> <p>Protecting the ozone layer is essential to prevent <b>increased UV radiation exposure</b>, which can lead to <b>higher risks of skin cancer, cataracts, ecosystem disruption, and climate instability</b>. International agreements like the <b>Montreal Protocol</b> have been instrumental in <b>phasing out ozone-depleting substances</b>, aiding in the <b>gradual recovery of the ozone layer</b>.</p>
<b>Ozone Layer Depletion</b>	<p><b>Ozone layer depletion</b> refers to the <b>gradual thinning of the stratospheric ozone layer</b>, due to chemical reactions triggered by <b>ozone-depleting substances (ODS)</b> such as <b>chlorofluorocarbons (CFCs)</b> and <b>halons</b>. This process is further <b>exacerbated by climate change</b>, altering atmospheric conditions that influence ozone breakdown.</p> <p>As the ozone layer weakens, it allows <b>higher levels of ultraviolet (UV-B) radiation</b> to reach the Earth's surface, leading to <b>increased risks of skin cancer, cataracts, weakened ecosystems, and disruptions in global climate patterns</b>. Addressing ozone depletion requires <b>strict control of ODS emissions</b> through international agreements like the <b>Montreal Protocol</b>, alongside <b>climate mitigation efforts</b> to preserve atmospheric stability.</p> <p>This depletion occurs in two key ways:</p> <ol style="list-style-type: none"> <li>1. <b>Global Decline:</b> Since the late 1970s, the total volume of ozone in the <b>stratosphere</b> has been decreasing by about <b>4% per decade</b>, weakening its ability to <b>block harmful ultraviolet (UV-B) radiation</b>.</li> <li>2. <b>Seasonal Ozone Hole:</b> A <b>significant seasonal drop in ozone levels</b> occurs over <b>polar regions</b>, especially over <b>Antarctica</b>, forming what is commonly known as the <b>ozone hole</b>. Additionally, <b>tropospheric ozone depletion events</b> are observed in <b>polar regions during spring</b>.</li> </ol>

<b>Ozone Pollution</b>	<p><b>Ozone pollution</b> occurs when <b>high concentrations of ozone (O<sub>3</sub>)</b> accumulate at <b>ground level</b>, primarily due to <b>photochemical reactions</b> involving <b>nitrogen oxides (NO<sub>x</sub>)</b> and <b>volatile organic compounds (VOCs)</b> from <b>vehicle emissions, industrial activities, and fossil fuel combustion</b>.</p> <p><b>Exposure to ground-level ozone</b> poses <b>serious health risks</b>, causing <b>respiratory issues, aggravated lung diseases, and cardiovascular problems</b> in humans. It also <b>damages crops, forests, and ecosystems</b>, reducing agricultural yields and biodiversity. <b>Ozone pollution</b> is a significant environmental challenge in <b>urban and industrialized regions</b>, requiring <b>strict air quality regulations and emission control measures</b> to mitigate its harmful effects.</p>
<b>Ozone Precursors</b>	<p><b>Ozone precursors</b> are <b>chemical compounds</b> that contribute to the <b>formation of ground-level ozone (O<sub>3</sub>)</b> through <b>photochemical reactions in the presence of sunlight</b>. Key precursors include <b>carbon monoxide (CO)</b>, <b>methane (CH<sub>4</sub>)</b>, <b>non-methane hydrocarbons (NMHCs)</b>, and <b>nitrogen oxides (NO<sub>x</sub>)</b>, which originate from <b>fossil fuel combustion, industrial emissions, agricultural activities, and biomass burning</b>.</p> <p>In the <b>troposphere</b>, these pollutants react to form <b>ozone</b>, a major component of <b>smog</b>, which negatively impacts <b>air quality, human health, and ecosystems</b>. Managing <b>ozone precursor emissions</b> is essential for <b>reducing ozone pollution</b>, mitigating <b>climate change</b>, and improving <b>environmental sustainability</b>.</p>
<b>Parameterization</b>	<p><b>Parameterization</b> is a technique used in <b>climate modelling</b> to represent <b>small-scale processes</b> that cannot be explicitly resolved due to <b>limitations in spatial or temporal resolution</b>. These <b>sub-grid-scale processes</b>, such as <b>cloud formation, turbulence, and radiation transfer</b>, are approximated through <b>mathematical relationships</b> that link their <b>average effects to larger-scale atmospheric and oceanic systems</b>.</p> <p>Effective <b>parameterization</b> is crucial for <b>improving the accuracy of climate models</b>, enabling better predictions of <b>weather patterns, extreme events, and long-term climate trends</b>. Advancements in this approach help refine <b>climate projections</b> and support <b>informed decision-making for climate adaptation and mitigation strategies</b>.</p>
<b>Paris Agreement</b>	<p>The <b>Paris Agreement</b> is a landmark <b>international climate treaty</b> adopted in <b>2015</b> to combat <b>global warming</b> by limiting the <b>rise in global temperatures to well below 2°C above pre-industrial levels</b>, while striving to <b>limit warming to 1.5°C</b>. Nearly every country has <b>signed and ratified</b> this agreement, making it a cornerstone of <b>global climate action</b>.</p> <p>Under the agreement, countries submit and update their <b>Nationally Determined Contributions (NDCs)</b> every <b>five years</b>, outlining their plans to <b>reduce greenhouse gas emissions and adapt to climate impacts</b>. It also includes provisions for <b>financial support to developing nations</b>, fostering <b>climate resilience, sustainable development, and low-carbon transitions</b>. Additionally, the agreement facilitates the <b>management of global carbon markets</b>, promoting <b>international cooperation on emissions reduction</b>.</p> <p>The <b>Paris Agreement</b> serves as a crucial framework for <b>coordinated global efforts</b> to address <b>climate change</b>, urging nations to <b>enhance their commitments</b> to achieve a <b>climate-safe future</b>.</p>

<b>Particulate matter</b>	<p><b>Particulate Matter (PM)</b> refers to <b>tiny solid and liquid particles</b> suspended in the air, including <b>dust, soot, aerosols, and fumes</b>. These particles originate from both <b>natural sources</b> (such as <b>forest fires, volcanic eruptions, and windblown dust</b>) and <b>human activities</b> (such as <b>burning fossil fuels, industrial emissions, mining, construction, and agricultural practices</b>).</p> <p>Fine particles like <b>PM<sub>2.5</sub></b> (particles smaller than 2.5 micrometers) and <b>PM<sub>10</sub></b> (particles smaller than 10 micrometers) pose <b>serious health risks</b>, causing <b>respiratory diseases, cardiovascular issues, and irritation of the eyes, nose, and throat</b>. Additionally, PM plays a role in <b>climate change</b>, as certain particles like <b>black carbon (soot) absorb heat</b>, contributing to <b>atmospheric warming and glacier melting</b>, while others reflect sunlight, affecting <b>cloud formation and weather patterns</b>.</p> <p>Reducing <b>particulate matter pollution</b> is crucial for <b>improving air quality, protecting human health, and mitigating climate impacts</b>, requiring <b>strict emission controls, sustainable energy transitions, and effective policy interventions</b>.</p>
<b>Parts Per Billion (ppb)</b>	<p><b>Parts Per Billion (ppb)</b> is a unit of measurement used to express the <b>concentration of a substance in air, water, or soil</b>. It represents <b>one part of a chemical per one billion parts of a given medium</b>, equivalent to <b>one microgram per liter (µg/L) in water</b> or <b>one microgram per kilogram (µg/kg) in soil</b>. ppb is commonly used to measure <b>pollutants and contaminants</b>, such as <b>heavy metals in water, greenhouse gases in the atmosphere, and toxic substances in soil</b>.</p>
<b>Parts Per Million (ppm)</b>	<p><b>Parts Per Million (ppm)</b> is a unit used to express <b>very low concentrations of substances in air, water, or soil</b>. It represents <b>one part of a substance per one million parts of a given medium</b>, equivalent to <b>one milligram per liter (mg/L) in water</b> or <b>one milligram per kilogram (mg/kg) in soil</b>. ppm is widely used to measure <b>greenhouse gas concentrations</b> (such as <b>carbon dioxide (CO<sub>2</sub>) levels in the atmosphere</b>), as well as <b>pollutants, chemicals, and contaminants</b> in natural ecosystems.</p>
<b>Parts Per Trillion (ppt)</b>	<p><b>Parts Per Trillion (ppt)</b> is a unit of measurement used to express <b>extremely low concentrations of substances in air, water, or soil</b>. It represents <b>one part of a chemical per one trillion parts of a given medium</b>, allowing for the detection of <b>trace amounts of pollutants, greenhouse gases, and contaminants</b> in the environment. Ppt is often used to measure <b>highly potent pollutants</b>, such as <b>per- and polyfluoroalkyl substances (PFAS) in water, persistent organic pollutants (POPs) in soil, and trace greenhouse gases like sulphur hexafluoride (SF<sub>6</sub>) in the atmosphere</b>.</p>
<b>Payment for Environmental Services (PES)</b>	<p><b>Payment for Environmental Services (PES)</b> is an <b>innovative conservation approach</b> that provides <b>financial incentives to landowners and resource managers</b> for preserving and sustainably managing <b>ecosystems and natural resources</b>. It directly links <b>environmental service providers (sellers)</b> with <b>beneficiaries (buyers)</b>, ensuring that those who <b>protect biodiversity, improve water quality, or enhance carbon sequestration</b> are compensated for their efforts.</p> <p>PES offers <b>significant advantages over traditional conservation methods</b>, fostering <b>sustainable land-use practices</b> while aligning <b>economic and environmental interests</b>. However, it is most effective when used <b>alongside other conservation strategies</b>, as its success depends on <b>strong governance, financial support, and long-term commitment</b> to environmental protection.</p>

<b>Perfluorocarbons (PFCs)</b>	<p><b>Perfluorocarbons (PFCs)</b> are <b>human-made greenhouse gases</b> composed of <b>carbon and fluorine</b>. They were introduced as <b>alternatives to ozone-depleting substances (ODS)</b>, such as chlorofluorocarbons (CFCs), but are now recognized for their <b>significant global warming potential (GWP)</b> of PFCs is 6,500 - 9,200 times that of carbon dioxide. Key PFCs include <b>tetrafluoromethane (CF<sub>4</sub>)</b> and <b>hexafluoroethane (C<sub>2</sub>F<sub>6</sub>)</b>, with GWPs of <b>7,390 and 12,200</b>, respectively, as per the <b>IPCC's Fourth Assessment Report (AR4)</b>.</p> <p>PFCs are primarily released as <b>by-products of industrial processes</b>, such as <b>aluminium smelting, uranium enrichment, and semiconductor manufacturing</b>. While they <b>do not deplete the ozone layer</b>, they are <b>highly persistent in the atmosphere</b>, contributing to <b>long-term climate change</b>. As one of the <b>six greenhouse gases targeted for reduction under the Kyoto Protocol</b>, mitigating PFC emissions is crucial for <b>limiting global warming and achieving climate goals</b>.</p>
<b>Permafrost</b>	<p><b>Permafrost</b> refers to <b>perennially frozen ground</b> that remains at or below <b>0°C</b> for at least <b>two consecutive years</b>. It consists of <b>soil, rock, sand, ice, and organic material</b> and is primarily found in <b>polar regions and high-altitude mountainous areas</b>, including <b>40% of the Hindu Kush Himalayan region</b>.</p> <p>Due to <b>climate change</b>, permafrost is <b>rapidly melting</b>, with projections indicating that a <b>2°C rise in global temperatures</b> could reduce its extent by <b>over 40%</b>. This thawing has <b>severe environmental consequences</b>, including <b>disrupting hydrological cycles, altering ecosystems, and destabilizing landscapes</b>. More critically, <b>melting permafrost releases large amounts of greenhouse gases (methane and carbon dioxide)</b>, further <b>accelerating global warming</b> in a dangerous feedback loop. <b>Protecting permafrost regions</b> is essential for <b>climate stability and ecosystem resilience</b>.</p>
<b>Permits</b>	<p>In the context of <b>emissions trading systems</b>, <b>permits</b> refer to the <b>allowances</b> granted to organizations or entities, permitting them to emit a specified amount of greenhouse gases. These permits are part of <b>domestic carbon markets</b> and are used to regulate emissions, providing an economic incentive for companies to reduce their carbon output.</p>
<b>Perturbed Ensembles</b> <b>Parameter</b>	<p><b>Perturbed Parameter Ensembles</b> involve <b>systematically varying model parameters</b> within an ensemble. This method aims to provide a <b>more objective estimate</b> of modelling uncertainty compared to <b>traditional multi-model ensembles</b>.</p>
<b>Phased Approach</b>	<p>The <b>Phased Approach</b> is a structured method used in the context of <b>change or development</b>, particularly in environmental and climate change projects. It involves breaking down a complex process into distinct, manageable <b>stages</b>, each with specific goals and milestones. This approach allows for careful monitoring and adjustment at each phase, ensuring that the project progresses systematically. By adopting a <b>phased approach</b>, it becomes easier to identify challenges early, adapt to unforeseen issues, and align the development process with evolving goals or external conditions, thus improving the likelihood of success and sustainability in the long term.</p>
<b>Phase-down and phase-out</b>	<p><b>Phase-down</b> and <b>phase-out</b> are terms commonly used in the context of negotiations aimed at reducing the use of <b>fossil fuels</b>. A <b>phase-down</b> of fossil fuels refers to a <b>reduction in the proportion</b> of fossil fuels within <b>total energy production</b>, while a <b>phase-out</b> signifies an</p>



	<b>absolute cessation</b> of fossil fuel consumption. However, neither term has a <b>clear official definition, timeline, or metrics</b> in <b>UN climate negotiations</b> .
<b>Phenology</b>	<b>Phenology</b> refers to the <b>timing of natural events</b> , such as <b>flower blooms</b> and <b>animal migration</b> , which are influenced by <b>climate changes</b> . It is the study of these crucial seasonal events and their patterns. <b>Phenological events</b> are shaped by a combination of <b>climate factors</b> , including <b>light, temperature, rainfall, and humidity</b> . The study of recurring natural phenomena in biological systems, such as development stages and migration, and their relationship to <b>climate</b> and <b>seasonal changes</b> is known as <b>phenology</b> .
<b>Phenotypic Plasticity</b>	<b>Phenotypic Plasticity</b> refers to an organism's ability to <b>adapt to a changing environment</b> by modifying its <b>phenotype</b> , without altering its <b>genotype</b> . This enables organisms to adjust their physical traits or behaviours in response to environmental changes, enhancing their survival and resilience.
<b>Photosynthesis</b>	<p><b>Photosynthesis</b> is a fundamental biological process through which plants, algae, and certain bacteria absorb <b>carbon dioxide (CO2)</b> from the air (or bicarbonate in water) to produce <b>carbohydrates</b>, while releasing <b>oxygen (O2)</b> as a by-product. Photosynthesis occurs mainly in the chloroplasts of plant cells, where the pigment <b>chlorophyll</b> captures light energy, typically from the sun.</p> <p>There are several distinct <b>pathways of photosynthesis</b>, with the two primary types being <b>C3, C4, and CAM</b> photosynthesis, each adapted to specific environmental conditions. The efficiency and rate of photosynthesis can be influenced by factors such as <b>light intensity, temperature, and notably, atmospheric CO2 concentrations</b>.</p> <ul style="list-style-type: none"> <li>• <b>C3 photosynthesis</b> is the most common pathway and occurs in most plants. It is directly influenced by the availability of CO2 and is less efficient under higher temperatures and low CO2 levels.</li> <li>• <b>C4 photosynthesis</b> is more efficient in hot and dry environments, as it minimizes water loss and concentrates CO2 around the enzyme responsible for carbon fixation, making it more efficient in environments with low atmospheric CO2.</li> <li>• <b>CAM (Crassulacean Acid Metabolism)</b> photosynthesis is typically found in plants like succulents, which open their stomata at night to reduce water loss, storing CO2 as organic acids, and then using it during the day for carbohydrate production.</li> </ul> <p>Photosynthesis is a key process in the <b>global carbon cycle</b>, as it helps remove CO2 from the atmosphere, mitigating the effects of climate change. Changes in atmospheric CO2 levels can significantly impact the efficiency of photosynthesis and, consequently, plant growth and carbon sequestration. Therefore, understanding how photosynthesis adapts to environmental variables is crucial for addressing issues like food security, climate resilience, and ecosystem sustainability.</p>
<b>Physical Capital</b>	<b>Physical Capital</b> refers to the <b>basic infrastructure</b> such as <b>transport, shelter, water, energy, and communications</b> , as well as the <b>production equipment</b> and resources that enable individuals to sustain their livelihoods. This form of capital is crucial for economic development and plays a key role in enhancing resilience to environmental and climate-related challenges.

<b>Planned Adaptation</b>	<p><b>Planned Adaptation</b> refers to the intentional and strategic approach taken by governments, organizations, or communities to adjust to <b>climate change</b> and its impacts. It involves <b>deliberate policy decisions</b> based on an understanding that environmental, social, or economic conditions have already changed or are projected to change in the future. This awareness drives the need for <b>targeted actions</b> to either <b>maintain</b> the current systems, <b>restore</b> them to their desired state, or <b>enhance</b> their resilience to future climate challenges.</p> <p>Unlike reactive or spontaneous adaptation, planned adaptation is a <b>proactive</b> process, often involving comprehensive planning, assessments, and the implementation of policies or projects. These may include infrastructure improvements, changes in land use, investment in sustainable technologies, and community-focused interventions aimed at reducing vulnerability.</p> <p>Planned adaptation also typically incorporates <b>climate modelling</b>, <b>risk assessments</b>, and continuous monitoring to ensure that the actions taken remain effective as climate conditions evolve. This approach is critical for building resilience and minimizing the long-term social, economic, and environmental costs of climate change impacts. Through planned adaptation, societies can better prepare for the future and protect vulnerable populations and ecosystems</p>
<b>Plantation</b>	<p><b>Plantation</b> refers to a large-scale area of land where <b>trees or other vegetation</b> are intentionally planted and cultivated, often for the <b>production of specific goods</b> such as <b>wood</b>, <b>non-wood products</b>, or agricultural crops. These areas are typically composed of <b>introduced species</b>, although in some cases, <b>native species</b> may also be used. Plantations are often established for commercial purposes, including timber production, paper manufacturing, or the cultivation of certain crops like rubber, tea, or coffee. The management of plantations can have both economic and environmental impacts, depending on factors such as species choice, land use, and sustainability practices.</p>
<b>Polar Vortex</b>	<p><b>Polar Vortex</b> refers to a vast area of <b>low pressure</b> and <b>cold air</b> surrounding the Earth's <b>North Pole</b>. This phenomenon generally remains unnoticed by those living in <b>lower latitudes</b>, but occasionally, shifts in <b>air pressure</b> and <b>wind patterns</b> can cause it to extend beyond the pole, impacting weather conditions in regions further south.</p>
<b>Polluters Pay Principle (PPP)</b>	<p>The <b>Polluter Pays Principle (PPP)</b> is an environmental policy concept that mandates those responsible for pollution to bear the costs associated with it. Initially, the principle focused on determining how the expenses related to <b>pollution prevention</b> and <b>control</b> should be distributed among those causing the harm.</p>
<b>Pollution</b>	<p><b>Pollution</b> refers to the <b>introduction of harmful substances</b> or <b>contaminants</b> into the <b>environment</b>, which causes <b>adverse effects</b> on natural systems and living organisms. It can take various forms, including <b>chemical pollutants</b> (e.g., toxic waste, gases), as well as <b>energy pollutants</b> like <b>noise</b>, <b>heat</b>, or <b>light</b>. Pollution disrupts the balance of ecosystems and can lead to long-term damage to air, water, soil, and biodiversity, ultimately affecting human health and the climate.</p>
<b>Post Glacial Rebound</b>	<p><b>Post Glacial Rebound</b> refers to the <b>vertical movement</b> of the <b>continents</b> and <b>sea floor</b> following the retreat and shrinkage of <b>ice sheets</b>, such as those that occurred since the <b>Last Glacial Maximum</b> (approximately <b>21,000 years ago</b>). This phenomenon is a type of <b>isostatic land movement</b>, where the Earth's crust gradually rises due to the reduction in weight from the melting ice.</p>

Potential Impacts	<b>Potential Impacts</b> refer to all the <b>possible effects</b> that may arise from a projected <b>change in climate</b> , without taking into account any <b>adaptation measures</b> . These impacts represent the outcomes that could occur if no action is taken to mitigate or adjust to climate change.
Potential production	<b>Potential Production</b> refers to the <b>estimated crop productivity</b> that can be achieved under <b>optimal conditions</b> , where <b>soil, nutrients, and water</b> are not limiting factors. This represents the maximum yield that could be attained if the crops receive ideal conditions for growth, such as sufficient water supply, nutrient availability, and favourable soil health. Potential production can be affected by shifts in climate patterns, water availability, and soil quality, making it a critical benchmark for understanding how crops might perform under future environmental conditions. However, <b>realized production</b> often falls short of potential production due to a range of limiting factors like drought, pests, and soil degradation, which are increasingly influenced by climate change.
Precession	<b>Precession</b> : The gradual <b>wobbling of Earth's axial tilt</b> over thousands of years relative to the <b>plane of the solar system</b> . This phenomenon, also known as the <b>precession of the equinoxes or long-term climate cycles</b> , occurs due to gravitational interactions between the Earth, the Sun, and the Moon including shifts in <b>seasonal intensity</b> and the Earth's <b>orbital climate variations</b> .
Precipitation	<p><b>Precipitation</b> is the process by which <b>water, in various forms, falls from the atmosphere to the Earth's surface</b> due to the condensation of atmospheric water vapor. It occurs when the air becomes <b>saturated with moisture</b>, leading to the formation of water droplets or ice crystals that grow heavy enough to fall under gravity.</p> <p>Precipitation is a vital part of the <b>hydrological cycle</b>, influencing <b>freshwater availability, agriculture, ecosystems, and climate patterns</b>. Climate change is altering <b>precipitation intensity, frequency, and distribution</b>, leading to <b>droughts, extreme rainfall, and flooding</b>, affecting both natural systems and human societies.</p> <p><b>Main Forms of Precipitation:</b></p> <ul style="list-style-type: none"> <li>• <b>Rain</b>: Liquid water droplets.</li> <li>• <b>Drizzle</b>: Fine, light rain with small droplets.</li> <li>• <b>Snow</b>: Ice crystals forming flakes.</li> <li>• <b>Sleet</b>: Frozen raindrops that partially melt before reaching the ground.</li> <li>• <b>Hail</b>: Hard, layered ice balls formed in strong thunderstorms.</li> <li>• <b>Graupel</b>: Soft, pellet-like snowflakes coated in ice.</li> </ul>
Preparedness	<b>Preparedness</b> refers to the <b>knowledge, skills, and capabilities</b> developed by <b>governments, response and recovery organizations, communities, and individuals</b> to effectively <b>anticipate, respond to, and recover from</b> potential, imminent, or ongoing hazard events.

	<p>Preparedness is an essential component of <b>disaster risk management</b>, aimed at <b>strengthening capacities</b> to efficiently handle emergencies and ensure a <b>smooth transition from response to recovery</b>. It relies on <b>comprehensive risk assessments</b> and strong <b>integration with early warning systems</b> to facilitate timely and effective action.</p> <p><b>Key Preparedness Measures:</b></p> <ul style="list-style-type: none"> <li>• <b>Contingency planning</b> to address various disaster scenarios.</li> <li>• <b>Stockpiling emergency supplies and equipment</b> for rapid deployment.</li> <li>• <b>Establishing coordination mechanisms</b> for efficient response.</li> <li>• <b>Developing evacuation strategies and public awareness programs</b>.</li> <li>• <b>Conducting training sessions and field exercises</b> to enhance readiness.</li> </ul> <p>The related concept of "<b>readiness</b>" refers to the ability to <b>act swiftly and effectively</b> when a disaster occurs. By prioritizing <b>preparedness</b>, communities can <b>reduce risks, minimize losses, and enhance resilience</b> against natural and human-induced hazards.</p>
<b>Prevention</b>	<p><b>Prevention</b> refers to the <b>complete avoidance of adverse impacts</b> from hazards and disasters through <b>proactive measures taken in advance</b>. It involves implementing strategies that <b>eliminate risks</b> rather than just mitigating their effects.</p> <p><b>Key Aspects of Prevention:</b></p> <ul style="list-style-type: none"> <li>• <b>Eliminating Hazard Impacts:</b> Prevention focuses on <b>stopping disasters before they occur</b> by addressing risks at their source.</li> <li>• <b>Infrastructure &amp; Engineering Solutions:</b> Examples include <b>dams and embankments</b> designed to <b>prevent flooding</b>, as well as <b>seismic-resistant buildings</b> that remain functional during earthquakes.</li> <li>• <b>Land-Use Planning &amp; Regulations:</b> Restricting <b>settlements in high-risk zones</b> to avoid exposure to hazards.</li> </ul> <p><b>Preventive actions</b> in societies can <b>reduce vulnerability, enhance resilience, and ensure long-term safety</b> from disaster risks.</p>
<b>Primary Energy Sources</b>	<p><b>Primary Energy / Energy Sources</b> refer to the <b>natural energy stored in resources</b> such as <b>coal, crude oil, natural gas, and uranium</b>, which has not yet been altered by human processes. To be utilized, this <b>raw energy must undergo conversion and transportation</b> into more accessible forms of energy, such as <b>electricity or heat</b>.</p>
<b>Primary forest</b>	<p><b>Primary Forest</b> is a <b>natural, undisturbed forest ecosystem</b> composed of <b>native tree species</b>, where there are <b>no visible signs of human activity</b> and <b>ecological processes remain largely intact</b>. These forests have developed <b>without significant external interference</b>, maintaining their <b>original biodiversity, structure, and functions</b>. They play a crucial role in <b>carbon storage, climate regulation, and ecosystem stability</b>, making their protection vital for <b>environmental conservation and climate change mitigation</b>.</p>

<b>Primary production</b>	<p><b>Primary Production</b> is the process by which <b>organic compounds are generated from atmospheric or aquatic carbon dioxide</b>, primarily through <b>photosynthesis</b> in plants, algae, and certain bacteria. This process forms the foundation of the <b>food chain</b>, converting <b>solar energy into chemical energy</b>, which supports all higher trophic levels in an ecosystem. <b>Primary production</b> is crucial for <b>carbon cycling, oxygen generation, and maintaining ecological balance</b>, making it a key factor in <b>climate regulation and ecosystem sustainability</b>.</p>
<b>Priority Sector</b>	<p><b>Priority Sector</b> refers to <b>specific areas that require urgent attention and focused action</b> to address <b>critical environmental, social, or economic challenges</b>. In the context of <b>climate change and sustainability</b>, priority sectors often include <b>renewable energy, water conservation, sustainable agriculture, biodiversity protection, and disaster resilience</b>. Targeting these sectors is essential for <b>mitigating climate change, promoting sustainable development, and ensuring environmental and social well-being</b>.</p>
<b>Private Adaptation</b>	<p><b>Private Adaptation</b> refers to <b>adaptive actions taken by individuals, households, or private companies to reduce climate-related risks and enhance resilience</b>. These measures are typically driven by <b>self-interest, economic benefits, or risk management strategies</b>.</p> <p><b>Examples of Private Adaptation:</b></p> <ul style="list-style-type: none"> <li>• <b>Households</b> installing <b>rainwater harvesting systems</b> or improving <b>home insulation</b> to cope with changing climate conditions.</li> <li>• <b>Businesses</b> investing in <b>climate-resilient infrastructure</b> or adopting <b>sustainable supply chain practices</b> to minimize financial losses.</li> <li>• <b>Farmers</b> shifting to <b>drought-resistant crops</b> or improving <b>irrigation techniques</b> to adapt to variable rainfall patterns.</li> </ul> <p>Private adaptation plays a crucial role in <b>complementing public climate policies</b>, fostering <b>innovative solutions</b>, and driving <b>climate resilience at the local and global levels</b>.</p>
<b>Productivity or Production</b>	<p><b>Productivity or Production</b> refers to the <b>rate at which biomass is generated per unit area by a specific group of organisms</b> within an ecosystem. It is a key measure of <b>ecosystem functioning and energy flow</b>, directly influencing <b>carbon cycling, food availability, and biodiversity</b>.</p> <p><b>Types of Productivity:</b></p> <ul style="list-style-type: none"> <li>• <b>Primary Productivity:</b> The rate at which <b>plants, algae, and other autotrophs</b> convert <b>solar energy into organic matter</b> through photosynthesis.</li> <li>• <b>Secondary Productivity:</b> The rate at which <b>consumers (herbivores, carnivores, decomposers)</b> convert organic matter into biomass.</li> </ul> <p>In the context of <b>climate change and environmental sustainability</b>, productivity plays a vital role in <b>carbon sequestration, food security, and ecosystem stability</b>, making its conservation and enhancement essential for <b>climate resilience and biodiversity protection</b>.</p>

<b>Projection</b>	<p><b>Projection</b> refers to the <b>possible future development of a variable or set of variables</b>, typically estimated using <b>models based on specific assumptions</b>. Unlike <b>predictions</b>, projections consider <b>various possible future scenarios</b>, such as <b>socio-economic trends, technological advancements, and environmental changes</b>, making them subject to <b>uncertainty</b>.</p> <p><b>Climate projections</b> help estimate <b>future temperature patterns, sea level rise, and extreme weather events</b>, guiding <b>policy decisions, adaptation strategies, and risk management</b>.</p>
<b>Prospective Disaster Risk Management</b>	<p><b>Prospective Disaster Risk Management</b> refers to <b>proactive strategies and actions aimed at preventing the creation or escalation of disaster risks</b>. Unlike traditional disaster risk management, which focuses on <b>reducing existing vulnerabilities</b>, this approach emphasizes <b>anticipating and mitigating future risks</b> before they materialize.</p> <p><b>Key Aspects of Prospective Disaster Risk Management:</b></p> <ul style="list-style-type: none"> <li>• <b>Risk Prevention &amp; Avoidance:</b> Focuses on <b>long-term planning and development</b> to prevent hazards from turning into disasters.</li> <li>• <b>Integration into Policy &amp; Planning:</b> Encourages <b>sustainable land-use planning, resilient infrastructure design, and climate adaptation measures</b> to ensure future safety.</li> <li>• <b>Climate &amp; Environmental Considerations:</b> Addresses risks arising from <b>climate change, deforestation, rapid urbanization, and unsustainable practices</b> that could contribute to future disasters.</li> <li>• <b>Resilience-Building:</b> Strengthens <b>governance, community preparedness, and early warning systems</b> to minimize potential future threats.</li> </ul>
<b>Protocol</b>	<p>A <b>protocol</b> is an <b>international agreement</b> that is <b>linked to an existing convention</b> but functions as a <b>separate and additional legal instrument</b>. It must be <b>individually signed and ratified</b> by the parties to the original convention. <b>Protocols typically enhance and strengthen conventions</b> by introducing <b>new, more specific commitments</b> to address emerging challenges or improve implementation.</p> <p><b>Examples in Climate &amp; Environmental Governance:</b></p> <ul style="list-style-type: none"> <li>• <b>Kyoto Protocol</b> (linked to the <b>UNFCCC</b>) set binding emission reduction targets for developed nations.</li> <li>• <b>Montreal Protocol</b> (linked to the <b>Vienna Convention</b>) focused on phasing out substances that deplete the ozone layer.</li> </ul> <p>Protocols play a crucial role in <b>strengthening international cooperation, ensuring accountability, and advancing environmental and climate action</b>.</p>
<b>Provisioning Services</b>	<p><b>Provisioning Services</b> are the <b>tangible benefits</b> that ecosystems provide to humans, including essential resources such as <b>food, water, raw materials, and medicinal resources</b>. These services support <b>human well-being, economic activities, and survival</b> by supplying <b>natural goods</b> directly from the environment.</p>

	<p><b>Key Examples of Provisioning Services:</b></p> <ul style="list-style-type: none"> <li>• <b>Food Supply:</b> Crops, fruits, fish, livestock, and wild game.</li> <li>• <b>Freshwater Resources:</b> Rivers, lakes, and groundwater for drinking, agriculture, and industry.</li> <li>• <b>Raw Materials:</b> Timber, fiber, and biofuels for construction, clothing, and energy.</li> <li>• <b>Medicinal Resources:</b> Plants and compounds used in traditional and modern medicine.</li> </ul> <p>These services are <b>vital for sustainability</b>, but <b>climate change, deforestation, pollution, and overexploitation</b> threaten their availability. Protecting and managing ecosystems ensures the <b>continued provision of these essential resources</b> for future generations.</p>
<b>Proxy</b>	<p>A <b>proxy</b> is an <b>indirect climate indicator</b> used to reconstruct <b>past climate conditions</b> based on <b>natural records</b> that respond to environmental changes. These indicators rely on <b>physical and biophysical principles</b> to infer <b>climate variations over time</b>, providing insights into periods before direct measurements were available.</p> <p><b>Examples of Proxy Data:</b></p> <ul style="list-style-type: none"> <li>• <b>Tree Rings:</b> Reveal past temperature and precipitation patterns.</li> <li>• <b>Coral Growth Patterns:</b> Indicate historical ocean temperatures and chemistry.</li> <li>• <b>Ice Cores:</b> Contain trapped gases, dust, and isotopes that reflect past atmospheric conditions.</li> <li>• <b>Sediment Layers &amp; Pollen Records:</b> Provide evidence of past vegetation and climate shifts.</li> </ul> <p>Proxy data are essential for understanding long-term climate trends, validating climate models, and studying climate change before the era of direct measurements.</p>
<b>Public Adaptation</b>	<p><b>Public Adaptation</b> refers to <b>climate adaptation measures initiated and implemented by governments at various levels</b> to address <b>collective societal needs</b>. These actions aim to <b>reduce climate risks, enhance resilience, and protect public infrastructure, communities, and ecosystems</b>.</p> <p><b>Examples of Public Adaptation Measures:</b></p> <ul style="list-style-type: none"> <li>• <b>Developing climate policies and regulations</b> to guide adaptation efforts.</li> <li>• <b>Constructing resilient infrastructure</b>, such as flood defences and sustainable water management systems.</li> <li>• <b>Implementing ecosystem-based solutions</b>, like afforestation and wetland restoration.</li> <li>• <b>Enhancing disaster preparedness</b> through early warning systems and emergency response planning.</li> </ul>

	Public adaptation plays a <b>critical role in long-term climate resilience</b> , ensuring that societies can <b>effectively respond to and mitigate the impacts of climate change</b> .
<b>Public Awareness</b>	<p><b>Public awareness</b> refers to the <b>level of understanding and knowledge among individuals and communities about climate change, its causes, impacts, and potential solutions</b>. It encompasses awareness of <b>climate-induced disasters, associated risks, and the actions needed to reduce vulnerability and enhance resilience</b>.</p> <p>Public awareness is a <b>crucial element of climate action and adaptation</b>, as it empowers individuals and communities to make informed decisions, adopt sustainable practices, and support policies that mitigate climate change impacts. It is developed through <b>education, media outreach, community engagement, and advocacy efforts</b> led by governments, organizations, and civil society.</p>
<b>Quotas</b>	<p>In international systems, <b>quotas</b> refer to the <b>allocated limits on greenhouse gas (GHG) emissions within emissions trading mechanisms</b>. These quotas enable countries, industries, or entities to <b>buy, sell, or trade emission allowances</b> as part of market-based climate policies aimed at reducing overall emissions efficiently.</p> <p>Quotas are designed to <b>cap overall emissions</b> while providing flexibility for entities to <b>buy, sell, or trade allowances</b> based on their emission levels. This system incentivizes <b>low-carbon innovation and cost-effective emission reductions</b> while ensuring compliance with climate targets set under agreements like the <b>Kyoto Protocol</b> and the <b>Paris Agreement</b>.</p>
<b>Radiation</b>	<p><b>Radiation</b> refers to the <b>transfer of energy through electromagnetic waves or particles, which release energy when absorbed by an object</b>. In the context of <b>climate and the environment</b>, radiation plays a crucial role in <b>Earth's energy balance, atmospheric processes, and climate dynamics</b>.</p> <p>Key aspects include:</p> <ul style="list-style-type: none"> <li>• <b>Solar radiation:</b> The primary source of Earth's energy, influencing weather patterns, climate systems, and ecosystems.</li> <li>• <b>Terrestrial radiation:</b> Heat emitted by the Earth's surface, which interacts with greenhouse gases and contributes to the <b>greenhouse effect</b>.</li> <li>• <b>Ionizing radiation:</b> Emitted from radioactive substances, which can impact environmental and human health.</li> </ul> <p>Understanding radiation is essential for assessing <b>climate change, global warming, and the effects of atmospheric pollutants on energy transfer</b>.</p>
<b>Radiative Forcing</b>	<p><b>Radiative forcing</b> is a measure of how a specific factor—such as <b>greenhouse gases (GHGs), aerosols, or land use changes</b>—affects the <b>Earth's energy balance</b>. It quantifies the change in <b>net energy flux</b> at the <b>tropopause (the boundary between the troposphere and stratosphere)</b>, expressed in <b>watts per square meter (W/m²)</b>.</p> <p>Radiative forcing occurs due to <b>internal or external changes</b> in the climate system, including:</p>



	<ul style="list-style-type: none"> <li>• <b>Increased CO<sub>2</sub> concentrations</b>, which trap more heat and contribute to global warming.</li> <li>• <b>Variations in solar output</b>, affecting the amount of solar energy reaching Earth.</li> <li>• <b>Aerosols and cloud formation</b>, which can either cool or warm the atmosphere depending on their properties.</li> </ul> <p>A positive radiative forcing leads to <b>warming</b> (e.g., from GHGs), while a negative forcing results in <b>cooling</b> (e.g., from volcanic aerosols or increased cloud cover). Understanding radiative forcing is critical for assessing <b>climate change drivers and predicting future climate impacts</b>.</p>
<b>Rainfall</b>	<p><b>Rainfall</b> refers to the <b>liquid form of precipitation</b>, distinguishing it from other types like <b>snow, hail, or sleet</b>. For rain to occur, a <b>sufficiently thick atmospheric layer</b> must have <b>temperatures above the melting point of water</b> near and above the Earth's surface, allowing water droplets to remain in liquid form as they fall.</p> <p>Rainfall plays a <b>critical role in the hydrological cycle</b>, influencing <b>climate patterns, water availability, and ecosystem health</b>. Its distribution and intensity are affected by factors such as <b>temperature, atmospheric circulation, and climate change</b>.</p>
<b>Rapid Climate Change</b>	<p><b>Rapid climate change</b> refers to <b>sudden and significant shifts in the climate system</b> due to its <b>non-linear nature</b>. These abrupt changes, sometimes termed <b>climate surprises</b>, can result from intense and rapidly evolving environmental forces.</p> <p>Some <b>potential abrupt events</b> include:</p> <ul style="list-style-type: none"> <li>• <b>Disruption of the thermohaline circulation</b>, altering global ocean currents and weather patterns.</li> <li>• <b>Rapid deglaciation</b>, leading to sea level rise and ecosystem shifts.</li> <li>• <b>Permafrost thaw</b>, releasing large amounts of methane and accelerating changes in the carbon cycle.</li> </ul> <p>While some of these events can be anticipated based on current climate models, <b>others may be entirely unexpected</b> due to the complex and unpredictable interactions within the climate system.</p>
<b>Ratification</b>	<p><b>Ratification</b> is the <b>formal approval of a convention, protocol, or treaty by a national legislature or governing body</b>, allowing a country to officially become a <b>Party</b> to the agreement. This process follows the <b>initial signing</b> of the treaty and involves the submission of an <b>instrument of ratification</b> to the designated <b>depository</b>.</p> <p>In the case of <b>climate agreements</b>, such as the <b>UNFCCC and the Paris Agreement</b>, the <b>UN Secretary-General</b> serves as the depository. Once ratification is completed, a <b>countdown period (typically 90 days)</b> begins before the agreement becomes legally binding for the country.</p>

<b>Reactive Adaptation</b>	<p><b>Reactive adaptation</b> is the <b>process of making adjustments to social, economic, or environmental systems in response to climate change impacts that have already occurred</b>. Unlike <b>proactive adaptation</b>, which anticipates future changes, reactive adaptation focuses on <b>mitigating damage and restoring stability</b> after climate-related disruptions such as extreme weather events, flooding, or ecosystem shifts.</p> <p>This approach often involves <b>emergency response measures, policy revisions, infrastructure repairs, and community resilience-building efforts</b> to cope with ongoing climate challenges.</p>
<b>Readiness Preparation Proposal (R-PP)</b>	<p>The <b>Readiness Preparation Proposal (R-PP)</b> is a <b>strategic roadmap</b> outlining the steps a country must take to achieve <b>REDD+ Readiness</b>—the capacity to implement <b>Reducing Emissions from Deforestation and Forest Degradation (REDD+)</b> initiatives.</p> <p>The R-PP serves as a <b>guiding framework</b> by:</p> <ul style="list-style-type: none"> <li>• <b>Identifying key activities</b> necessary for REDD+ implementation.</li> <li>• <b>Providing a structured approach</b> to how these activities should be carried out.</li> <li>• <b>Estimating resource requirements</b> for successful execution.</li> <li>• <b>Drafting Terms of Reference (ToR)</b> to further refine specific activities.</li> </ul> <p>While the R-PP does not predetermine outcomes, it helps countries develop institutional, technical, and policy frameworks to support <b>sustainable forest management and emissions reduction efforts</b>.</p>
<b>Recovery</b>	<p><b>Recovery</b> refers to the <b>process of restoring and improving facilities, livelihoods, and living conditions</b> in communities affected by disasters. It involves both <b>short-term rehabilitation</b> and <b>long-term rebuilding efforts</b>, with a focus on <b>reducing future disaster risks</b> and enhancing resilience.</p> <p>Key aspects of recovery include:</p> <ul style="list-style-type: none"> <li>• <b>Reconstruction of infrastructure</b> and essential services.</li> <li>• <b>Economic and livelihood restoration</b> to support affected populations.</li> <li>• <b>Social and psychological support</b> for community well-being.</li> <li>• <b>Integration of disaster risk reduction (DRR) measures</b> to strengthen future preparedness.</li> </ul> <p>Effective recovery goes beyond mere restoration—it aims for <b>sustainable improvements</b> that make communities more resilient to future climate and environmental challenges.</p>
<b>Recycling</b>	<p><b>Recycling</b> is the <b>process of collecting, processing, and repurposing materials</b> to be reused, reducing waste and conserving natural resources. This involves transforming discarded items into <b>new products</b> rather than disposing of them in landfills.</p>

	For example, <b>aluminium cans</b> can be collected, melted down, and reformed into <b>new cans or other aluminium-based products</b> . Recycling helps minimize environmental impact by <b>reducing resource extraction, energy consumption, and pollution</b> .
<b>REDD Standards</b>	<p><b>REDD+ Standards</b> are a set of guidelines designed to help <b>governments, NGOs, financing agencies, and other stakeholders</b> develop and implement <b>REDD+ programs</b> that uphold the <b>rights of indigenous peoples and local communities</b> while ensuring <b>social and environmental co-benefits</b>.</p> <p>These standards are developed through a <b>collaborative and inclusive process</b>, involving:</p> <ul style="list-style-type: none"> <li>• <b>Governments and policymakers</b></li> <li>• <b>Non-governmental and civil society organizations</b></li> <li>• <b>Indigenous peoples' organizations</b></li> <li>• <b>International research institutions</b></li> <li>• <b>The private sector</b></li> </ul> <p>By establishing clear principles, <b>REDD+ Standards</b> promote <b>equitable, transparent, and sustainable forest conservation efforts</b> aligned with climate action and biodiversity goals.</p>
<b>Reference Scenario</b>	<p>A <b>reference scenario</b> represents a <b>plausible projection of the future state of a system without any adaptation measures</b>. It serves as a <b>baseline</b> for evaluating and comparing the effectiveness of various <b>adaptation strategies, policies, and interventions</b>.</p> <p>By establishing a "<b>business-as-usual</b>" scenario, this approach helps policymakers and stakeholders assess <b>potential climate impacts</b> and determine the benefits of <b>adaptive actions</b> in mitigating risks and enhancing resilience.</p>
<b>Reflectivity</b>	<p><b>Reflectivity</b> refers to a <b>surface's ability to reflect sunlight</b>, including <b>visible, infrared, and ultraviolet wavelengths</b>. It determines how much solar radiation is reflected back into the atmosphere rather than being absorbed.</p> <p>This property influences:</p> <ul style="list-style-type: none"> <li>• <b>The albedo effect</b>, where highly reflective surfaces (e.g., snow, ice) help cool the planet, while darker surfaces (e.g., asphalt, forests) absorb more heat.</li> <li>• <b>The urban heat island effect</b>, as low-reflectivity materials contribute to higher temperatures in cities.</li> <li>• <b>Energy efficiency in buildings</b>, where reflective materials reduce heat absorption and lower cooling costs.</li> </ul>
<b>Reforestation</b>	<b>Reforestation</b> is the process of <b>restoring forests on lands that were previously forested but were converted to other uses</b> . It involves <b>planting, seeding, or facilitating natural regeneration</b> to re-establish forest cover on degraded or deforested land.

	Reforestation can be <b>human-induced</b> through <b>afforestation efforts</b> or by promoting the natural recovery of ecosystems. It plays a critical role in <b>carbon sequestration, biodiversity conservation, and climate change mitigation</b>
<b>Regeneration</b>	<p><b>Regeneration</b> refers to the <b>process of renewal, restoration, and growth</b> that enables <b>genomes, cells, organs, organisms, and ecosystems</b> to recover from disturbances or damage. This ability helps maintain resilience against <b>natural fluctuations and environmental stressors</b>.</p> <p>Regeneration occurs across all living organisms, from <b>bacteria to humans</b>, playing a vital role in <b>healing, tissue repair, and ecosystem recovery</b>.</p>
<b>Regime</b>	<p>A <b>regime</b> refers to a <b>dominant state or pattern within the climate system</b>, often associated with specific <b>phases of climate variability</b>. These regimes influence <b>weather patterns, ocean currents, and atmospheric circulation</b> over different timescales.</p> <p>Examples include:</p> <ul style="list-style-type: none"> <li>• <b>El Niño-Southern Oscillation (ENSO) regimes</b>, which alternate between El Niño and La Niña phases, affecting global weather conditions.</li> <li>• <b>Monsoon regimes</b>, characterized by seasonal shifts in wind and precipitation patterns.</li> <li>• <b>Arctic climate regimes</b>, influencing ice cover, temperature trends, and ocean circulation.</li> </ul> <p>Understanding climate regimes is essential for <b>predicting long-term climate trends, assessing environmental changes, and developing adaptation strategies</b>.</p>
<b>Region</b>	<p>A <b>region</b> is a <b>specific geographical area</b> defined by its <b>climatic, environmental, and physical characteristics</b>. The climate of a region is influenced by <b>local factors</b> such as <b>topography, land use, and nearby water bodies</b>, as well as <b>remote influences</b> from global climate systems.</p> <p>Regions can vary in <b>climate, biodiversity, and human activities</b>, making them important units for <b>climate studies, environmental planning, and policy development</b>.</p>
<b>Regulating Services</b>	<p><b>Regulating services</b> are the <b>ecosystem functions that help maintain environmental balance</b> by regulating <b>natural processes</b> such as <b>flood control, drought mitigation, land degradation prevention, and disease regulation</b>.</p> <p>These services contribute to <b>climate stability, water purification, air quality maintenance, and biodiversity conservation</b>, playing a crucial role in sustaining ecosystems and human well-being. Examples include:</p> <ul style="list-style-type: none"> <li>• <b>Forests and wetlands absorbing excess rainfall, reducing flood risks.</b></li> <li>• <b>Soil ecosystems preventing erosion and land degradation.</b></li> <li>• <b>Mangroves and coastal vegetation acting as natural barriers against storms.</b></li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Healthy ecosystems controlling pest populations and disease outbreaks.</b></li> </ul> <p>Regulating services are essential for <b>climate resilience, disaster risk reduction, and long-term environmental sustainability.</b></p>
<b>Rehabilitation</b>	<p><b>Rehabilitation</b> is the process of restoring individuals, ecosystems, or communities to a functional and stable state following injury, illness, environmental degradation, or disaster. It involves targeted interventions designed to <b>facilitate recovery, improve resilience, and enhance overall well-being.</b> In a medical context, rehabilitation includes <b>physical therapy, psychological support, and treatments</b> to help individuals regain health and mobility. In environmental and climate-related contexts, it refers to <b>restoring degraded ecosystems, rebuilding communities after disasters, and implementing sustainable practices</b> to prevent further harm. Whether applied to human health, ecosystems, or infrastructure, rehabilitation plays a crucial role in <b>long-term recovery, sustainability, and resilience-building.</b></p>
<b>Relative sea level</b>	<p><b>Relative sea level</b> is the <b>height of the sea surface measured by a tide gauge in relation to the land on which it is located.</b> It accounts for both <b>changes in sea level</b> and <b>vertical movements of the land</b>, such as land subsidence or uplift.</p> <p>Mean sea level is typically determined by <b>averaging relative sea level measurements over an extended period</b>, such as a month or year, to filter out short-term variations caused by <b>waves, tides, and atmospheric conditions.</b> Understanding relative sea level is essential for <b>coastal planning, flood risk assessment, and climate change adaptation.</b></p>
<b>Relative Sea Level Rise</b>	<p><b>Relative sea level rise</b> refers to the <b>increase in ocean water levels at a specific location, considering both global sea level rise and local geological factors, such as land subsidence or uplift.</b> It is measured relative to a <b>fixed vertical reference point (datum)</b>, which may itself change over time due to shifting land elevations.</p> <p>This phenomenon occurs when the <b>rise in ocean levels exceeds or combines with local land movements</b>, leading to a net increase in relative sea level. Researchers studying coastal impacts focus on <b>relative sea level change</b> to assess risks such as <b>coastal erosion, increased flooding, and saltwater intrusion.</b> Understanding relative sea level rise is crucial for <b>climate adaptation, infrastructure planning, and disaster risk management in coastal regions.</b></p>
<b>Relief Response</b>	<p><b>Relief response, also known as emergency management,</b> refers to the <b>strategic and coordinated efforts aimed at protecting critical assets and populations from disasters and hazards.</b> It involves a set of <b>interdisciplinary management processes</b> designed to <b>minimize damage, provide immediate assistance, and ensure continuity of essential services</b> during and after a crisis.</p> <p>Relief response includes <b>rapid mobilization of resources, emergency aid distribution, evacuation procedures, medical assistance, and infrastructure protection.</b> It is a key component of <b>disaster risk reduction (DRR), humanitarian aid, and resilience-building efforts,</b> ensuring that affected communities can recover effectively while mitigating future risks.</p>

Remote Sensing	<p><b>Remote sensing</b> is the process of <b>collecting information about an object or phenomenon from a distance</b> using <b>recording or real-time sensing devices</b> that do not require physical contact. These devices can be mounted on <b>aircraft, satellites, spacecraft, buoys, or ships</b> to capture data on various scales, from local to global.</p> <p>In practice, remote sensing involves the <b>use of specialized sensors</b> to gather data on <b>land, water, atmosphere, and ecosystems</b>, aiding in applications such as <b>climate monitoring, disaster management, environmental assessment, and resource mapping</b>.</p>
Removals	<p><b>Removals</b> refer to the <b>process of extracting greenhouse gases (GHGs) or pollutants from the atmosphere, land, or water systems</b>, contributing to environmental restoration and climate mitigation. This can occur through <b>natural processes, such as carbon sequestration in forests and oceans, or technological interventions, such as carbon capture and storage (CCS)</b>.</p> <p>Removals play a crucial role in achieving <b>net-zero emissions, improving air and water quality, and enhancing ecosystem resilience</b> against climate change impacts.</p>
Removals Unit (RMU)	<p>A <b>Removals Unit (RMU)</b> is a <b>tradable carbon credit under the Kyoto Protocol, representing the removal of one metric tonne of greenhouse gases (GHGs) from the atmosphere</b>. RMUs are issued by <b>Annex I countries</b> for <b>carbon sequestration activities under Land Use, Land-Use Change, and Forestry (LULUCF) projects</b>, such as <b>reforestation and afforestation</b>.</p> <p>These units contribute to <b>carbon accounting, emissions reduction commitments, and international carbon markets</b>, helping countries meet their climate targets through <b>nature-based and land-use solutions</b>.</p>
Renewable Energy	<p><b>Renewable energy</b> refers to <b>energy derived from naturally replenishing sources</b> such as <b>solar, wind, hydro, geothermal, and biomass</b>. Unlike fossil fuels, <b>these sources are not finite</b> and can continuously regenerate within a human lifetime.</p> <p>Key characteristics of renewable energy include:</p> <ul style="list-style-type: none"> <li>• <b>Sustainability:</b> These energy sources are continuously replenished by natural processes.</li> <li>• <b>Low Carbon Emissions:</b> Unlike fossil fuels, <b>renewable energy production typically does not release greenhouse gases</b>, helping to mitigate climate change.</li> <li>• <b>Diverse Sources:</b> It includes <b>solar radiation, wind power, hydropower, ocean energy (tidal, wave, and thermal), geothermal heat, and biomass</b>.</li> <li>• <b>Role in Climate Action:</b> Transitioning from fossil fuels to renewable energy is <b>critical for reducing global carbon emissions</b> and limiting climate change impacts.</li> </ul> <p>In 2020, <b>renewable energy accounted for 29% of global electricity production</b>. While <b>hydropower</b> is a significant renewable source, <b>large dams can disrupt ecosystems, river systems, and local communities</b>, making it a controversial energy solution.</p>

	By investing in <b>renewable technologies and policies</b> , countries can <b>enhance energy security, reduce environmental damage, and create a sustainable energy future.</b>
<b>Reservoirs</b>	<p><b>Reservoirs</b> are <b>natural or artificial components of the climate system that store greenhouse gases (GHGs) or their precursors</b>, helping regulate atmospheric concentrations. These reservoirs can be found in <b>terrestrial, oceanic, and atmospheric systems.</b></p> <p>Examples of reservoirs include:</p> <ul style="list-style-type: none"> <li>• <b>Forests and vegetation</b>, which absorb and store <b>carbon dioxide (CO<sub>2</sub>)</b> through photosynthesis.</li> <li>• <b>Oceans</b>, which act as major carbon sinks, <b>absorbing CO<sub>2</sub> from the atmosphere.</b></li> <li>• <b>Soils and wetlands</b>, which store organic carbon and influence greenhouse gas cycles.</li> </ul> <p>Reservoirs play a <b>crucial role in the global carbon cycle and climate regulation</b>, as they help mitigate climate change by <b>sequestering carbon and reducing the accumulation of GHGs in the atmosphere.</b></p>
<b>Residence Time</b>	<p><b>Residence time</b> refers to the <b>average duration an individual atom or molecule spends within a specific reservoir</b> before being removed or cycled into another system. In the context of <b>greenhouse gases (GHGs)</b>, residence time indicates <b>how long a particular gas molecule remains in the atmosphere</b> before being absorbed by natural sinks, such as oceans or vegetation.</p> <p>For most gases, except <b>methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>)</b>, residence time is approximately equal to their <b>atmospheric lifetime.</b> Understanding the residence time of GHGs is <b>crucial for assessing their impact on climate change</b> and developing effective mitigation strategies.</p>
<b>Residual Impacts</b>	<p><b>Residual impacts</b> refer to the <b>remaining effects of climate change that persist even after adaptation measures have been implemented.</b> These impacts occur when <b>adaptation efforts reduce, but do not fully eliminate, climate-related risks and damages.</b></p> <p>Examples of residual impacts include:</p> <ul style="list-style-type: none"> <li>• <b>Rising sea levels</b> still causing coastal erosion despite protective barriers.</li> <li>• <b>Heatwaves and droughts</b> continuing to affect agriculture and water availability even with improved irrigation and drought-resistant crops.</li> <li>• <b>Biodiversity loss</b> occurring despite conservation efforts.</li> </ul> <p>Understanding residual impacts is essential for <b>developing long-term resilience strategies, enhancing adaptation measures, and minimizing irreversible climate-related damages.</b></p>

<b>Residual Risk</b>	<p><b>Residual risk</b> refers to the <b>remaining level of risk that persists despite the implementation of disaster risk reduction (DRR) measures</b>. Even with effective adaptation and mitigation strategies in place, some risks cannot be entirely eliminated, requiring <b>ongoing preparedness, emergency response, and recovery efforts</b>.</p> <p>The presence of residual risk highlights the <b>need for continuous investment in emergency services, disaster preparedness, and socio-economic policies</b> such as <b>insurance mechanisms, safety nets, and risk transfer strategies</b> to protect communities and infrastructure.</p>
<b>Resilience</b>	<p><b>Resilience</b> is the <b>capacity of a system, community, or society to anticipate, prepare for, respond to, and recover from disruptions while maintaining essential functions and structure</b>. It involves <b>absorbing disturbances, adapting to stressors, and restoring stability</b> with minimal long-term damage to <b>social well-being, the economy, and the environment</b>.</p> <p>In the context of <b>climate change</b>, resilience refers to <b>a community's ability to cope with and recover from extreme weather events and other climate-related impacts</b>. Unlike adaptation, which implies <b>a permanent shift in response to changing conditions</b>, resilience suggests <b>the ability to bounce back to a functional state after a disruption</b>.</p> <p>Key aspects of resilience include:</p> <ul style="list-style-type: none"> <li>• <b>Absorption of shocks and stresses</b> (e.g., withstanding climate-related disasters).</li> <li>• <b>Adaptive capacity</b> (e.g., learning from past events to improve future responses).</li> <li>• <b>Self-organization and recovery</b> (e.g., rebuilding communities and ecosystems after disturbances).</li> </ul> <p>Building resilience requires <b>effective disaster risk reduction, sustainable resource management, and strong social and institutional frameworks</b> to ensure long-term stability and protection against future hazards.</p>
<b>Resistance</b>	<p><b>Resistance</b> refers to the <b>ability of an ecosystem to withstand disturbances while maintaining its fundamental structure, functions, and processes</b>. A highly resistant ecosystem can <b>absorb external stressors, such as climate change, pollution, or extreme weather events, with minimal alteration</b>.</p> <p>Examples of ecological resistance include:</p> <ul style="list-style-type: none"> <li>• <b>Old-growth forests</b> that remain stable despite periodic droughts or storms.</li> <li>• <b>Coral reefs</b> that can tolerate fluctuations in ocean temperature without significant bleaching.</li> <li>• <b>Wetlands</b> that continue to regulate floods and filter water even under increased environmental pressures.</li> </ul> <p><b>Resistance is a key factor in ecosystem resilience, helping to sustain biodiversity, ecological balance, and long-term environmental stability.</b></p>



<b>Respiration</b>	<p><b>Respiration</b> is the <b>biological process by which living organisms break down organic matter to produce energy, releasing carbon dioxide (CO<sub>2</sub>) and consuming oxygen (O<sub>2</sub>) in the process.</b> This occurs at the cellular level in both <b>plants and animals</b>, enabling them to sustain vital functions such as growth, repair, and reproduction.</p> <p>There are two main types of respiration:</p> <ul style="list-style-type: none"> <li>• <b>Aerobic respiration:</b> Requires oxygen and produces energy efficiently, along with CO<sub>2</sub> and water as by-products.</li> <li>• <b>Anaerobic respiration:</b> Occurs without oxygen, generating less energy and producing by-products such as lactic acid or methane.</li> </ul> <p>In the context of <b>climate change and ecosystems</b>, respiration plays a crucial role in the <b>carbon cycle</b>, as the release of CO<sub>2</sub> contributes to atmospheric carbon dynamics and influences global climate patterns.</p>
<b>Respond to climate change</b>	<p><b>Responding to climate change</b> refers to <b>human actions taken to address the impacts and causes of climate change</b> through two key approaches:</p> <ul style="list-style-type: none"> <li>• <b>Climate Change Adaptation:</b> Adjusting systems, practices, and policies to <b>reduce vulnerability</b> and enhance resilience against climate-related risks, such as rising sea levels, extreme weather events, and shifting ecosystems.</li> <li>• <b>Climate Change Mitigation:</b> Implementing strategies to <b>reduce greenhouse gas (GHG) emissions</b> and enhance carbon sinks, such as transitioning to renewable energy, improving energy efficiency, and promoting sustainable land use practices.</li> </ul> <p>A comprehensive response to climate change involves <b>policy measures, technological advancements, behavioural changes, and international cooperation</b> to ensure a sustainable and climate-resilient future.</p>
<b>Response</b>	<p><b>Response</b> refers to the <b>immediate actions taken to address the impacts of environmental hazards, disasters, or climate-related events</b> in order to <b>protect lives, reduce health risks, ensure public safety, and provide essential services to affected communities.</b></p> <p>In the context of <b>climate change and disaster management</b>, response efforts include <b>emergency aid distribution, medical assistance, evacuation procedures, and the restoration of critical infrastructure.</b> These actions are essential for <b>minimizing damage and supporting communities in the aftermath of extreme events such as hurricanes, floods, wildfires, and heatwaves.</b></p> <p>A well-coordinated response is a key component of <b>disaster risk management, humanitarian efforts, and resilience-building</b> to help societies recover and adapt to future climate challenges.</p>
<b>Response Time</b>	<p><b>Response time (or adjustment time)</b> refers to the duration required for the <b>climate system</b> or its components to reach a new equilibrium following a <b>forcing</b> caused by external or internal processes or feedbacks. The response time varies significantly across different elements of the climate system:</p> <ul style="list-style-type: none"> <li>• <b>Troposphere:</b> Adjusts relatively quickly, within <b>days to weeks.</b></li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Stratosphere:</b> Takes a <b>few months</b> to reach equilibrium.</li> <li>• <b>Oceans:</b> Due to their <b>high heat capacity</b>, response times range from <b>decades to centuries or even millennia</b>.</li> <li>• <b>Surface-Troposphere System:</b> Strongly influenced by oceanic response, making it <b>slower than the stratosphere</b>.</li> <li>• <b>Biosphere:</b> Can exhibit <b>both rapid responses</b> (e.g., to droughts) and <b>long-term adjustments</b> to imposed changes.</li> </ul> <p>The overall pace of climate response is largely dictated by the <b>ocean-atmosphere interactions</b>, underscoring the complexity of climate adaptation and mitigation strategies.</p>
<b>Restoration</b>	<p><b>Restoration</b> refers to the process of bringing a system, environment, or object back to a healthier or improved state. In the context of <b>environment and climate change</b>, restoration involves efforts to <b>rehabilitate ecosystems, natural habitats, and degraded landscapes</b> to enhance biodiversity, ecosystem services, and resilience to climate change.</p> <p>Examples of <b>environmental restoration</b> include:</p> <ul style="list-style-type: none"> <li>• <b>Forest restoration:</b> Replanting trees and promoting natural regeneration.</li> <li>• <b>Wetland restoration:</b> Reviving water bodies to restore ecological balance.</li> <li>• <b>Soil restoration:</b> Improving soil health through sustainable land management practices.</li> <li>• <b>Marine restoration:</b> Protecting coral reefs and restoring coastal ecosystems.</li> </ul> <p>Restoration plays a crucial role in <b>climate mitigation and adaptation</b>, helping to reverse environmental damage and enhance ecosystem resilience.</p>
<b>Result Based Payment</b>	<p><b>Result-Based Payment (RBP)</b> is a <b>performance-driven reimbursement system</b> that provides financial incentives based on the achievement of predefined outcomes and quality standards. It ensures that payments are linked to measurable results rather than just the provision of services.</p> <p>In the context of <b>climate action, sustainability, and environmental projects</b>, <b>Result-Based Payment</b> is widely used to support:</p> <ul style="list-style-type: none"> <li>• <b>Climate finance mechanisms</b> (e.g., REDD+ for forest conservation).</li> <li>• <b>Sustainable development projects</b> with verifiable impacts.</li> <li>• <b>Carbon credit and offset programs</b> rewarding emission reductions.</li> <li>• <b>Biodiversity conservation efforts</b> tied to ecological restoration outcomes.</li> </ul> <p>By aligning financial incentives with <b>measurable environmental and social benefits</b>, RBP promotes <b>accountability, efficiency, and long-term sustainability</b> in policy implementation and project execution.</p>

<b>Retrofitting</b>	<p><b>Retrofitting</b> is the process of <b>modifying, reinforcing, or upgrading existing structures</b> to improve their <b>resilience, safety, and functionality</b> against potential hazards such as <b>earthquakes, floods, cyclones, or climate-related impacts</b>. It involves assessing structural vulnerabilities and implementing <b>targeted improvements</b> to enhance durability and sustainability.</p> <p><b>Key aspects of retrofitting include:</b></p> <ul style="list-style-type: none"> <li>• Strengthening <b>walls, foundations, and roofs</b> to withstand stress.</li> <li>• Enhancing <b>seismic resistance</b> through structural reinforcements.</li> <li>• Improving <b>energy efficiency</b> by upgrading insulation and ventilation.</li> <li>• Protecting critical infrastructure and equipment from damage.</li> </ul> <p>Retrofitting is essential for <b>disaster risk reduction, climate adaptation, and sustainable infrastructure development</b>, ensuring long-term safety and resilience.</p>
<b>Risk</b>	<p><b>Risk</b> refers to the <b>potential for loss or damage</b> resulting from the interaction of a <b>hazard</b>, the <b>likelihood of its occurrence</b>, and the <b>vulnerability of the exposed system</b>. In the context of <b>climate change and disaster management</b>, risk is determined by three key factors:</p> <ul style="list-style-type: none"> <li>• <b>Hazard:</b> A natural or human-induced event (e.g., extreme weather, floods, droughts).</li> <li>• <b>Exposure:</b> The presence of people, assets, or ecosystems in hazard-prone areas.</li> <li>• <b>Vulnerability:</b> The susceptibility of a system to harm due to its social, economic, or environmental conditions.</li> </ul> <p>Risk is often expressed as: <b>Risk = Probability of Hazard × Vulnerability</b>.</p> <p>Effective <b>risk management</b> involves <b>mitigation, adaptation, and resilience-building</b> to minimize potential negative consequences on communities, infrastructure, and ecosystems.</p>
<b>Risk Assessment</b>	<p><b>Risk assessment</b> is a systematic process used to <b>evaluate the nature and extent of risks</b> by analysing potential <b>climate and environmental hazards</b> and assessing the <b>vulnerabilities of exposed communities, ecosystems, and infrastructure</b>. It helps identify the likelihood and potential impact of threats that could harm <b>people, livelihoods, property, and the environment</b>.</p> <p>This process involves:</p> <ul style="list-style-type: none"> <li>• <b>Identifying hazards</b> (e.g., extreme weather events, rising sea levels, biodiversity loss).</li> <li>• <b>Assessing exposure</b> (e.g., population density in flood-prone areas, infrastructure at risk).</li> <li>• <b>Evaluating vulnerability</b> (e.g., socio-economic factors, resilience of ecosystems).</li> </ul>

	<p>Risk assessment is essential for <b>climate adaptation, disaster preparedness, and policy planning</b>, enabling proactive measures to <b>mitigate environmental risks and enhance resilience</b>.</p>
<b>Risk management</b>	<p><b>Risk management</b> is a <b>systematic approach</b> to identifying, assessing, and addressing risks to <b>minimize potential harm and loss</b> in the face of <b>climate and environmental uncertainties</b>. It involves implementing <b>strategies and actions</b> to <b>reduce, control, or transfer risks</b>, particularly in sectors vulnerable to climate change, such as <b>water supply, energy, and agriculture</b>.</p> <p>In the context of <b>climate action</b>, risk management is broadly categorized into:</p> <ul style="list-style-type: none"> <li>• <b>Adaptation:</b> Strengthening resilience to climate impacts (e.g., flood defenses, drought-resistant crops).</li> <li>• <b>Mitigation:</b> Reducing greenhouse gas emissions to prevent future climate risks (e.g., renewable energy adoption, carbon sequestration).</li> </ul> <p>Key components of risk management include:</p> <ul style="list-style-type: none"> <li>• <b>Risk assessment and analysis</b> to evaluate potential environmental and social threats.</li> <li>• <b>Preventive measures</b> to limit damage from extreme weather events, wildfires, and pollution.</li> <li>• <b>Sustainable planning</b> to ensure long-term ecosystem and community resilience.</li> </ul> <p>By integrating <b>climate risk management</b> into decision-making, governments, businesses, and communities can <b>enhance sustainability, reduce vulnerabilities, and improve climate resilience</b>.</p>
<b>Risk Mapping</b>	<p><b>Risk mapping</b> is the process of <b>identifying and visualizing high-risk areas</b> by analysing the relationship between <b>hazards, terrain, and the probability of occurrence</b>. It involves assessing the potential impact of <b>natural disasters, climate hazards, and environmental threats</b> on specific geographic locations.</p> <p>Key aspects of risk mapping include:</p> <ul style="list-style-type: none"> <li>• <b>Hazard assessment:</b> Identifying threats such as earthquakes, floods, wildfires, and sea-level rise.</li> <li>• <b>Geospatial analysis:</b> Correlating hazards with terrain, land use, and population density.</li> <li>• <b>Risk visualization:</b> Creating <b>risk maps</b> that indicate the type and severity of potential impacts.</li> </ul> <p>Risk mapping serves as a <b>crucial tool for disaster preparedness, climate adaptation, and urban planning</b>, enabling policymakers and communities to <b>implement effective risk reduction strategies</b>.</p>
<b>Risk Transfer</b>	<p><b>Risk transfer</b> is the process of <b>shifting financial responsibility for potential risks</b> from one party to another, ensuring that resources are available for recovery after a disaster. This mechanism allows <b>households, communities, businesses, or governments</b> to reduce financial exposure in exchange for ongoing payments or other compensatory benefits.</p>

	<p><b>Common Risk Transfer Mechanisms:</b></p> <ul style="list-style-type: none"> <li>• <b>Insurance &amp; Reinsurance:</b> Coverage is obtained in exchange for premiums, providing financial protection after disasters.</li> <li>• <b>Catastrophe Bonds:</b> Investors finance disaster recovery efforts, with pay-outs triggered by specific events.</li> <li>• <b>Contingent Credit Facilities:</b> Pre-arranged credit lines offering immediate post-disaster funding.</li> <li>• <b>Reserve Funds:</b> Governments and organizations allocate financial reserves for future risks.</li> <li>• <b>Mutual Aid &amp; Informal Networks:</b> Communities and families support each other through reciprocal aid systems.</li> </ul> <p>Risk transfer is a crucial component of <b>climate resilience and disaster risk management</b>, helping to <b>reduce economic shocks, enhance preparedness, and improve recovery capacity in the face of extreme events</b>.</p>
<b>Runoff</b>	<p><b>Runoff</b> refers to the <b>movement of excess water</b> from <b>rainfall, snowmelt, or irrigation</b> that flows over the land surface instead of being absorbed into the ground. This water eventually drains into <b>rivers, lakes, wetlands, or other surface water bodies</b>.</p> <p><b>Types of Runoffs:</b></p> <ul style="list-style-type: none"> <li>• <b>Surface Runoff:</b> Water that flows over land due to <b>impermeable surfaces</b> or saturated soil.</li> <li>• <b>Subsurface Runoff:</b> Water that infiltrates the soil but moves laterally toward water bodies.</li> <li>• <b>Urban Runoff:</b> Water from roads, buildings, and paved areas, often carrying pollutants.</li> </ul> <p><b>Runoff plays a crucial role in the hydrological cycle</b>, influencing <b>water availability, soil erosion, and flood risks</b>, while also affecting <b>water quality and ecosystem health</b>.</p>
<b>Safeguard Principles</b>	<p><b>Safeguard principles</b> refer to <b>policies, guidelines, or measures</b> that are put in place to <b>protect specific sectors, communities, or the environment</b> from potential risks, harm, or negative impacts. These principles aim to ensure that development projects, business practices, or trade activities are conducted in a manner that safeguards <b>human rights, social well-being, environmental health, and economic stability</b>.</p> <p>In the context of international trade or development, safeguard principles might include measures to <b>protect local industries</b> from <b>unfair foreign competition</b> or to <b>prevent environmental degradation</b> and social harm.</p> <p>These principles help to <b>balance economic, social, and environmental interests</b>, promoting <b>sustainable development</b> while minimizing potential adverse consequences.</p>
<b>Salinisation</b>	<p><b>Salinisation</b> is the process of <b>salt accumulation</b> in the soil, which can result from <b>natural factors</b> or <b>human activities</b> such as irrigation. This build-up of salts can negatively affect soil fertility, <b>plant growth</b>, and agricultural productivity, making the land less suitable for cultivation.</p>

	<p><b>Causes of Salinisation:</b></p> <ul style="list-style-type: none"> <li>• <b>Irrigation:</b> Excessive use of water containing high salt concentrations can lead to salt build-up when water evaporates.</li> <li>• <b>Poor drainage:</b> Inadequate drainage systems can cause salts to remain in the soil.</li> <li>• <b>Natural factors:</b> In some areas, salts naturally accumulate due to high evaporation rates or the geological composition of the land.</li> </ul>
<b>Salt Water Intrusion</b>	<p><b>Saltwater intrusion</b> refers to the <b>movement of saltwater</b> into <b>freshwater aquifers or surface water</b> sources, typically occurring in <b>coastal and estuarine areas</b>. This phenomenon is driven by the <b>greater density of saltwater</b> compared to freshwater, leading to the displacement of fresh water.</p> <p>It typically occurs due to:</p> <ul style="list-style-type: none"> <li>• <b>Reduced land-based influence</b>, such as <b>decreased runoff</b> or <b>lower groundwater recharge</b> from excessive water withdrawals.</li> <li>• <b>Increased marine influence</b>, such as <b>sea level rise</b>, which pushes saltwater further inland.</li> </ul> <p>Saltwater intrusion can have significant <b>environmental and socio-economic impacts</b>, including the <b>degradation of freshwater resources</b>, which is especially problematic for <b>agriculture, drinking water supplies</b>, and <b>ecosystem health</b> in coastal regions.</p>
<b>Scenario</b>	<p>A <b>scenario</b> is a <b>plausible, often simplified</b> description of how the future might unfold, based on a <b>coherent set of assumptions</b> about key <b>driving forces</b> (such as technological change, prices, or policies) and their relationships. Scenarios are not <b>predictions</b> or <b>forecasts</b>, but instead serve as tools to explore different possible outcomes.</p> <p>While scenarios can be based on <b>projections</b>, they often incorporate additional information from other sources, sometimes expressed through a <b>narrative storyline</b>. This helps to create a <b>broader understanding</b> of potential developments under varying conditions.</p> <p>In the context of <b>climate change</b>, for example, scenarios could involve <b>climate scenarios</b> or <b>emission scenarios</b>, which explore the potential impacts of different policy choices, technological advancements, or societal shifts.</p>
<b>Scoping</b>	<p><b>Scoping</b> is the process of identifying and outlining the <b>key issues and concerns</b> at the early stages of a planning or decision-making process. It is conducted to help in <b>site selection</b>, assess potential alternatives, and ensure that all relevant factors are considered.</p> <p>The scoping process should involve all <b>interested stakeholders</b>, such as <b>project proponents, planning or environmental agencies</b>, and <b>members of the public</b>, to ensure that diverse perspectives and concerns are addressed before proceeding with further planning or development.</p>
<b>Sea ice</b>	<p><b>Sea ice</b> refers to <b>frozen ocean water</b> that forms in both the <b>Arctic</b> and <b>Antarctic</b> seas. It is distinct from <b>glaciers</b> and <b>ice sheets</b> as it forms directly from <b>saltwater</b> rather than freshwater. Since <b>1979</b>, the Earth has experienced a significant loss in <b>sea ice mass</b>, with an area roughly the size of <b>Maryland</b> disappearing each year. This reduction in sea ice is closely linked to <b>climate change</b>, with warmer</p>

	temperatures causing earlier melting and reduced ice coverage, particularly in polar regions. The decline in sea ice has significant implications for <b>marine ecosystems</b> , <b>global climate patterns</b> , and <b>sea levels</b> .
<b>Sea level</b>	<p><b>Sea level</b> refers to the <b>average height</b> of the <b>ocean's surface</b>, measured between <b>high tide</b> and <b>low tide</b>, where the <b>sea meets the shoreline</b>. It serves as a <b>baseline</b> for measuring <b>elevation</b> and <b>depth</b> on Earth.</p> <p>Sea level is influenced by various factors, including <b>tides</b>, <b>ocean currents</b>, <b>climate change</b>, and <b>glacial melt</b>, and it plays a critical role in understanding <b>coastal flooding</b>, <b>erosion</b>, and <b>changes in land elevation</b>. Rising sea levels, driven by <b>global warming</b>, pose significant risks to coastal regions worldwide.</p>
<b>Sea level rise</b>	<p><b>Sea level rise</b> refers to the <b>long-term increase</b> in the <b>average level of the ocean</b>, specifically the level between <b>high tide</b> and <b>low tide</b>, where the sea meets the shoreline.</p> <p>This rise can occur both <b>globally</b> and <b>locally</b>, driven by:</p> <ol style="list-style-type: none"> <li>1. <b>Changes in the shape of ocean basins</b></li> <li>2. <b>Variations in the total mass of water</b>, such as the <b>melting of glaciers and ice sheets</b></li> <li>3. <b>Alterations in water density</b>, due to <b>rising ocean temperatures</b> and changes in <b>salinity</b></li> </ol> <p>Under <b>global warming</b>, factors contributing to sea level rise include the <b>addition of water</b> from melting <b>land-based ice</b> and <b>thermal expansion</b> from warming ocean waters. <b>Relative sea-level rise</b> refers to a <b>local increase</b> in sea level relative to the land, which can be caused by both <b>ocean rise</b> and <b>land subsidence</b> (sinking of land).</p>
<b>Sea Surface Temperature</b>	<b>Sea Surface Temperature (SST)</b> refers to the <b>temperature of the top layer</b> of the ocean, typically within the <b>top several feet</b> . It is measured using various tools, including <b>ships</b> , <b>buoys</b> , and <b>drifters</b> . SST plays a crucial role in <b>climate systems</b> , influencing <b>weather patterns</b> , <b>ocean currents</b> , and <b>marine ecosystems</b> . It also impacts <b>global heat exchange</b> , contributing to <b>climate variability</b> and <b>extreme weather events</b> .
<b>Sea wall</b>	A <b>sea wall</b> is a <b>man-made structure</b> built along a coastline to <b>protect the land</b> from the damaging effects of <b>sea water</b> and <b>coastal flooding</b> . Sea walls are designed to act as a <b>barrier</b> , preventing erosion, storm surges, and the intrusion of seawater onto land, thus safeguarding coastal areas, infrastructure, and human settlements.
<b>Second Assessment Report (SAR)</b>	The <b>Second Assessment Report (SAR)</b> , also known as <b>Climate Change 1995</b> , is a comprehensive review of <b>global research on climate change</b> compiled by the <b>IPCC</b> and published in <b>1995</b> . This report synthesized scientific findings, providing critical insights into the state of <b>climate science</b> , <b>impacts</b> , and potential <b>mitigation strategies</b> , contributing to the global understanding of climate change.
<b>Secondary Forest</b>	A <b>secondary forest</b> is a <b>degraded forest</b> that has undergone changes due to <b>human activities</b> , leading to a loss of its <b>natural structure</b> , <b>function</b> , <b>species composition</b> , or <b>productivity</b> that would typically be found in a natural forest of that type. As a result, a secondary forest

	provides a <b>reduced supply</b> of goods and services and supports only <b>limited biological diversity</b> . The biological diversity in these forests often includes <b>non-tree species</b> , which may dominate the <b>under-canopy vegetation</b> .
<b>Secretariat</b>	The <b>Secretariat</b> is the office staffed by <b>international civil servants</b> tasked with supporting the <b>UNFCCC convention</b> and ensuring its effective operation. The Secretariat is responsible for organizing meetings, preparing and compiling reports, and coordinating with other relevant <b>international organizations</b> . The <b>UNFCCC Secretariat</b> , located in <b>Bonn, Germany</b> , is institutionally connected to the <b>United Nations</b> .
<b>Sector</b>	A <b>sector</b> refers to a <b>specific part or division</b> of the economy (e.g., the <b>manufacturing sector</b> , the <b>services sector</b> ) or the environment (e.g., <b>water resources</b> , <b>forestry</b> ). These sectors represent distinct areas of activity, each with its own set of processes, resources, and impacts.
<b>Sediment data</b>	<b>Sediment data</b> refers to the <b>materials and measurements</b> collected by extracting a <b>vertical core</b> from lake bottom sediments and analysing the <b>layers</b> . These data provide valuable information on historical environmental conditions, such as past climate patterns, water quality, and ecological changes over time.
<b>Seed particles</b>	<b>Seed particles</b> are <b>tiny solid or liquid particles</b> that offer a <b>non-gaseous surface</b> , facilitating the transition of water from <b>vapor to liquid</b> . These particles play a crucial role in processes like <b>cloud formation</b> and <b>precipitation</b> , as they provide the surface necessary for water vapor to condense and form droplets.
<b>Sensitivity</b>	<b>Sensitivity</b> refers to the <b>degree to which a system</b> is influenced, either <b>negatively or positively</b> , by <b>climate variability or change</b> . The effect can be <b>direct</b> , such as a <b>change in crop yield</b> due to shifts in <b>temperature</b> (mean, range, or variability), or <b>indirect</b> , such as the <b>damages caused by increased coastal flooding</b> due to <b>sea level rise</b> .
<b>Sensitivity analysis</b>	<b>Sensitivity analysis</b> is the process of evaluating how <b>different sources of variation</b> affect the <b>output</b> of a <b>predictive model</b> . It helps identify the factors that most significantly influence outcomes, allowing for better understanding and management of uncertainties in model prediction.
<b>Sequestration</b>	<b>Sequestration</b> is the process of <b>increasing the carbon content</b> in a <b>carbon reservoir</b> other than the atmosphere. <b>Biological sequestration</b> methods include <b>direct removal of carbon dioxide</b> through practices such as <b>land-use change</b> , <b>afforestation</b> , <b>reforestation</b> , and techniques that enhance <b>soil carbon</b> in agriculture. <b>Physical sequestration</b> involves the <b>separation and disposal of carbon dioxide</b> from sources like <b>flue gases</b> or <b>fossil fuel processing</b> , with long-term storage in <b>depleted oil and gas reservoirs</b> , <b>coal seams</b> , or <b>saline aquifers</b> .
<b>Short Ton</b>	A <b>short ton</b> is a unit of mass commonly used in the <b>United States</b> , equal to <b>2,000 pounds (lbs)</b> or approximately <b>0.907 metric tons</b> . It is often used to measure quantities of materials like coal, steel, and other commodities.



<b>Silviculture</b>	<b>Silviculture</b> is the <b>development and management of forests</b> , focusing on the <b>establishment, composition, and growth</b> of trees to best meet the <b>objectives of the landowner</b> . It is the <b>science, art, and practice</b> of <b>caring for forests</b> in alignment with <b>human objectives</b> , which may or may not involve <b>timber production</b> . The term originates from the Latin <b>silvi-</b> (forest) and <b>culture</b> (as in growing).
<b>Sink</b>	A <b>sink</b> is any <b>process, activity, or mechanism</b> that <b>removes greenhouse gases, aerosols, or precursors of greenhouse gases or aerosols</b> from the atmosphere. <b>Forests</b> and other <b>vegetation</b> are considered sinks because they <b>remove carbon dioxide</b> through <b>photosynthesis</b> , playing a crucial role in <b>mitigating climate change</b> .
<b>Site-specific Approach</b>	The <b>site-specific approach</b> focuses on developing and evaluating <b>detailed adaptation strategies</b> based on specific <b>vulnerabilities</b> identified by a broad range of <b>stakeholders</b> at the <b>local level</b> , such as <b>communities</b> and <b>projects</b> . This approach ensures that adaptation efforts are tailored to the unique conditions and challenges of a particular site.
<b>Slash and Burn</b>	<b>Slash and Burn</b> is a practice that involves the <b>cutting and burning of forests or woodlands</b> to create fields for agriculture, pasture for livestock, or for other purposes. It is often associated with <b>shifting cultivation agriculture</b> and <b>transhumance livestock herding</b> . This method typically involves <b>minimal technology</b> and tools, and is primarily used for <b>subsistence farming</b> . The environmental impact of slash and burn agriculture includes <b>deforestation</b> , loss of biodiversity, and the release of <b>greenhouse gases</b> , contributing to <b>climate change</b> .
<b>Snow</b>	<b>Snow</b> is a form of precipitation in the Earth's atmosphere, consisting of <b>crystalline water ice</b> that forms numerous <b>snowflakes</b> falling from clouds. As snow is made up of small ice particles, it is a <b>granular material</b> with an open, <b>soft structure</b> , unless compacted by external pressure. In the context of <b>climate change</b> , snow plays a critical role in <b>reflecting sunlight</b> (albedo effect), and its <b>melting</b> due to rising global temperatures contributes to <b>sea level rise</b> and the disruption of <b>ecosystems</b> that depend on seasonal snow cover.
<b>Snow Packs</b>	<b>Snow Packs</b> refer to the seasonal accumulation of <b>slow-melting snow</b> that builds up over time. In the context of <b>climate change</b> , the <b>melting of snowpacks</b> at a faster rate due to rising temperatures can lead to <b>water scarcity</b> , disrupt <b>ecosystems</b> , and impact <b>water resources</b> that depend on the gradual release of meltwater during warmer months.
<b>Snow water equivalent</b>	<p><b>Snow Water Equivalent (SWE)</b> is the <b>volume or mass of water</b> that would be produced if a particular body of <b>snow or ice</b> were to melt. It is an important measurement because it helps quantify the <b>amount of water stored in snowpacks</b> and provides an estimate of the potential <b>runoff</b> once the snow melts. The SWE is a critical parameter for <b>water resource management</b>, particularly in areas where <b>snowmelt</b> serves as a primary source of freshwater during warmer months.</p> <p><b>Snow Water Equivalent (SWE)</b> can be calculated using the following formula:</p> $\text{SWE} = \text{Depth of Snow} \times \text{Density of Snow}$ <p>SWE is increasingly significant, as rising temperatures can lead to earlier <b>snowmelt</b> or reduced <b>snow accumulation</b> in some regions. This alters the timing and volume of water available, impacting <b>agriculture, hydropower generation, and ecosystems</b> that rely on gradual</p>

	<p>snowmelt for water supply. For example, <b>reduced snowpacks</b> and altered SWE patterns can exacerbate <b>water shortages</b> during droughts and affect seasonal <b>flooding</b> patterns. Monitoring SWE is thus crucial for adapting to the changing dynamics of <b>climate variability</b> and ensuring sustainable management of water resources.</p>
<b>Snowline</b>	<p><b>Snowline</b> refers to the <b>altitude or latitude</b> above which <b>snow and ice</b> persist on the ground throughout the year. This <b>climatic snow line</b> is influenced by factors such as temperature and precipitation. However, the <b>actual snow line</b> can vary seasonally, often being <b>significantly lower</b> during warmer months due to <b>temperature increases</b> from <b>climate change</b>. The shifting of the snowline is an important indicator of <b>climate change</b>, as rising temperatures are causing snowlines to move to higher altitudes or latitudes, reducing <b>glacial cover</b> and affecting <b>ecosystems</b> dependent on snow and ice.</p>
<b>Snowpack</b>	<p><b>Snowpack</b> refers to the seasonal accumulation of <b>slow-melting snow</b> that builds up over time. This snowpack plays a crucial role in <b>water storage</b>, as it gradually releases meltwater into rivers and streams, especially during <b>warmer months</b>. In the context of <b>climate change</b>, the timing and <b>magnitude of snowpack melt</b> are shifting, leading to earlier snowmelt and altered <b>water availability</b>. These changes can result in <b>water shortages</b>, disrupt <b>agricultural cycles</b>, and affect <b>hydropower generation</b> in regions dependent on <b>snowmelt</b>.</p>
<b>Social Capital</b>	<p><b>Social Capital</b> refers to the <b>social resources</b> that individuals rely on in their pursuit of livelihoods. This includes <b>networks, group memberships, relationships of trust</b>, and access to <b>wider societal institutions</b>. Social capital plays a vital role in enhancing <b>community resilience</b> to environmental stresses, as strong social networks can facilitate <b>information sharing, collaborative action</b>, and <b>resource mobilization</b> during times of crisis. Communities with higher social capital are better equipped to adapt to <b>climate impacts</b> and implement <b>sustainable practices</b>.</p>
<b>Social Vulnerability</b>	<p><b>Social Vulnerability</b> is a key aspect of vulnerability to various <b>stressors</b> and <b>shocks</b>, including <b>natural hazards</b>. It refers to the <b>inability of individuals, organizations, and societies</b> to withstand the <b>adverse impacts</b> of multiple stressors, such as <b>climate change, extreme weather events</b>, and <b>economic disruptions</b>. These impacts are influenced by factors inherent in <b>social interactions, institutions, and cultural values</b>. In the context of <b>climate change</b>, social vulnerability is heightened by <b>inequality, lack of access to resources</b>, and <b>social exclusion</b>, making marginalized communities more susceptible to the <b>impacts of climate-related events</b>.</p>
<b>Socio Natural Hazard</b>	<p><b>Socio-Natural Hazard</b> refers to the increased frequency of certain <b>geophysical</b> and <b>hydro-meteorological hazard events</b>, such as <b>landslides, flooding, land subsidence, and drought</b>, which arise from the interaction between <b>natural hazards</b> and <b>overexploited or degraded land</b> and <b>environmental resources</b>. These hazards are often exacerbated by <b>unsustainable land use practices</b> and <b>environmental degradation</b>. In the context of <b>climate change</b>, socio-natural hazards are becoming more frequent and severe due to changing weather patterns and <b>human impacts on ecosystems</b>. However, these hazards can be mitigated and prevented through <b>wise management of land and environmental resources</b>, promoting <b>sustainable practices</b> and <b>climate adaptation strategies</b>.</p>

<b>Socio-economic scenarios</b>	<b>Socio-economic Scenarios</b> refer to projections of future conditions based on factors such as <b>population growth</b> , <b>Gross Domestic Product (GDP)</b> , and other key <b>socio-economic variables</b> . These scenarios are crucial for understanding the potential <b>impacts of climate change</b> , as they help to assess how <b>economic development</b> , <b>social trends</b> , and <b>resource consumption</b> might evolve in different contexts. By incorporating these scenarios, policymakers can better plan for the <b>adaptive responses</b> needed to address climate risks and vulnerabilities.
<b>Socio-economic Vulnerability</b>	<b>Socio-economic Vulnerability</b> is an overall measure of <b>human welfare</b> that combines <b>environmental</b> , <b>social</b> , <b>economic</b> , and <b>political</b> exposure to various harmful disruptions. It reflects how vulnerable individuals, communities, or societies are to <b>climate change impacts</b> , such as extreme weather events, <b>resource scarcity</b> , and <b>economic shocks</b> . In the context of <b>climate change</b> , socio-economic vulnerability is influenced by factors like <b>poverty</b> , <b>inequality</b> , and <b>lack of access to adaptive resources</b> , making certain populations more at risk to the adverse effects of environmental changes.
<b>Soil Carbon</b>	<b>Soil Carbon</b> is a key component of the <b>terrestrial biosphere pool</b> in the <b>carbon cycle</b> . The amount of carbon stored in the soil is influenced by historical <b>vegetative cover</b> and <b>productivity</b> , which are, in turn, impacted by <b>climatic variables</b> such as temperature, precipitation, and seasonality. In the context of <b>climate change</b> , soil carbon plays a crucial role in <b>carbon sequestration</b> , as it can either act as a <b>sink</b> or <b>source</b> of carbon, depending on land use practices and environmental conditions. Managing soil carbon effectively can help mitigate <b>greenhouse gas emissions</b> and support <b>climate adaptation</b> efforts.
<b>Soil Erosion</b>	<b>Soil Erosion</b> is the process of <b>weathering</b> and <b>transporting solids</b> —such as <b>sediment</b> , <b>soil</b> , <b>rock</b> , and other particles—through natural processes, depositing them in different locations. It typically occurs due to <b>wind</b> , <b>water</b> , <b>ice</b> , or the <b>down-slope creep of soil</b> driven by gravity. Erosion can also be caused by living organisms, such as <b>burrowing animals</b> , in a process known as <b>bio-erosion</b> . In the context of <b>climate change</b> , increased <b>extreme weather events</b> (like heavy rainfall and high winds) and <b>land degradation</b> can accelerate soil erosion, leading to the loss of <b>fertile soil</b> , reduced <b>agricultural productivity</b> , and increased <b>sedimentation</b> in water bodies, which impacts <b>ecosystems</b> and <b>water quality</b> .
<b>Soil Moisture</b>	<b>Soil Moisture</b> refers to the <b>water present in the soil or on the land surface</b> that is <b>accessible for evaporation</b> . It plays a <b>vital role in the environment and climate system</b> , directly impacting <b>plant growth</b> , <b>weather patterns</b> , and <b>the global water cycle</b> .
<b>Solar Cycle</b>	<p>The <b>Solar Cycle</b> is a recurring <b>approximately 11-year</b> period of fluctuating solar activity, characterized by changes in <b>sunspots</b>, <b>solar flares</b>, and <b>coronal mass ejections</b>. These variations are driven by the <b>Sun's magnetic field</b>, which undergoes periodic reversals, influencing the intensity of solar radiation reaching Earth.</p> <p>The cycle was first discovered in <b>1843 by German astronomer Heinrich Schwabe</b>, who observed patterns in sunspot occurrences. At its peak, known as the <b>solar maximum</b>, the Sun experiences increased sunspot activity, stronger solar winds, and heightened electromagnetic disturbances, which can affect <b>satellite operations</b>, <b>communication systems</b>, and <b>power grids on Earth</b>. Conversely, during the <b>solar minimum</b>, solar activity decreases, leading to fewer sunspots and reduced solar emissions.</p>

	Scientists continue to study the <b>solar cycle's impact on Earth's climate</b> , seeking to understand how fluctuations in solar energy contribute to <b>temperature variations, atmospheric changes, and long-term climate patterns</b> . While the Sun's influence is significant, it is only one factor among many driving global climate dynamics.
<b>Solar Power</b>	<b>Solar Power</b> is the <b>renewable energy</b> harnessed from the <b>Sun's radiation</b> , which can be converted into <b>thermal or electrical energy</b> . It plays a <b>crucial role in sustainable energy solutions</b> , reducing <b>carbon emissions</b> and mitigating <b>climate change</b> by providing an <b>eco-friendly alternative</b> to fossil fuels.
<b>Solar Radiation</b>	<b>Solar Radiation</b> refers to the <b>electromagnetic energy emitted by the Sun</b> , also known as <b>shortwave radiation</b> . It plays a <b>critical role in Earth's climate system</b> , driving <b>weather patterns, ocean currents, and the global energy balance</b> . The Sun's temperature determines the <b>spectrum of solar radiation</b> , which peaks in <b>visible wavelengths</b> and influences <b>atmospheric dynamics, photosynthesis, and climate variability</b> .
<b>Soot Particles</b>	<b>Soot Particles</b> are <b>tiny carbon-rich particles</b> formed when <b>organic materials undergo incomplete combustion</b> , typically from <b>fossil fuels, biomass burning, and wildfires</b> . These particles contain <b>carbon, oxygen, and hydrogen</b> and have an <b>imperfect graphitic structure</b> .  <b>Soot is a major air pollutant</b> that contributes to <b>poor air quality, respiratory diseases, and environmental degradation</b> . Additionally, <b>black carbon, a key component of soot, absorbs sunlight</b> , accelerating <b>global warming</b> by reducing the reflectivity of surfaces like <b>ice and snow</b> , leading to faster <b>glacier melt and temperature rise</b> . Reducing <b>soot emissions</b> is crucial for <b>mitigating climate change</b> and improving <b>public health</b> .
<b>Source</b>	A <b>Source</b> refers to any <b>process, activity, or mechanism</b> that releases <b>greenhouse gases (GHGs), aerosols, or their precursors</b> into the <b>atmosphere</b> . These emissions contribute to <b>climate change</b> , air pollution, and environmental imbalances. <b>Major sources</b> include <b>burning fossil fuels, industrial processes, deforestation, and agricultural activities</b> , all of which play a <b>significant role in global warming and atmospheric changes</b> . Reducing these <b>emission sources</b> is essential for <b>mitigating climate change and improving air quality</b> .
<b>Spatial Scale</b>	<b>Spatial Scale</b> refers to the <b>geographic extent</b> at which <b>climate variations</b> occur, ranging from <b>local to continental levels</b> . Climate patterns can change across different <b>spatial scales</b> , including <b>local (less than 100,000 km²), regional (100,000 to 10 million km²), and continental (10 to 100 million km²)</b> . Understanding these <b>scales is crucial</b> for analyzing <b>climate change impacts, weather patterns, and environmental shifts</b> at different levels, from <b>small ecosystems to entire continents</b> .
<b>Special Climate Change Fund (SCCF)</b>	The <b>Special Climate Change Fund (SCCF)</b> is a <b>global financial mechanism</b> established under the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> to support <b>developing countries in addressing climate change challenges</b> . It provides funding for <b>climate adaptation, technology transfer, and capacity building</b> , enabling vulnerable nations to <b>enhance resilience and transition to sustainable development pathways</b> .

	<p>The SCCF finances projects across <b>critical sectors</b>, including <b>energy, transport, industry, agriculture, forestry, and waste management</b>, helping countries implement <b>low-carbon and climate-resilient solutions</b>. Additionally, it supports <b>economic diversification efforts</b>, ensuring that economies reliant on <b>climate-sensitive industries</b> can adapt to changing environmental and market conditions.</p> <p>This fund is <b>designed to complement</b> other international climate finance mechanisms, such as the <b>Green Climate Fund (GCF)</b> and the <b>Global Environment Facility (GEF)</b>, ensuring comprehensive support for <b>climate mitigation and adaptation initiatives</b>. By investing in <b>innovative solutions and sustainable practices</b>, the SCCF plays a vital role in helping nations <b>achieve their climate commitments</b> and build <b>long-term environmental resilience</b>.</p>
<b>Specific Humidity</b>	<p><b>Specific Humidity</b> is the <b>ratio of the mass of water vapor to the mass of dry air</b> in the atmosphere, expressed as a <b>fraction or ratio (e.g., 1:200)</b>. It serves as a <b>key measure of atmospheric moisture</b>, directly influencing <b>weather patterns, precipitation, cloud formation, and humidity levels</b>.</p> <p>Specific humidity plays a <b>critical role in the Earth's water cycle</b>. As global temperatures <b>rise due to greenhouse gas emissions</b>, the atmosphere <b>holds more moisture</b>, leading to <b>increased humidity levels</b>. This can intensify <b>extreme weather events</b>, such as <b>heavier rainfall, stronger storms, and prolonged heatwaves</b>, contributing to <b>climate variability and disruptions in ecosystems</b>.</p> <p>Understanding <b>specific humidity trends</b> is essential for <b>climate modeling, weather forecasting, and assessing regional climate impacts</b>, helping scientists predict <b>future changes in rainfall patterns, drought risks, and overall climate shifts</b>.</p>
<b>Spill Over Effect</b>	<p>The <b>Spill over Effect</b> refers to the <b>indirect economic and environmental impacts</b> that <b>climate mitigation measures</b> in one country or sector have on others. These effects can be <b>positive or negative</b>, influencing <b>global trade, carbon leakage, and the transfer of environmentally sound technologies</b>.</p> <p><b>Negative spill over effects</b> may include <b>carbon leakage</b>, where industries relocate to regions with weaker environmental regulations, potentially undermining global emission reduction efforts. Conversely, <b>positive spill over effects</b> can drive <b>sustainable innovation</b>, encouraging the <b>diffusion of clean technologies</b> and <b>strengthening international cooperation</b> in climate action. Understanding and managing these effects is crucial for <b>designing fair and effective global climate policies</b>.</p>
<b>Spring</b>	<p><b>Spring</b> is one of the four temperate seasons, acting as the transitional phase between winter and summer. <b>Spring</b> and "springtime" symbolize <b>rebirth, renewal, and regrowth</b> in both natural ecosystems and broader cultural contexts. The precise timing of <b>spring</b> varies based on local <b>climate, cultures, and customs</b>. At the <b>spring equinox</b>, day and night are nearly equal in length, with daylight hours gradually increasing as the season advances.</p>
<b>SRES</b>	<p>The <b>Special Report on Emissions Scenarios (SRES)</b> (Nakićenović et al., 2000) outlines a set of <b>storylines</b> along with associated scenarios of <b>population, GDP, and emissions</b>, which are used to project potential climate change and <b>sea-level rise</b>. The SRES defines four distinct families of socio-economic scenarios—<b>A1, A2, B1, and B2</b>—that represent different future pathways for the world. These scenarios are</p>

	framed around two primary dimensions: the balance between <b>economic</b> and <b>environmental</b> priorities, and the extent of <b>global</b> versus <b>regional</b> development patterns.
<b>Stability</b>	<b>Stability</b> refers to the capacity of an ecosystem to maintain a relatively constant state over time, within certain limits. It is the ability of the ecosystem to preserve a <b>dynamic equilibrium</b> —a balance where the system can continue to function and adapt while resisting significant disruptions or changes. Stability ensures that the ecosystem can recover from disturbances and continue its processes without undergoing drastic shifts and sustain their functions, helping to mitigate the impacts of climate change.
<b>Stabilization</b>	<b>Stabilization</b> in the context of climate change refers to the process of achieving a steady state in the atmospheric concentrations of one or more greenhouse gases, such as <b>carbon dioxide</b> or a <b>CO2-equivalent</b> mix of greenhouse gases. This involves maintaining these concentrations at levels that prevent dangerous human interference with the climate system.
<b>Stabilization Analysis</b>	<b>Stabilization Analysis</b> refers to the evaluation of a scenario that focuses on achieving the stabilization of <b>greenhouse gas concentrations</b> in the atmosphere. This analysis examines various pathways, strategies, and policies that can limit the rise in greenhouse gas levels, aiming to prevent dangerous climate impacts and ensure long-term climate stability.
<b>Stakeholder</b>	<p>A <b>stakeholder</b> is an individual or entity that holds grants, concessions, or any other type of value that could be impacted by a specific action or policy. In the context of a project or organization, a stakeholder is anyone with a <b>legitimate interest</b> in the project or who would be <b>affected</b> by its outcomes or decisions, including the potential consequences of related actions or policies.</p> <p>This includes governments, businesses, local communities, NGOs, and others who have a <b>vested interest in mitigating or adapting to climate change and its effects on ecosystems, economies, and societies</b>.</p>
<b>Stern Report/ Review</b>	The <b>Stern Review</b> on the <b>Economics of Climate Change</b> is a comprehensive 700-page report released on <b>October 30, 2006</b> , by economist <b>Nicholas Stern</b> for the <b>British government</b> . Stern, who chaired the <b>Grantham Research Institute on Climate Change and the Environment</b> at the <b>London School of Economics</b> and the <b>Centre for Climate Change Economics and Policy (CCCEP)</b> at <b>Leeds University</b> , led the review. The report analyzes the potential economic impacts of <b>global warming</b> and emphasizes the economic case for taking early action to mitigate climate change. Although not the first economic report on climate change, the <b>Stern Review</b> is considered the most significant and widely recognized due to its comprehensive approach and global influence in shaping climate policy.
<b>Stimuli</b>	<b>Stimuli</b> refers to the various elements that influence and drive changes in the climate system. This includes <b>mean climate characteristics</b> , such as average temperature and precipitation patterns, as well as <b>climate variability</b> , which encompasses natural fluctuations in climate over time. Additionally, <b>stimuli</b> encompass the <b>frequency</b> and <b>magnitude of extreme events</b> like heatwaves, storms, and floods, which are becoming more frequent and intense due to climate change. These stimuli interact in complex ways, influencing ecosystems, human societies, and the global environment, often leading to shifts in patterns that challenge existing systems and require adaptation and mitigation strategies.

<b>Storm</b>	<p>A <b>storm</b> refers to a disturbance in the atmosphere of an astronomical body, particularly affecting its surface, and often resulting in <b>severe weather</b>. Storms can be characterized by <b>strong winds</b>, <b>thunder</b> and <b>lightning</b> (as in a <b>thunderstorm</b>), <b>heavy precipitation</b> (such as <b>ice</b> in an <b>ice storm</b>), or wind transporting substances like dust or snow (e.g., <b>dust storms</b>, <b>snowstorms</b>, <b>hailstorms</b>). Storms often lead to significant <b>negative impacts</b> on lives, infrastructure, and property, including <b>storm surges</b>, <b>heavy rains</b>, <b>lightning</b>, <b>wildfires</b>, and <b>vertical wind shear</b>, which can contribute to events like <b>airplane crashes</b>. In the context of climate change, storms are becoming more frequent and intense, exacerbating their destructive effects.</p>
<b>Storm Surge</b>	<p>A <b>storm surge</b> is an abnormal and often sudden rise in <b>sea level</b> that occurs as a result of a <b>hurricane</b> or other intense storm. It is caused by the combination of <b>strong winds</b>, <b>low atmospheric pressure</b>, and the <b>storm's rotation</b>, which push water towards the shore, raising sea levels above normal tidal ranges. The height of the storm surge is defined as the <b>difference</b> between the observed sea surface level during the storm and the level that would have occurred in the absence of the cyclone or storm.</p> <p>Storm surges can have devastating effects, as they can cause <b>coastal flooding</b>, particularly in low-lying areas. These surges are often <b>amplified</b> by high tides and can inundate large areas, damaging infrastructure, homes, and agricultural lands. In some cases, storm surges may lead to the loss of life and contribute to the destruction of coastal ecosystems. As <b>climate change</b> leads to rising sea levels, the intensity and frequency of storm surges are expected to increase, further exacerbating the risks associated with <b>hurricanes</b> and other intense storms.</p>
<b>Strategy</b>	<p>A <b>strategy</b> is a comprehensive action plan implemented through various <b>policies and measures</b>. In the context of <b>climate change adaptation</b>, it refers to a general approach for addressing the <b>impacts of climate change</b>, including <b>climate variability</b> and <b>extreme events</b>. This strategy often incorporates a blend of <b>policies and measures</b>, carefully chosen to achieve the key goal of <b>reducing the country's vulnerability</b> to climate-related risks.</p>
<b>Stratosphere</b>	<p>The <b>stratosphere</b> is the second layer of Earth's atmosphere, located above the <b>troposphere</b> and below the <b>mesosphere</b>. It extends from approximately <b>10 km</b> (9 km at high latitudes) to about <b>50 km</b> above the Earth's surface. The <b>stratosphere</b> is characterized by a <b>temperature increase with altitude</b> in the upper part, primarily due to the absorption of <b>solar radiation</b> by <b>ozone</b>. This layer contains the <b>ozone layer</b>, which is essential for absorbing and filtering out harmful <b>ultraviolet (UV) radiation</b> from the sun, protecting life on Earth.</p>
<b>Stratospheric Ozone</b>	<p><b>Stratospheric ozone</b> refers to the <b>ozone molecules (O<sub>3</sub>)</b> formed in the <b>stratosphere</b> through a chemical reaction between <b>solar ultraviolet (UV) radiation</b> and <b>molecular oxygen (O<sub>2</sub>)</b>. This process, known as the <b>ozone-oxygen cycle</b>, results in the creation of ozone, which is most concentrated in the <b>ozone layer</b>, located between approximately <b>15 to 35 km</b> above Earth's surface.</p> <p><b>Key Roles of Stratospheric Ozone:</b></p>

	<ol style="list-style-type: none"> <li>1. <b>Radiative Balance:</b> Stratospheric ozone plays a critical role in maintaining the <b>radiative balance</b> of the atmosphere. It absorbs a significant portion of the <b>solar ultraviolet (UV) radiation</b>, particularly the harmful <b>UV-B rays</b>, preventing these rays from reaching the Earth's surface. This helps to regulate the planet's climate and protects ecosystems and human health.</li> <li>2. <b>Protection from UV Radiation:</b> The ozone layer's primary function is to absorb <b>UV-B radiation</b>, which can cause severe <b>health problems</b>, such as <b>skin cancer</b>, <b>eye damage</b>, and <b>weakened immune systems</b>, as well as harm to <b>marine life</b> and terrestrial ecosystems.</li> <li>3. <b>Impact of Ozone Depletion:</b> The depletion of stratospheric ozone—often caused by chemicals like <b>chlorofluorocarbons (CFCs)</b> and other ozone-depleting substances (ODS)—can lead to a thinning of the ozone layer. As a result, more harmful <b>UV-B radiation</b> reaches the Earth's surface, increasing the risk of <b>health problems</b> and negatively affecting the environment. <b>Climate change</b> may further enhance the depletion of ozone due to the alteration of atmospheric conditions and chemical reactions.</li> </ol>
<b>Streamflow</b>	<p><b>Streamflow</b> refers to the <b>volume of water</b> that flows through a specific point in a stream, river, or creek over a designated period of time. It is commonly measured in <b>cubic feet per second (ft³/sec)</b> or other units such as <b>cubic meters per second (m³/sec)</b>, depending on the region or system in use.</p> <p>Streamflow is influenced by various factors such as precipitation, snowmelt, land use, and human interventions (e.g., dams and water withdrawals). Monitoring streamflow is essential for managing water resources, flood forecasting, and understanding ecological health, as it directly affects the availability of water for both human use and natural ecosystems.</p>
<b>Stress</b>	<p><b>Stress</b> refers to long-term, ongoing challenges or pressures that negatively impact the potential for livelihoods and well-being. These stresses can undermine the ability of individuals or communities to sustain or improve their living conditions.</p> <p>Examples of stresses include:</p> <ul style="list-style-type: none"> <li>• <b>Inadequate public services</b> (such as poor healthcare, education, and transportation)</li> <li>• <b>Decline in natural resources</b> (including depletion or degradation of water, soil, and biodiversity)</li> <li>• <b>Climate change</b> and its impacts on ecosystems and agriculture, including extreme weather events and shifting climate patterns</li> <li>• <b>Political instability</b> and <b>economic decline</b> at local, national, or regional levels</li> </ul> <p>These stresses gradually weaken the resilience of communities and ecosystems, making it difficult for both people and the environment to adapt to changing conditions and maintain long-term well-being.</p>
<b>Structural Means</b>	<p><b>Structural means</b> refer to the <b>physical and organizational measures</b> or systems put in place to address challenges or manage specific issues, often in the context of environmental or climate change adaptation. These can include <b>infrastructure</b>, such as <b>dams</b>, <b>levees</b>, <b>flood barriers</b>, <b>water storage systems</b>, and <b>building designs</b>, as well as <b>institutional frameworks</b> like <b>laws</b>, <b>policies</b>, or <b>governance structures</b>.</p>



	Structural means are often used to manage or mitigate risks, improve resilience, or enhance sustainability by creating tangible systems or frameworks that provide long-term solutions.
<b>Subsidiary Body for Scientific and Technology Advice</b>	<p>The <b>Subsidiary Body for Scientific and Technological Advice (SBSTA)</b> is a body established under the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> to provide <b>scientific and technological advice</b> to the <b>Conference of the Parties (COP)</b> and, as appropriate, its other subsidiary bodies. The SBSTA is designed to offer <b>timely information and expert guidance</b> on issues related to the scientific and technological aspects of climate change and the implementation of the Convention.</p> <p>Key features of the SBSTA include:</p> <ul style="list-style-type: none"> <li>• <b>Open Participation:</b> The body is open to participation by all Parties to the Convention.</li> <li>• <b>Multidisciplinary Approach:</b> It covers a wide range of scientific and technological topics, involving expertise from various disciplines.</li> <li>• <b>Government Representatives:</b> The members of the SBSTA are government representatives with <b>relevant technical expertise</b> in climate science, technology, and policy.</li> <li>• <b>Reporting:</b> The SBSTA reports regularly to the <b>Conference of the Parties (COP)</b> on its activities, providing updates and recommendations based on its work.</li> </ul> <p>Overall, the SBSTA serves as a critical advisory body that supports the COP in making informed decisions on climate action based on scientific and technological developments.</p>
<b>Subsidiary Body of Implementation</b>	<p>The <b>Subsidiary Body for Implementation (SBI)</b> is an advisory body established under the <b>United Nations Framework Convention on Climate Change (UNFCCC)</b>. Its primary role is to provide <b>recommendations on policy and implementation issues</b> to the <b>Conference of the Parties (COP)</b>, and, if requested, to other subsidiary bodies of the Convention. The SBI focuses on the practical aspects of implementing the Convention's objectives, including reviewing the progress of commitments, assessing financial resources, and ensuring that the operational and technical aspects of climate change agreements are being effectively carried out.</p> <p>Key features of the <b>SBI</b> include:</p> <ul style="list-style-type: none"> <li>• <b>Policy and Implementation Recommendations:</b> The SBI offers advice and suggestions to the COP regarding the <b>implementation</b> of the Convention's policies, including assessing the progress of the Parties in meeting their climate-related commitments.</li> <li>• <b>Permanent Subsidiary Body:</b> The SBI is one of the two permanent subsidiary bodies created by the UNFCCC, the other being the <b>Subsidiary Body for Scientific and Technological Advice (SBSTA)</b>.</li> <li>• <b>Supporting the COP:</b> The SBI helps the COP with the technical, financial, and procedural aspects of climate action, facilitating the translation of agreements into concrete measures on the ground.</li> </ul>

	In essence, the <b>SBI</b> plays a crucial role in supporting the effective implementation of climate change policies and ensuring that the commitments made by Parties are properly executed.
<b>Subsiding/Subsidence</b>	<b>Subsiding</b> or <b>subsidence</b> refers to the <b>downward movement</b> or <b>settling</b> of the Earth's crust relative to the surrounding areas. This phenomenon can occur due to various factors, including <b>geological processes</b> such as the natural settling of the Earth's surface, the <b>collapse of underground cavities</b> , or the <b>extraction of resources</b> like water, oil, or gas. Subsidence can result in the <b>sinking</b> of land areas, leading to issues such as <b>flooding</b> , <b>damage to infrastructure</b> , and changes in local ecosystems. It is commonly observed in areas with <b>compacted soils</b> , <b>mining activities</b> , or <b>over-extraction of groundwater</b> .
<b>Succession</b>	<p><b>Succession</b> refers to the <b>natural, gradual process</b> of change in the <b>species composition</b> and <b>community structure</b> of an ecosystem over time. This process occurs in stages and is typically driven by natural factors, such as <b>climate</b>, <b>soil development</b>, and the <b>interaction of species</b> within the environment. There are two main types of ecological succession:</p> <ol style="list-style-type: none"> <li>1. <b>Primary Succession:</b> Occurs in areas where no soil or life previously existed, such as after a volcanic eruption or the retreat of glaciers. Over time, simple organisms like <b>lichen</b> and <b>mosses</b> pave the way for more complex plant and animal life.</li> <li>2. <b>Secondary Succession:</b> Happens in areas where an ecosystem has been disturbed but soil and some organisms remain, such as after a forest fire or agricultural activity. This process is typically faster than primary succession because the soil is already present and can support plant life.</li> </ol> <p>Succession leads to the development of a more complex and stable <b>ecosystem</b> over time, eventually reaching a <b>climax community</b>, which is a relatively stable and mature ecosystem.</p>
<b>Sulfate Aerosols</b>	<p><b>Sulfate aerosols</b> are tiny particulate matter composed of sulfur compounds, primarily formed through the interaction of <b>sulfur dioxide (SO<sub>2</sub>)</b> and <b>sulfur trioxide (SO<sub>3</sub>)</b> with other compounds in the atmosphere. These aerosols are released into the atmosphere primarily through <b>human activities</b> like the <b>combustion of fossil fuels</b>, as well as <b>natural events</b> such as <b>volcanic eruptions</b>, such as the eruption of <b>Mount Pinatubo</b>.</p> <p><b>Key Characteristics and Effects:</b></p> <ol style="list-style-type: none"> <li>1. <b>Formation:</b> Sulfate aerosols are created when sulfur dioxide (SO<sub>2</sub>) emitted by sources like power plants, industrial activities, and volcanoes reacts with water vapor and oxygen in the atmosphere, forming sulfuric acid, which then condenses into aerosol particles.</li> <li>2. <b>Climate Impact:</b> Sulfate aerosols can have a <b>cooling effect</b> on the Earth's climate because they <b>reflect solar radiation</b> back into space, reducing the amount of heat absorbed by the Earth. This is known as <b>negative radiative forcing</b>. As a result, the presence of sulfate aerosols can <b>lower global temperatures</b>.</li> </ol>

	<p>3. <b>Influence on Climate Models:</b> The effect of sulfate aerosols on global temperature variations is incorporated into <b>General Circulation Models (GCMs)</b>, which are used to predict climate patterns. When these models account for the cooling effect of sulfate aerosols, they provide <b>more accurate predictions</b> of global temperature changes and climatic variations.</p> <p>While sulfate aerosols can help <b>counteract some effects of global warming</b> by reducing solar radiation, they also contribute to air pollution and can cause <b>acid rain</b>, which negatively impacts ecosystems, water quality, and human health.</p>
<b>Sulfur Hexafluoride (SF<sub>6</sub>)</b>	<p><b>Sulfur Hexafluoride (SF<sub>6</sub>)</b> is a <b>colorless, odorless gas</b> that is <b>slightly soluble in water</b> and highly soluble in alcohol and ether. It is a <b>potent greenhouse gas</b> with a <b>Global Warming Potential (GWP)</b> of <b>22,800 to 23,900</b> times greater than carbon dioxide (CO<sub>2</sub>), depending on the source. This makes SF<sub>6</sub> one of the most powerful greenhouse gases.</p> <p><b>Key Characteristics and Uses:</b></p> <ol style="list-style-type: none"> <li>1. <b>Industrial Applications:</b> SF<sub>6</sub> is primarily used in <b>electrical transmission and distribution systems</b>, particularly as an <b>insulator</b> for <b>high-voltage equipment</b>. It is also used as a <b>dielectric</b> in electronics and as a <b>coolant</b> in various manufacturing processes, such as <b>cable cooling systems</b>.</li> <li>2. <b>Global Warming Potential (GWP):</b> The GWP of SF<sub>6</sub> is exceptionally high, meaning that even small quantities of SF<sub>6</sub> in the atmosphere can have a significant long-term impact on global warming. Its GWP, as reported by the <b>IPCC's Fourth Assessment Report (AR4)</b>, is 22,800, though some reports list it as 23,900.</li> <li>3. <b>Kyoto Protocol:</b> SF<sub>6</sub> is one of the six greenhouse gases targeted for reduction under the <b>Kyoto Protocol</b> due to its significant contribution to climate change. Efforts have been made to minimize its use and prevent its release into the atmosphere.</li> </ol> <p>Despite its utility in industrial applications, SF<sub>6</sub> is a major contributor to <b>climate change</b> due to its extremely high GWP, and efforts are being made to <b>reduce emissions</b> and find alternatives in electrical systems and manufacturing.</p>
<b>Summer</b>	<p><b>Summer</b> is the warmest of the four temperate seasons, occurring between <b>spring</b> and <b>autumn</b>. It is characterized by longer daylight hours, higher temperatures, and often more sunlight. The <b>summer solstice</b>, which occurs around June 21st in the Northern Hemisphere, marks the start of summer and is the day with the <b>longest daylight hours</b> and the <b>shortest night</b>. After the solstice, the days gradually become shorter, and the temperatures may vary depending on the geographical location. Summer typically brings warmer weather and is associated with activities like vacations, outdoor sports, and agricultural growth.</p>
<b>Supporting Services</b>	<p><b>Supporting services</b> are the fundamental ecological processes and functions that ecosystems provide, which are essential for the <b>maintenance of life on Earth</b>. These services enable the functioning of all other ecosystem services, such as provisioning, regulating, and cultural services. Supporting services include:</p> <ol style="list-style-type: none"> <li>1. <b>Soil formation:</b> The process by which soil is created and enriched, which is crucial for plant growth and agricultural productivity.</li> </ol>

	<ol style="list-style-type: none"> <li>2. <b>Nutrient cycling:</b> The movement and exchange of nutrients (such as nitrogen, phosphorus, and carbon) within ecosystems, which helps sustain life by maintaining soil fertility and supporting plant growth.</li> <li>3. <b>Primary production:</b> The creation of organic matter through photosynthesis and other processes, which forms the base of the food chain for all organisms.</li> <li>4. <b>Biodiversity:</b> The maintenance of diverse species and genetic resources that are critical for ecosystem stability and resilience.</li> </ol> <p>These supporting services are vital for the <b>functioning of ecosystems</b>, and without them, life on Earth, including human life, would not be sustainable.</p>
<b>Surface runoff</b>	<p><b>Surface runoff</b> refers to the <b>flow of water</b> over the surface of the ground, typically after precipitation, that moves towards the nearest surface water body, such as a stream, river, or pond. This occurs when the soil is unable to absorb all the water, often due to saturation, impermeability, or intense rainfall. Surface runoff can carry water, nutrients, and pollutants across the land, eventually draining into surface water bodies or land depressions. It plays a significant role in the <b>water cycle</b> and can contribute to <b>erosion, flooding</b>, and the transport of contaminants.</p>
<b>Sustainability</b>	<p><b>Sustainability</b> refers to the concept of <b>development</b> that addresses the <b>needs of the present</b> while ensuring that <b>future generations</b> can meet their own needs. It involves balancing <b>economic growth, environmental protection</b>, and <b>social well-being</b> to create long-term systems that are <b>resilient, equitable</b>, and <b>resource-efficient</b>. The goal of sustainability is to maintain or improve the quality of life without depleting resources, degrading ecosystems, or causing irreversible harm to the environment.</p>
<b>Sustainable Development</b>	<p><b>Sustainable Development (SD)</b> is a development approach that seeks to meet <b>human needs</b> while simultaneously <b>preserving the environment</b> so that these needs can continue to be met both in the present and for future generations. It emphasizes the <b>balanced use of resources</b> to ensure that economic, social, and environmental goals are achieved without depleting natural resources or causing long-term harm to ecosystems.</p> <p>Sustainable development is often summarized by the principle that it "meets the needs of the present without compromising the ability of future generations to meet their own needs." It integrates <b>concern for the carrying capacity of natural systems</b> (the ability of the environment to support life) with the <b>social challenges</b> facing humanity, such as poverty, inequality, and access to resources. Sustainable development is often taught as ELF—<b>Environment, Local people</b>, and <b>Future</b>—focusing on these three interrelated dimensions to ensure long-term sustainability.</p>
<b>Sustainable Development Goals</b>	<p>The <b>Sustainable Development Goals (SDGs)</b> are a set of <b>17 interconnected goals</b> established by the <b>United Nations</b> in <b>2015</b>, aimed at addressing the world's most pressing <b>social, economic</b>, and <b>environmental challenges</b> by <b>2030</b>. These goals provide a comprehensive framework for achieving a sustainable future for all, promoting <b>equity, prosperity</b>, and <b>environmental stewardship</b>.</p> <p>The SDGs most closely linked to <b>climate change</b> include:</p>

		<ol style="list-style-type: none"> <li>1. <b>Affordable and Clean Energy</b> (Goal 7): Promoting the use of <b>renewable energy</b> sources and increasing global access to affordable and sustainable energy.</li> <li>2. <b>Climate Action</b> (Goal 13): Taking urgent action to <b>limit</b> the impacts of <b>climate change</b> and reduce greenhouse gas emissions.</li> <li>3. <b>Life on Land</b> (Goal 15) and <b>Life Below Water</b> (Goal 14): Protecting ecosystems, reducing deforestation, and preserving biodiversity in both terrestrial and marine environments.</li> </ol> <p>These goals are designed to work together to create a more <b>sustainable, equitable, and resilient</b> world, ensuring that development can occur without compromising the environment or the ability of future generations to meet their own needs.</p>
<b>Sustainable Management</b>	<b>Forest</b>	<b>Sustainable Forest Management (SFM)</b> is the practice of managing forests in a way that ensures they continue to provide essential ecological, social, and economic benefits without compromising the ability of future generations to meet their needs. SFM aims to balance the <b>conservation</b> of forest ecosystems, the <b>sustainable use</b> of forest resources (such as timber, water, and non-timber products), and the support of <b>local communities</b> and <b>biodiversity</b> . It involves adopting practices that maintain forest health, productivity, and diversity over the long term while addressing the needs of people who depend on forests for their livelihoods.
<b>Sustainable Livelihood</b>		<b>Sustainable livelihood</b> refers to the ability of individuals, households, or communities to <b>cope with and recover from external stresses and shocks</b> , while maintaining or improving their capabilities and assets over time. A livelihood is considered sustainable when it provides the means for people to meet their basic needs, supports economic stability, and ensures long-term well-being, without depleting natural resources or harming the environment. It involves <b>diverse, resilient strategies</b> that allow communities to adapt to changing conditions and to <b>thrive now and in the future</b> .
<b>Sustainable Use</b>		<b>Sustainable use</b> refers to the practice of using resources in a way that <b>meets the needs of the present</b> without <b>depleting or damaging</b> those resources for future generations. In the context of <b>ecology</b> , it describes how biological systems, such as wetlands, forests, and other ecosystems, can remain <b>diverse</b> and <b>productive</b> over time. Sustainable use ensures that natural resources are used at a rate that allows them to regenerate, preserving their <b>health</b> and <b>functionality</b> for long-term benefits. Examples include managing forests and wetlands in a way that supports both current human needs and the natural environment, without compromising future use.
<b>Synoptic</b>		<b>Synoptic</b> refers to a <b>large-scale weather system</b> typically spanning over <b>200 miles</b> (approximately 320 kilometers) in diameter. It is often used in meteorology to describe weather patterns and phenomena, such as storms, high-pressure systems, or fronts, that affect large areas. Synoptic weather systems are generally studied using <b>satellite data</b> , <b>weather maps</b> , and <b>global observation networks</b> to analyze and predict weather conditions across broad regions.
<b>System</b>		<b>System</b> refers to a region, community, household, economic sector, business, or population group that is subject to varying levels of exposure to different <b>climate hazards</b> . These hazards can include extreme weather events, changes in temperature, sea-level rise, and other climate-related impacts that can affect the system's resilience and sustainability.

<b>Technological Hazard</b>	<b>Technological hazard</b> refers to a risk or danger originating from <b>technological or industrial conditions</b> , including accidents, unsafe practices, infrastructure failures, or specific human activities. These hazards can lead to <b>loss of life, injury, illness</b> , or other health impacts, as well as <b>property damage, loss of livelihoods, social and economic disruption</b> , and <b>environmental harm</b> . Examples of technological hazards include <b>industrial pollution, nuclear radiation, toxic waste, dam failures, transport accidents, factory explosions, fires</b> , and <b>chemical spills</b> . Technological hazards can also occur as secondary effects of natural hazards, such as when an earthquake causes a chemical spill or infrastructure failure.
<b>Technological Potential</b>	<b>Technological potential</b> refers to the <b>extent to which greenhouse gas emissions can be reduced or energy efficiency improved</b> by implementing a <b>technology or practice</b> that has already been demonstrated or proven effective. It represents the achievable impact of a technology in mitigating climate change or improving sustainability, based on its existing capabilities and proven performance. Technological potential is often used to assess the feasibility and effectiveness of various technologies in contributing to climate goals, such as reducing emissions or enhancing energy efficiency.
<b>Technology</b>	<b>Technology</b> refers to a <b>tool, equipment, or technique</b> used to perform a specific activity or task. The full prevention of the adverse impacts of hazards is often not possible, but their <b>scale</b> or <b>severity</b> can be significantly reduced through various <b>strategies</b> and <b>actions</b> . By implementing various <b>technological strategies</b> and actions, it is possible to <b>reduce the risks</b> and <b>minimize the damage</b> caused by natural or technological hazards.
<b>Technology Additionality</b>	<b>Technology Additionality</b> refers to the use of <b>the best available technology</b> for a project activity, considering the specific circumstances of the <b>host party</b> . It means that the technology implemented goes beyond the baseline or standard technology that would have been used in the absence of the project, leading to <b>additional environmental benefits</b> such as <b>reduced emissions</b> or <b>improved efficiency</b> . In essence, technology additionality ensures that the chosen technology results in improvements that would not have occurred otherwise.
<b>Technology Transfer</b>	<b>Technology Transfer</b> refers to the broad set of processes that facilitate the <b>exchange of knowledge, capital, and goods</b> among various stakeholders, with the goal of <b>spreading technology</b> for <b>climate change adaptation or mitigation</b> . It encompasses the <b>diffusion of technologies</b> and <b>technological cooperation</b> both across countries and within countries. Technology transfer plays a key role in enabling the adoption of innovative technologies, particularly in developing nations, to address the challenges posed by climate change.
<b>Temperature</b>	<b>Temperature</b> is a fundamental physical property of matter that measures the degree of <b>hotness</b> or <b>coldness</b> and reflects the amount of <b>thermal energy</b> contained within an object or substance. It plays a critical role in determining the state of matter—whether it is in a <b>solid, liquid, or gas</b> —and influences various physical processes, such as chemical reactions, biological functions, and climate patterns.  In simple terms, <b>low temperatures</b> are perceived as cold, where the particles within a substance move slowly, and <b>high temperatures</b> are perceived as warm or hot, where the particles move rapidly. For example, in cold conditions, water may freeze into ice, while in hot conditions, it may evaporate into steam.

	<p>Temperature is measured using devices called <b>thermometers</b>, which are calibrated to specific scales. The most common temperature scales are:</p> <ul style="list-style-type: none"> <li>• <b>Celsius (°C)</b>, used widely in scientific and everyday contexts.</li> <li>• <b>Fahrenheit (°F)</b>, used primarily in the United States.</li> <li>• <b>Kelvin (K)</b>, the standard scale in scientific research, especially in physics and chemistry, where absolute zero (0 K) represents the complete absence of thermal energy.</li> </ul> <p><b>1°C = 33.8°F</b></p> <p><b>1°C = 274.15 K</b></p> <p>Temperature measurement is vital for understanding weather patterns, controlling industrial processes, monitoring health conditions, and assessing the impact of climate change. It also helps in fields like medicine (body temperature), agriculture (frost risk), and engineering (material properties under different temperatures).</p>
<b>Temporal Scale</b>	<p><b>Temporal scale</b> refers to the range of time over which climate variations and changes occur. It encompasses different periods, from <b>short-term</b> changes (such as <b>seasonal</b> variations) to <b>long-term</b> changes (spanning <b>decades</b>, <b>centuries</b>, or even <b>millions of years</b>). Climate can vary significantly across these different scales, from the seasonal patterns that influence weather to the geological timescales that capture shifts in Earth's climate over long periods. Understanding temporal scale is crucial for analysing both short-term climate fluctuations and long-term climate trends, such as <b>global warming</b> and <b>ice ages</b>.</p>
<b>Teragram</b>	<p>A <b>teragram</b> (Tg) is a unit of mass equivalent to <b>1 trillion (10<sup>12</sup>) grams</b> or <b>1 million (10<sup>6</sup>) metric tons</b>.</p> <p>1 trillion (10<sup>12</sup>) grams = 1 million (10<sup>6</sup>) metric tons.</p> <p>It is commonly used in environmental science and climate change contexts to quantify large amounts of mass, such as greenhouse gas emissions, carbon storage, or pollutants. For reference, 1 metric ton equals 1,000 kilograms or 1 million grams. Thus, 1 teragram equals <b>1,000,000,000 kilograms</b> or <b>1,000,000 metric tons</b>.</p>
<b>The Himalayas</b>	<p>The <b>Himalayas</b> are the <b>highest mountain range</b> in the world, stretching across five countries: India, Nepal, Bhutan, China, and Pakistan. This majestic range is known for its towering peaks, including <b>Mount Everest</b>, the highest point on Earth. The Himalayas play a crucial role in the <b>hydrological system</b> of Asia, supplying <b>freshwater</b> to millions of people through its eight major rivers: the <b>Ganges</b>, <b>Brahmaputra</b>, <b>Indus</b>, <b>Irrawaddy</b>, <b>Salween</b>, <b>Mekong</b>, <b>Yellow River</b>, and <b>Yangtze</b>. These rivers originate from the glaciers and snowmelt in the Himalayas, making the range a vital source of water for drinking, agriculture, and energy for the surrounding regions. The Himalayas also serve as a critical buffer against climate change, impacting weather patterns and sustaining biodiversity.</p>

<b>Thermal Expansion</b>	<p><b>Thermal expansion</b> is the <b>increase in volume</b> (or length) of a material as its temperature rises. As the temperature of a substance increases, its molecules or atoms move faster and tend to spread out, causing the material to expand. This property is common to all materials, although the degree of expansion varies depending on the type of material.</p> <p>In the context of <b>sea level rise</b>, thermal expansion specifically refers to the <b>expansion of ocean water</b> as it warms, which leads to an <b>increase in sea level</b>. This phenomenon is a significant contributor to rising sea levels, alongside the melting of glaciers and ice sheets, and is directly linked to the impacts of global warming and climate change.</p>
<b>Thermal infrared radiation</b>	<p><b>Thermal infrared radiation</b> refers to radiation emitted by the Earth's surface, atmosphere, and clouds. Often called <b>terrestrial</b> or <b>long-wave radiation</b>, it differs from near-infrared radiation, which is part of the solar spectrum. Infrared radiation, in general, has longer wavelengths than the visible red light. The spectrum of thermal infrared radiation is distinct from that of <b>shortwave</b> or <b>solar radiation</b> due to the temperature difference between the Sun and the Earth-atmosphere system. In the context of <b>climate change</b>, this radiation plays a significant role in the Earth's energy balance and the greenhouse effect, as it is absorbed and re-emitted by greenhouse gases, contributing to global warming.</p>
<b>Thermochemical technologies</b>	<p><b>Thermochemical technologies</b> are processes used to harness the energy potential of biomass through chemical reactions that involve heat. These technologies play a crucial role in the context of <b>renewable energy</b> and <b>climate change</b>, as they enable the conversion of organic materials into energy, such as biofuels, through methods like <b>gasification</b>, <b>pyrolysis</b>, and <b>combustion</b>. This helps reduce reliance on fossil fuels and supports the transition to more sustainable energy systems.</p>
<b>Thermodynamic modules</b>	<p><b>Thermodynamic modules</b> are components of climate models that specifically predict changes in aerosols as a result of temperature variations. These modules simulate how temperature influences aerosol formation, distribution, and behaviour in the atmosphere. Aerosols, which can include particles like dust, soot, and sulfate, play a critical role in <b>climate systems</b> by affecting <b>radiation balance</b>, <b>cloud formation</b>, and <b>precipitation patterns</b>. Thermodynamic modules help in understanding and forecasting the impact of temperature changes on aerosol dynamics and, consequently, their effects on climate change.</p>
<b>Thermohaline Circulation</b>	<p><b>Thermohaline circulation</b> refers to a large-scale ocean circulation driven by differences in <b>temperature</b> and <b>salinity</b> (salt content), which affect water density. This circulation is a crucial part of the global climate system, as it helps regulate the Earth's <b>heat distribution</b>. In the <b>North Atlantic</b>, for example, warm surface water flows northward, while cold, dense water sinks in high-latitude regions and flows southward at deeper ocean levels. This process results in the <b>poleward transport of heat</b>, influencing global climate patterns and playing a key role in regulating climate, particularly in terms of <b>temperature</b> and <b>weather systems</b> across the planet.</p>
<b>Third Assessment Report</b>	<p>The <b>Third Assessment Report</b> is the third comprehensive review of global scientific research on <b>climate change</b>, published by the <b>Intergovernmental Panel on Climate Change (IPCC)</b> in <b>2001</b>. The report synthesized the latest scientific findings on the causes, effects, and potential impacts of climate change, providing a clear assessment of the state of knowledge at the time. It also outlined potential</p>



	future scenarios and the risks associated with global warming. The Third Assessment Report was instrumental in raising awareness about the urgency of addressing climate change and laid the groundwork for the <b>Kyoto Protocol</b> and future international climate negotiations.
<b>Third Pole</b>	The <b>Third Pole</b> refers to the region that includes the <b>Hindu Kush Himalaya Mountain range</b> and the <b>Tibetan Plateau</b> , often called the "Third Pole" because its ice fields contain the largest amount of frozen water outside the polar regions. This region is critical for the global water supply as it is the source of <b>10 major river systems</b> , which provide <b>irrigation, power, and drinking water</b> to nearly <b>two billion people</b> —over <b>24% of the world's population</b> . The Third Pole plays a vital role in supporting the livelihoods of millions and is increasingly vulnerable to the impacts of <b>climate change</b> , including glacial melt and water scarcity.
<b>Threatened Species</b>	<b>Threatened species</b> are species (including animals, plants, fungi, and other organisms) that are at risk of becoming endangered in the near future due to factors such as <b>habitat loss, climate change, over-exploitation, or pollution</b> . These species face a significant decline in population or habitat, putting their survival at risk. The term "threatened" typically refers to species that are not yet endangered but are likely to become so without conservation efforts. Protection of threatened species is essential for maintaining biodiversity and ecosystem health.
<b>Threshold</b>	<b>Threshold</b> refers to the <b>critical level or magnitude</b> of a system's process at which <b>a sudden or rapid change occurs</b> . It is a point where a system—whether ecological, economic, or otherwise—undergoes a significant transformation, <b>leading to new properties or behaviours</b> that were not observable at lower levels. Once this threshold is crossed, predictions based on previous conditions or mathematical models may no longer hold true, as the system enters a new state. In the context of <b>climate change</b> , thresholds can refer to tipping points where small changes in factors like temperature or carbon emissions can lead to disproportionate and potentially irreversible impacts on ecosystems and human systems.
<b>Thunderstorm</b>	A <b>thunderstorm</b> , also known as an electrical storm, a lightning storm, thundershower or simply a storm is a type of weather event characterized by the presence of <b>lightning</b> and its <b>accompanying acoustic effect on the Earth's atmosphere</b> , known as <b>thunder</b> . Thunderstorms typically form when warm, moist air rises and cools, causing water vapor to condense into clouds, leading to the <b>release of energy in the form of lightning</b> . Thunderstorms can also be associated with heavy rain, strong winds, and sometimes hail. They are a natural part of Earth's atmospheric processes and can vary in intensity, with some storms developing into severe weather conditions, including tornadoes.
<b>Tide gauge</b>	A <b>tide gauge</b> is an instrument located at coastal sites (and occasionally in deep-sea areas) that continuously measures the <b>sea level</b> in relation to the surrounding land. By averaging the recorded sea level over time, the tide gauge provides data on the <b>long-term changes in relative sea level</b> . This information is crucial for monitoring <b>sea level rise</b> and understanding its impacts on coastal ecosystems and human infrastructure.

<b>Tillage</b>	<b>Tillage</b> is the agricultural practice of preparing and <b>cultivating the soil to enhance crop production</b> . It involves activities such as <b>plowing, turning, and loosening the soil</b> to improve its <b>structure, aeration, and nutrient content</b> , making it more conducive to plant growth. Tillage can also help control <b>weeds, incorporate organic matter, and improve water infiltration</b> . However, excessive or improper tillage can lead to soil degradation, erosion, and reduced soil fertility.
<b>Tipping point</b>	<p><b>Tipping point</b> is a critical threshold that, once surpassed, triggers a significant, <b>irreversible</b>, and <b>self-perpetuating change</b> in the climate system. Researchers have identified <b>16 climate tipping points</b> so far, and some believe that certain points may already have been crossed, making dramatic shifts, such as the <b>collapse of Greenland's ice cap</b> and the <b>melting of permafrost</b>, increasingly inevitable.</p> <p>A key example of a tipping point is the <b>Amazon rainforest</b>, the world's largest rainforest and one of the most <b>biodiverse ecosystems</b>. The Amazon plays a crucial role in the climate, particularly by generating <b>rainfall</b> and stabilizing temperatures in the region. However, nearly <b>a fifth of the Amazon</b> has already been cleared or degraded, reducing the number of trees that can generate the rainfall the forest relies on. This creates a <b>vicious cycle</b>, with <b>reduced rainfall</b> threatening the survival of the remaining forest. Some scientists warn that if <b>deforestation reaches 20-25%</b>, the forest could reach a tipping point, after which much of it would transform into <b>grassland</b> within a few decades.</p>
<b>Tipping Elements</b>	Tipping elements are components of the Earth system that can undergo abrupt and potentially irreversible changes at specific thresholds, known as "tipping points," due to anthropogenic climate change. These shifts can have significant global consequences.
<b>Trace Gases</b>	<b>Trace gases</b> are gases present in <b>small quantities</b> within an environment, such as a planet's <b>atmosphere</b> . They constitute <b>less than 1%</b> of a planet's <b>atmosphere by volume</b> . <b>Trace gases</b> in Earth's atmosphere refer to gases other than <b>nitrogen (78.1%), oxygen (20.9%), and argon (0.934%)</b> , which together account for <b>99.934%</b> of the atmosphere (excluding <b>water vapor</b> ). These trace gases include <b>carbon dioxide, water vapor, methane, oxides of nitrogen, ozone, and ammonia</b> . While their overall volume is small, <b>trace gases</b> have a disproportionately large impact on <b>weather and climate</b> , playing key roles in processes like the greenhouse effect, ozone depletion, and weather patterns.
<b>Traditional People</b>	<b>Traditional people</b> are <b>indigenous communities or groups</b> that have historically inhabited a specific region, maintaining <b>distinct cultural practices, knowledge systems, and ways of life</b> that are deeply connected to their environment.
<b>Transhumance</b>	<p><b>Transhumance</b> is a <b>traditional, seasonal practice of livestock migration</b> in which <b>herders move their animals between different grazing areas</b> based on seasonal variations in climate and pasture availability. Typically, this involves <b>ascending to higher-altitude pastures during warmer months</b> when these areas become lush and returning to <b>lower valleys or plains in winter</b> to escape harsh weather conditions.</p> <p>This practice is especially common in <b>mountainous, semi-arid, and arid regions</b>, such as the <b>Himalayas, Alps, Andes, and parts of Africa and Central Asia</b>. Transhumance is often a <b>cultural tradition</b> passed down through generations, playing a crucial role in <b>sustainable livestock management, biodiversity conservation, and ecosystem balance</b>. It also provides economic benefits to pastoral communities</p>

		while maintaining <b>resilient food systems</b> . However, transhumance is increasingly threatened by <b>climate change, land-use changes, and socio-economic shifts</b> , which impact the availability of grazing lands and traditional migration routes.
<b>Transient Experiment</b>	<b>Climate</b>	A <b>Transient Climate Experiment</b> is a <b>climate model simulation</b> in which <b>external forcings, such as greenhouse gas concentrations or aerosol emissions, change gradually over time</b> according to a <b>specified emission scenario</b> . This experiment helps scientists analyze the <b>time-dependent response of the climate system</b> , including <b>temperature changes, sea level rise, and shifts in atmospheric and oceanic circulation patterns</b> . It contrasts with <b>equilibrium climate experiments</b> , where climate models are run until they reach a steady-state response to a fixed forcing level.
<b>Transient Climate Response</b>		<p><b>Transient Climate Response (TCR)</b> refers to the <b>increase in globally averaged surface air temperature</b> over a <b>20-year period</b>, centered around the time when atmospheric <b>CO<sub>2</sub> levels double</b> compared to pre-industrial levels. It is typically measured in <b>climate model experiments</b> where <b>CO<sub>2</sub> concentrations increase by 1% per year</b>, reaching <b>doubling levels around year 70</b>.</p> <p>TCR is a <b>key metric in climate science</b> used to estimate the <b>short- to mid-term warming response of the Earth's climate system to greenhouse gas emissions</b>. Unlike <b>Equilibrium Climate Sensitivity (ECS)</b>, which measures long-term temperature response after the climate system stabilizes, <b>TCR reflects more immediate temperature changes</b>, making it particularly relevant for <b>climate policy, mitigation strategies, and impact assessments</b>.</p>
<b>Transpiration</b>		<p><b>Transpiration</b> is the <b>process by which water evaporates from the leaves, stems, and other parts of plants</b> into the atmosphere. This process plays a crucial role in the <b>water cycle</b>, helping to regulate temperature and maintain moisture levels in ecosystems.</p> <p>Approximately <b>90% of all evaporating water</b> from land surfaces comes from transpiration, making it a key component in <b>climate regulation, plant health, and agricultural water management</b>. Transpiration rates are influenced by factors such as <b>temperature, humidity, wind speed, and soil moisture levels</b>.</p>
<b>Transportation Measures</b>	<b>Control</b>	<p><b>Transportation Control Measures (TCMs)</b> refer to strategies and policies designed to <b>reduce air pollution and greenhouse gas emissions from transportation sources</b> by managing travel demand and improving transportation efficiency.</p> <p>These measures aim to <b>reduce vehicle emissions, enhance fuel efficiency, and promote sustainable mobility options</b> such as <b>public transit, carpooling, telecommuting, and non-motorized transport (walking and cycling)</b>. TCMs are often implemented as part of <b>air quality management and climate action plans</b> to mitigate the environmental impact of urban transportation systems.</p>
<b>Tree line</b>		<b>Tree line</b> refers to the <b>boundary beyond which trees are unable to grow</b> due to <b>unsuitable environmental conditions</b> such as <b>extremely cold temperatures, low air pressure, or insufficient moisture</b> . It marks the <b>limit of tree growth</b> in mountainous or polar regions, where these conditions become too harsh for trees to survive. Beyond the tree line, only smaller vegetation or alpine plants can thrive.

<b>Tree Outside Forest</b>	<b>Trees outside the forest</b> refer to <b>trees that are not part of officially designated forests</b> or other wooded lands. These trees are typically found on <b>farmlands, built-up areas</b> , and in both <b>rural and urban settings</b> . Essentially, they are trees growing outside the boundaries of forested regions and can include those planted for agricultural, ornamental, or environmental purposes.
<b>Trend</b>	A <b>trend</b> refers to a <b>pattern of gradual change</b> in a condition, output, or process over time. It represents the <b>general direction</b> in which a series of data points move, either increasing, decreasing, or remaining stable. Trends are often depicted by a <b>line or curve</b> on a graph, illustrating the average or overall movement in a specific direction.
<b>Troposphere</b>	<p>The <b>troposphere</b> is the <b>lowest layer of Earth's atmosphere</b>, extending from the Earth's surface up to an average altitude of about <b>8 to 15 kilometers (5 to 9 miles)</b>, depending on the latitude (it is thicker at the equator and thinner at the poles). It plays a critical role in supporting life and regulating climate.</p> <p><b>Important points about the troposphere:</b></p> <ul style="list-style-type: none"> <li>• <b>Contains most of the Earth's weather:</b> The troposphere is where <b>clouds, storms, and weather patterns</b> occur due to the presence of water vapor.</li> <li>• <b>Rich in gases:</b> It is primarily composed of <b>nitrogen (78%), oxygen (21%)</b>, and small amounts of other gases like <b>carbon dioxide, argon, and water vapor</b>.</li> <li>• <b>Temperature decreases with altitude:</b> In the troposphere, the temperature <b>drops</b> as you go higher, averaging <b>6.5°C for every kilometer</b> of altitude.</li> <li>• <b>Bound by the tropopause:</b> The <b>tropopause</b> is the boundary layer that separates the troposphere from the <b>stratosphere</b>, and it marks the point where temperature starts to increase with altitude.</li> <li>• <b>Air pressure is highest near the Earth's surface:</b> The air pressure decreases as you go higher in the troposphere.</li> </ul>
<b>Tropospheric Ozone</b>	<b>Tropospheric ozone</b> is ozone formed in the <b>troposphere</b> through natural processes and <b>photochemical reactions</b> involving gases from <b>human activities</b> , such as vehicle emissions and industrial pollution. It is a key component of <b>photochemical smog</b> and can be harmful to <b>health</b> and the <b>environment</b> , causing respiratory issues and damaging vegetation. Additionally, it acts as a <b>greenhouse gas</b> , contributing to <b>global warming</b> . Unlike stratospheric ozone, which protects against UV radiation, tropospheric ozone is a <b>pollutant</b> that degrades air quality.
<b>Tundra</b>	A <b>tundra</b> is a <b>treeless, flat, or gently undulating plain</b> found primarily in the <b>Arctic and sub-Arctic regions</b> . It is characterized by <b>low temperatures</b> and a <b>short growing season</b> , with vegetation dominated by <b>mosses, lichens, grasses, and dwarf shrubs</b> . The tundra experiences <b>permafrost</b> , where the ground remains frozen year-round, preventing the growth of large plants. It is a unique and fragile ecosystem, highly sensitive to climate change.

<b>Ultraviolet Radiation (UV)</b>	<p><b>Ultraviolet Radiation (UV)</b> refers to the energy range just beyond the <b>violet end of the visible light spectrum</b>. It constitutes about <b>5% of the total energy</b> emitted by the sun and plays a crucial role in the <b>energy balance</b> and <b>chemical composition</b> of the <b>stratosphere</b> and <b>mesosphere</b>.</p> <p><b>Key points about UV radiation:</b></p> <ul style="list-style-type: none"> <li>• <b>Sun's Energy Contribution:</b> UV radiation is the <b>major energy source</b> for the stratosphere and mesosphere, influencing atmospheric processes.</li> <li>• <b>Atmospheric Protection:</b> Most UV radiation is blocked by Earth's atmosphere, particularly by the <b>ozone layer</b>, but some still reaches the surface.</li> <li>• <b>Benefits:</b> UV radiation is important for <b>photosynthesis</b> in plants and for helping the human body produce <b>vitamin D</b>.</li> <li>• <b>Harmful Effects:</b> Excessive exposure to UV radiation can <b>burn the skin</b>, cause <b>skin cancer</b> and <b>cataracts</b>, and damage vegetation.</li> </ul>
<b>Umbrella Group</b>	<p>The <b>Umbrella Group</b> is a loose coalition of <b>non-European Union developed countries</b> formed after the adoption of the <b>Kyoto Protocol</b>. This group does not have a formal membership list but typically includes countries such as <b>Australia, Canada, Iceland, Japan, New Zealand, Norway, the Russian Federation, Ukraine</b>, and the <b>United States</b>. The group was established to facilitate discussions and negotiations on climate change, particularly related to the implementation of the Kyoto Protocol and subsequent climate agreements.</p>
<b>UN REDD Programme</b>	<p>The <b>UN-REDD Programme</b> is a collaborative initiative by the <b>United Nations</b> focused on <b>Reducing Emissions from Deforestation and Forest Degradation (REDD)</b> in developing countries. It was established in response to the <b>UNFCCC decision on REDD</b> at <b>COP 13</b> and the <b>Bali Action Plan</b>. The programme leverages the expertise and convening power of the <b>Food and Agriculture Organization (FAO)</b>, the <b>United Nations Development Programme (UNDP)</b>, and the <b>United Nations Environment Programme (UNEP)</b>.</p> <p><b>Key points about the UN-REDD Programme:</b></p> <ul style="list-style-type: none"> <li>• It supports <b>nationally-led REDD+ processes</b>, which aim to reduce emissions from deforestation and forest degradation while promoting sustainable forest management.</li> <li>• The programme emphasizes the <b>meaningful involvement</b> of all stakeholders, especially <b>indigenous peoples</b> and other <b>forest-dependent communities</b>, in the implementation of <b>REDD+</b> at both <b>national</b> and <b>international</b> levels.</li> </ul>
<b>Uncertainty</b>	<p><b>Uncertainty</b> refers to the <b>degree to which a value</b>, such as the <b>future state of the climate system</b>, is <b>unknown</b>. It arises from a <b>lack of information</b> or <b>disagreement</b> about what is known or even knowable.</p> <p><b>Key points about uncertainty:</b></p> <ul style="list-style-type: none"> <li>• <b>Sources:</b> Uncertainty can stem from a variety of factors, such as <b>quantifiable errors</b> in data, <b>ambiguously defined concepts</b> or terminology, or <b>uncertain projections</b> of human behavior.</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Types of Representation:</b> It can be expressed both <b>quantitatively</b> (e.g., a <b>range of values</b> calculated by different models) or <b>qualitatively</b> (e.g., through the <b>judgment of experts</b>).</li> <li>• <b>Impact:</b> Uncertainty is inherent in many fields, especially when dealing with complex systems like climate change, and can affect decision-making and predictions.</li> </ul>
<b>Uniform Approach</b>	A <b>Uniform Approach</b> refers to a method that <b>conforms to one principle, standard, or rule</b> and is <b>consistent</b> in its application. It aims to develop and assess broad strategies, such as <b>adaptation strategies</b> , based on a comprehensive understanding of the vulnerabilities that may exist. This approach considers <b>vulnerabilities across various sectors, regions, and development challenges</b> , ensuring a consistent framework for addressing issues in a holistic manner.
<b>Uniform Report Format</b>	A <b>Uniform Report Format</b> is a <b>standardized format</b> used by parties to the convention to <b>submit information</b> on activities that have been <b>jointly implemented</b> under the terms of the convention. This format ensures that the information provided is <b>consistent, comparable, and structured</b> in a way that facilitates clear communication and assessment of progress on the shared goals.
<b>Unique and Threatened System</b>	A <b>Unique and Threatened System</b> refers to <b>entities</b> (such as ecosystems, species, or habitats) that are <b>confined to a narrow geographical range</b> but can influence <b>larger systems</b> beyond their immediate area. Their <b>limited geographic range</b> often makes them <b>sensitive to environmental variables</b> , including climate, and this sensitivity highlights their <b>vulnerability to climate change</b> . These systems are at a higher risk due to their isolation and the potential for environmental changes to disrupt their delicate balance.
<b>United Nations Framework Convention on Climate Change (UNFCCC)</b>	<p>The <b>United Nations Framework Convention on Climate Change (UNFCCC)</b> is an international treaty that provides an overall <b>framework for intergovernmental efforts</b> to address the challenge of <b>climate change</b>. The Convention acknowledges that the <b>climate system is a shared resource</b>, and its stability can be impacted by emissions of <b>greenhouse gases</b> such as <b>carbon dioxide</b> from industrial activities.</p> <p><b>Key points about the UNFCCC:</b></p> <ul style="list-style-type: none"> <li>• The <b>ultimate objective</b> of the UNFCCC is to <b>stabilize greenhouse gas concentrations</b> in the atmosphere at a level that would <b>prevent dangerous human interference</b> with the climate system.</li> <li>• The Convention <b>entered into force on 21 March 1994</b> after being adopted on 9 May 1992 in New York and signed by more than 150 countries and the European Community at the <b>1992 Earth Summit</b> in Rio de Janeiro.</li> <li>• It has <b>near-universal membership</b>, with <b>189 countries</b> having ratified the treaty.</li> <li>• Under the Convention, governments are required to: <ol style="list-style-type: none"> <li>1. <b>Gather and share information</b> on greenhouse gas emissions, national policies, and best practices.</li> <li>2. <b>Develop national strategies</b> for addressing greenhouse gas emissions and adapting to the impacts of climate change, including providing <b>financial and technological support</b> to developing countries.</li> </ol> </li> </ul>

	<p>3. <b>Cooperate in preparing for adaptation</b> to the impacts of climate change.</p> <ul style="list-style-type: none"> <li>The <b>Kyoto Protocol</b> and the <b>Conference of the Parties (COP)</b> are important elements of the UNFCCC's framework.</li> </ul> <p>The Convention sets <b>commitments for all Parties</b>, including those in <b>Annex I</b>, to reduce greenhouse gas emissions to <b>1990 levels</b> by the year <b>2000</b>.</p>
<b>United Nations Convention on Biological Diversity (UNCBD)</b>	<p>The <b>United Nations Convention on Biological Diversity (UNCBD)</b> is an international treaty aimed at promoting <b>sustainable development</b> and the <b>conservation of biodiversity</b>. It was signed in <b>1992</b> at the <b>Earth Summit</b> in <b>Rio de Janeiro, Brazil</b>. The UNCBD, also known as the <b>Biodiversity Convention</b>, seeks to conserve the world's biodiversity, ensure the sustainable use of its components, and promote the fair and equitable sharing of the benefits arising from the use of genetic resources.</p> <p><b>Key points about the UNCBD:</b></p> <ul style="list-style-type: none"> <li>The treaty focuses on <b>conserving biodiversity, sustainable use of biological resources</b>, and <b>equitable sharing of benefits</b> from biodiversity use.</li> <li>It recognizes that biodiversity is vital for <b>sustainable development</b> and human well-being.</li> <li>The <b>UNCBD</b> serves as a framework for <b>national action</b> and international cooperation in biodiversity conservation.</li> </ul>
<b>United Nations Convention to Combat Desertification (UNCCD)</b>	<p>The <b>United Nations Convention to Combat Desertification (UNCCD)</b> is a <b>legally binding international agreement</b> aimed at <b>combating desertification, land degradation</b>, and <b>drought</b>. It focuses on promoting <b>sustainable land management</b>, particularly in <b>dryland</b> regions, to restore and maintain the productivity of land and support the livelihoods of people who are affected by these environmental challenges.</p> <p><b>Key points about the UNCCD:</b></p> <ul style="list-style-type: none"> <li>It addresses the <b>global challenge of land degradation</b>, especially in arid, semi-arid, and dry sub-humid areas, which are highly susceptible to desertification.</li> <li>The <b>UNCCD</b> encourages <b>cooperative efforts</b> among countries to implement <b>sustainable land management practices</b> and improve land health.</li> <li>The convention aims to <b>mitigate the impacts of drought</b> and desertification on both the environment and human populations, particularly those dependent on dryland ecosystems.</li> </ul>
<b>Urban Heat Island effect</b>	<p>The <b>Urban Heat Island (UHI) effect</b> refers to the phenomenon where <b>urban areas</b> experience <b>significantly higher temperatures</b> than the surrounding rural areas. This temperature difference is primarily caused by:</p> <ul style="list-style-type: none"> <li><b>Artificial surfaces</b> like <b>concrete</b> and <b>roads</b> that absorb and retain heat.</li> <li><b>Heat generated</b> from human activities, such as the <b>burning of fuel</b> and other <b>industrial processes</b>.</li> </ul>

	<ul style="list-style-type: none"> <li>The <b>lack of vegetation</b>, which reduces natural cooling through processes like <b>evapotranspiration</b>.</li> </ul> <p>The <b>Urban Heat Island effect</b> can intensify the severity of <b>heatwaves</b> in urban areas, leading to <b>health risks</b>, increased <b>energy consumption</b>, and greater <b>air pollution</b>.</p>
<b>Vector</b>	<p>A <b>vector</b> is an organism, typically an <b>insect</b>, that <b>transmits a pathogen</b> (such as bacteria, viruses, or parasites) from one host to another. Vectors play a key role in the spread of diseases, as they carry and deliver the pathogens to susceptible individuals or populations. Common examples of vectors include <b>mosquitoes</b> (which transmit diseases like malaria and dengue) and <b>ticks</b> (which transmit Lyme disease).</p>
<b>Vector-borne Disease</b>	<p>A <b>vector-borne disease</b> is an illness that is transmitted to humans or animals by a <b>vector organism</b>, which is typically an insect or arthropod. The vector serves as a carrier for the <b>pathogens</b> (such as bacteria, viruses, or parasites) that cause the disease. The pathogen is typically acquired by the vector from an infected host and then transmitted to a new host when the vector feeds or comes into contact with them.</p> <p><b>Key points about vector-borne diseases:</b></p> <ul style="list-style-type: none"> <li><b>Vectors:</b> These are typically <b>mosquitoes</b>, <b>ticks</b>, <b>flies</b>, or <b>lice</b> that transmit pathogens through bites or other forms of interaction. <ul style="list-style-type: none"> <li>For example, <b>mosquitoes</b> transmit diseases like <b>malaria</b>, <b>dengue fever</b>, and <b>Zika virus</b>.</li> <li><b>Ticks</b> are known for transmitting <b>Lyme disease</b>, <b>Rocky Mountain spotted fever</b>, and <b>Tick-borne encephalitis</b>.</li> <li><b>Sandflies</b> are vectors for diseases like <b>leishmaniasis</b>.</li> </ul> </li> <li><b>Transmission process:</b> The vector picks up the pathogen from an infected host (such as a person, animal, or bird) and then transmits it to a healthy host. This transmission typically happens when the vector bites or feeds on the new host.</li> <li><b>Environmental and climatic factors:</b> Many vector-borne diseases are influenced by <b>climatic conditions</b> and <b>environmental factors</b>, such as <b>temperature</b>, <b>humidity</b>, and <b>rainfall</b>, which affect the breeding and survival rates of vectors. For instance, <b>mosquitoes</b> thrive in warm and wet environments, making regions with frequent rainfall or standing water more prone to diseases like malaria and dengue.</li> </ul>
<b>Vegetation Type</b>	<p><b>Vegetation type</b> refers to the <b>plant life</b> or <b>ground cover</b> provided by plants in a particular region. It is a broad term that does not specify particular plant species, life forms, or structural characteristics. Unlike the term <b>flora</b>, which refers exclusively to the <b>species composition</b> of plants in a given area, <b>vegetation type</b> encompasses a wider variety of <b>spatial scales</b> and can include large-scale areas, from local ecosystems to the <b>global</b> scale.</p> <p><b>Key points about vegetation type:</b></p> <ul style="list-style-type: none"> <li><b>General term:</b> Vegetation type broadly refers to the <b>plant cover</b> without delving into specific taxonomic groups or life forms (such as trees, shrubs, or grasses).</li> </ul>



	<ul style="list-style-type: none"> <li>• <b>Broader concept than flora:</b> While <b>flora</b> focuses on the species of plants present, <b>vegetation</b> can describe the overall plant community and how plants interact with their environment.</li> <li>• <b>Spatial scale:</b> Vegetation types can vary in scale, ranging from specific plant communities in a small area to entire biomes like <b>forests, grasslands, or deserts</b>. This broader scope allows vegetation types to be studied at multiple levels, from local to global.</li> <li>• <b>Plant community:</b> In some cases, vegetation type is similar to the concept of a <b>plant community</b>, but it can be applied to much larger or more diverse areas, including entire ecosystems or regions.</li> </ul> <p>Examples of vegetation types include:</p> <ul style="list-style-type: none"> <li>• <b>Tropical rainforests</b></li> <li>• <b>Savannas</b></li> <li>• <b>Tundra</b></li> <li>• <b>Temperate forests</b></li> <li>• <b>Desert vegetation</b></li> </ul> <p>Each of these types represents a collection of plants that thrive in specific environmental conditions and can form distinct plant communities within their respective ecosystems.</p>
<b>Volatile organic compounds</b>	<p><b>Volatile Organic Compounds (VOCs)</b> are chemical substances, often derived from solids or liquids, that are released into the atmosphere as gases. <b>VOCs</b> are emitted from a wide range of human-made sources, including <b>paints, lacquers, cleaning supplies, pesticides, building materials, furnishings, copiers, correction fluids, adhesives, permanent markers, cleaners and disinfectants, fuels, crude oil, and cosmetics</b>. Additionally, <b>natural sources</b> of VOCs include <b>trees, termites, cows (ruminants), and agricultural activities</b>. These compounds play a significant role in air quality and climate change, as they contribute to the formation of <b>ground-level ozone</b> and <b>secondary pollutants</b>.</p> <p>Here are some examples of <b>Volatile Organic Compounds (VOCs)</b>:</p> <ol style="list-style-type: none"> <li>1. <b>Benzene</b> – Found in emissions from vehicles, industrial processes, and tobacco smoke.</li> <li>2. <b>Formaldehyde</b> – Released from building materials, tobacco smoke, and certain household products like furniture and disinfectants.</li> <li>3. <b>Acetone</b> – Found in nail polish removers, paints, and as a solvent in various products.</li> <li>4. <b>Limonene</b> – A naturally occurring VOC found in citrus fruits and used in cleaning products and air fresheners.</li> <li>5. <b>Methanol</b> – Found in household products, fuel, and industrial solvents.</li> <li>6. <b>Acetaldehyde</b> – Produced by vehicles, industrial processes, and during the breakdown of ethanol.</li> </ol>

	These compounds contribute to air pollution and can have harmful effects on both human health and the environment.
<b>Voluntary Agreements</b>	A <b>Voluntary Agreement</b> is a commitment made between a <b>government authority</b> and one or more <b>private parties</b> , or a <b>unilateral commitment</b> recognized by a public authority, aimed at achieving <b>environmental objectives</b> or improving <b>environmental performance</b> . These agreements typically go beyond the requirements of legal compliance, encouraging actions that contribute to sustainability and environmental protection on a voluntary basis.
<b>Voluntary Carbon Offset Mechanism</b>	A <b>Voluntary Carbon Offset Mechanism</b> operates on the principle that <b>greenhouse gases</b> have the same impact on the climate regardless of where they are emitted. When it is not feasible to reduce emissions from a specific activity, these mechanisms allow entities to offset their emissions by investing in projects that reduce or avoid the same amount of emissions elsewhere. For instance, <b>companies can purchase "CO2 credits"</b> by funding projects in developing countries or emerging economies that reduce carbon emissions. Alternatively, they can buy <b>carbon credits</b> generated by activities that prevent emissions or from <b>surplus quotas</b> . By participating in these mechanisms, industries contribute to the reduction of global greenhouse gas emissions, even if they cannot directly eliminate emissions from their own operations.
<b>Voluntary Carbon Standard</b>	The <b>Voluntary Carbon Standard (VCS)</b> is a <b>quality standard</b> for the <b>voluntary carbon offset industry</b> , designed to ensure the integrity of carbon offset projects. Based on the <b>Kyoto Protocol's Clean Development Mechanism (CDM)</b> , the VCS sets out <b>criteria for validating, measuring, and monitoring</b> carbon offset projects. It helps ensure that the projects delivering carbon credits are credible, transparent, and effective in reducing or avoiding greenhouse gas emissions. The VCS provides a framework that guarantees carbon offsets meet rigorous standards and are reliable for voluntary carbon markets.
<b>Voluntary Commitments</b>	<b>Voluntary Commitments</b> refer to a <b>draft article</b> that was considered during the negotiation of the <b>Kyoto Protocol</b> . This article would have allowed <b>developing countries</b> to voluntarily agree to <b>legally binding emissions targets</b> , even though these countries were not initially required to do so under the Protocol's framework. The idea behind voluntary commitments was to encourage developing nations to participate in global efforts to reduce greenhouse gas emissions, even if they were not obligated by the protocol's provisions for emissions reductions.
<b>Voluntary Emission Reduction</b>	<b>Voluntary Emission Reductions (VERs)</b> , also known as <b>Verified Emission Reductions</b> , are a type of <b>carbon offset</b> traded in the voluntary or <b>Over-the-Counter (OTC) market</b> for carbon credits. These reductions are typically <b>certified through a voluntary certification process</b> and are created by <b>projects verified outside of the Kyoto Protocol</b> framework. One <b>VER</b> represents a reduction of <b>one metric ton of CO2 emissions</b> . Industries and individuals use these schemes to <b>voluntarily compensate for their emissions</b> or to make an additional contribution toward <b>mitigating climate change</b> .
<b>Vulnerability</b>	<b>Vulnerability</b> refers to the degree to which a system is <b>susceptible</b> to, or unable to cope with, the <b>adverse effects of climate change</b> , including <b>climate variability</b> and <b>extreme events</b> . It is determined by several factors: the <b>character, magnitude, and rate of climate</b>

	<p><b>variation</b> to which a system is exposed; its <b>sensitivity</b> to these changes; and its <b>adaptive capacity</b>—the ability to adjust to, moderate, or cope with climate-related stresses.</p> <p>Vulnerability is shaped by a combination of <b>physical, social, economic, and environmental factors</b>, which increase the likelihood that a community will be <b>negatively affected</b> by climate hazards or changes. It involves the <b>exposure</b> to climate conditions, the <b>sensitivity</b> of a community to those conditions, and its <b>capacity to adapt</b> to the changes. This can include <b>geographical, climatic, social, economic, and development-related</b> factors.</p> <p>The impacts of climate change are <b>disproportionately</b> felt across different communities, with <b>vulnerability</b> varying based on factors such as <b>geographical location, socioeconomic status, and social marginalization</b>. <b>Vulnerability</b> depends on a wide range of <b>institutional, economic, and environmental</b> elements, some of which are not directly linked to climate change itself.</p>
<b>Vulnerability Assessment</b>	<p>A <b>Vulnerability Assessment</b> is the process of identifying <b>who</b> and <b>what</b> is <b>exposed</b> to and <b>sensitive</b> to the impacts of <b>climate change</b> and other environmental changes. It begins by evaluating factors that make individuals, communities, or ecosystems <b>susceptible to harm</b>, such as <b>access to natural and financial resources, ability to self-protect</b>, and the strength of <b>support networks</b>.</p> <p>A vulnerability assessment typically focuses on examining the <b>exposure, sensitivity, and adaptive capacity</b> of a system in relation to specific impacts, such as the <b>increasing frequency of floods</b>. The scope of a vulnerability assessment is determined by several factors, including the <b>scale of the assessment</b>, the <b>type of impact or hazard</b> being studied, and the <b>target group or system</b> being evaluated. This process helps inform decisions and strategies for reducing vulnerability and enhancing resilience to climate change.</p>
<b>Vulnerability Context</b>	<p><b>Vulnerability Context</b> refers to the assessment of the <b>local context</b> during <b>livelihood analysis</b>, focusing on the various factors and long-term trends that influence <b>insecurity</b> and <b>vulnerability</b>, especially for <b>poor or marginalized communities</b>. It recognizes that while the poor are often in a state of <b>constant insecurity</b>, certain <b>external factors</b>—such as <b>economic trends, social structures, political influences, and climatic events</b>—can significantly worsen their vulnerability.</p> <p>This assessment involves analyzing both <b>immediate</b> and <b>long-term factors</b>, including those that may arise from sources far beyond the <b>local environment</b>. Understanding the <b>vulnerability context</b> helps identify how broader trends or changes, such as shifts in <b>markets, policies, or climate</b>, affect individuals and communities, especially those who are most at risk.</p>
<b>Vulnerability to Climate Change</b>	<p><b>Vulnerability to Climate Change</b> refers to the <b>characteristics of a system</b> that make it <b>susceptible to harm</b>, leading to <b>degradation</b> or an <b>inability to function</b> effectively when exposed to climate-related stresses. This vulnerability arises from exposure to <b>climate hazards</b> (such as extreme weather events, rising temperatures, and sea-level rise), the <b>sensitivity</b> of the system to these changes, and its <b>adaptive capacity</b>—the ability to cope with or adjust to the impacts.</p>

	<p><b>Vulnerability to climate change</b> is influenced by a combination of <b>environmental, social, economic, and institutional factors</b>. It can result from <b>human-induced climate change</b> and the <b>inability</b> of communities, ecosystems, or infrastructure to withstand or recover from its effects. Understanding <b>vulnerability</b> helps in developing strategies to <b>enhance resilience</b> and <b>reduce risks</b> associated with climate change.</p>
<b>Vulnerable</b>	<p><b>Vulnerable</b> refers to being <b>liable or susceptible to harm, injury, or adverse effects</b>, whether <b>physically, emotionally, or environmentally</b>. In the context of <b>climate change and environmental risks</b>, vulnerability indicates <b>exposure to hazards</b> such as <b>extreme weather events, rising temperatures, or resource scarcity</b>, which can threaten the <b>well-being, security, or stability</b> of individuals, communities, or ecosystems. Those who are vulnerable often have <b>limited capacity to cope with or adapt to threats</b>, making them more at risk of <b>harm or disruption</b>.</p>
<b>Vulnerable Communities</b>	<p><b>Vulnerable Communities</b> refer to <b>groups of people who have limited capacity to prepare for, respond to, or recover from emergencies, disasters, or environmental changes</b>, including those caused by <b>climate change</b>. These communities may face <b>social, economic, or physical barriers</b> that make them more susceptible to harm.</p> <p>Vulnerable communities often include individuals with <b>limited access to resources</b>, such as <b>healthcare, financial stability, or transportation</b>, as well as those who may be <b>unable or unwilling to follow emergency instructions</b> or access <b>preparedness and response services</b>. Factors contributing to vulnerability can include <b>poverty, age (elderly or children), disabilities, social marginalization, geographic location, and dependence on climate-sensitive livelihoods</b>. Addressing their needs is critical for ensuring <b>equitable climate resilience and disaster preparedness</b>.</p> <p>Examples of Vulnerable Communities:</p> <ul style="list-style-type: none"> <li>• <b>Coastal Communities</b> – People living in low-lying coastal areas are at high risk of <b>sea-level rise, coastal erosion, and extreme storms</b> (e.g., communities in the Sundarbans, Bangladesh).</li> <li>• <b>Indigenous Populations</b> – Many indigenous groups depend on <b>natural ecosystems</b> for their survival, making them highly vulnerable to <b>climate-related changes in biodiversity and water availability</b> (e.g., Arctic Inuit communities affected by melting ice).</li> <li>• <b>Urban Slum Dwellers</b> – People living in <b>overcrowded, informal settlements</b> often lack proper infrastructure, making them more vulnerable to <b>floods, heatwaves, and poor air quality</b> (e.g., Dharavi in Mumbai, India).</li> <li>• <b>Small-Scale Farmers</b> – Rural farmers relying on <b>rain-fed agriculture</b> are particularly susceptible to <b>droughts, erratic rainfall, and soil degradation</b> (e.g., farmers in sub-Saharan Africa facing prolonged droughts).</li> <li>• <b>Elderly and Disabled Populations</b> – Older adults and individuals with disabilities may struggle to <b>evacuate or access emergency resources</b> during disasters (e.g., elderly residents affected by Hurricane Katrina in the U.S.).</li> <li>• <b>Fisherfolk and Farmers</b> – People who <b>depend on natural resources</b> for their livelihoods are vulnerable to <b>climate-related disasters</b> like droughts, hurricanes, and rising sea levels, <b>ocean acidification, coral reef degradation, and declining fish stocks</b> (e.g., fishing villages in the Philippines) threatening their survival.</li> </ul>

<b>Vulnerable Groups</b>	<p><b>Vulnerable groups</b> are <b>populations that face higher risks of harm, exclusion, or marginalization</b> due to factors such as <b>age, gender, ethnicity, socioeconomic status, location, or health conditions</b>. These groups often have <b>limited access to resources, support systems, and decision-making processes</b>, making them more <b>susceptible to environmental, social, economic, and health-related challenges</b>.</p> <p><b>Key Characteristics of Vulnerable Groups:</b></p> <ol style="list-style-type: none"> <li>1. <b>Age – Children and elderly individuals</b> are more vulnerable due to their <b>dependency on others, physical limitations, and health risks</b>.</li> <li>2. <b>Gender – Women, especially pregnant individuals</b>, and gender minorities may face <b>discrimination, lack of healthcare, or social barriers</b> that increase their vulnerability.</li> <li>3. <b>Ethnicity &amp; Indigenous Status – Ethnic minorities and indigenous communities</b> often face <b>social exclusion, land dispossession, and limited access to education, healthcare, and economic opportunities</b>.</li> <li>4. <b>Location – People living in remote, disaster-prone, or conflict-affected areas</b> may have <b>limited infrastructure, weak governance, and restricted access to emergency services</b>.</li> <li>5. <b>People with Disabilities – Individuals with physical, sensory, cognitive, or mental health conditions</b> may struggle with <b>mobility, communication, and access to essential services</b>.</li> <li>6. <b>People with Stigmatized Illnesses – Those with diseases such as HIV/AIDS or mental illnesses</b> often face <b>discrimination, inadequate healthcare, and social isolation</b>.</li> <li>7. <b>Refugees &amp; Displaced Populations – People fleeing war, conflict, natural disasters, or persecution</b> often <b>lack stable shelter, legal rights, and essential services</b>, making them highly vulnerable.</li> <li>8. <b>Low-Income &amp; Unemployed Individuals – Economic instability</b> limits access to <b>healthcare, education, housing, and food security</b>, increasing vulnerability to external shocks.</li> </ol>
<b>Wastewater</b>	<p><b>Wastewater</b> refers to <b>water that has been used and contaminated by domestic, industrial, agricultural, or commercial activities</b>, containing <b>dissolved or suspended pollutants such as organic matter, chemicals, and microorganisms</b>. Effective <b>wastewater treatment and management</b> are critical for <b>protecting freshwater resources, reducing pollution, and mitigating climate change impacts</b>. Sustainable wastewater practices, such as <b>water recycling, resource recovery, and nature-based treatment solutions</b>, contribute to a <b>circular economy, enhance water security, and support ecosystem restoration</b>.</p>
<b>Water</b>	<p><b>Water</b> is a <b>chemical substance (H<sub>2</sub>O)</b> composed of <b>two hydrogen atoms and one oxygen atom, held together by covalent bonds</b>. It is <b>essential for all forms of life</b> and plays a critical role in <b>climate regulation, ecosystems, and human activities</b>.</p>

	<p>At ambient conditions, water exists as a <b>liquid</b>, but it also coexists with its <b>solid form (ice)</b> and <b>gaseous form (water vapor)</b>, forming a key part of the <b>Earth's hydrological cycle</b>. This cycle drives <b>precipitation, evaporation, and groundwater recharge</b>, influencing <b>weather patterns, freshwater availability, and climate systems</b>.</p>
<b>Water Borne Disease</b>	<p><b>Waterborne Diseases</b> are illnesses caused by <b>pathogenic microorganisms</b> such as <b>bacteria, viruses, parasites, and fungi</b> that thrive in <b>contaminated water sources</b>. These diseases are primarily transmitted when people <b>consume, bathe in, or come into contact with polluted water</b> that contains infectious agents or harmful chemicals.</p> <p>Contaminated water can also contribute to <b>foodborne diseases</b> when used in <b>food preparation, irrigation, or processing</b>, allowing pathogens to spread through consumption. <b>Common waterborne diseases</b> include <b>cholera, typhoid fever, dysentery, hepatitis A, giardiasis, and cryptosporidiosis</b>, which can lead to severe dehydration, gastrointestinal infections, and, in extreme cases, fatalities.</p> <p>The risk of waterborne diseases is exacerbated by <b>poor sanitation, inadequate wastewater treatment, and climate change impacts</b>, such as <b>flooding, rising temperatures, and extreme weather events</b>, which can increase water contamination. <b>Ensuring access to clean drinking water, improving sanitation infrastructure, promoting hygiene practices, and implementing effective water quality management strategies</b> are essential for <b>protecting public health, reducing disease outbreaks, and building climate resilience</b>.</p>
<b>Water column</b>	<p><b>Water Column</b> refers to the <b>full length of water extending from the surface to the bottom of a water body, such as a lake, river, or ocean</b>. It represents <b>different physical, chemical, and biological layers</b> that influence <b>water quality, aquatic ecosystems, and climate interactions</b>.</p> <p>The water column is often divided into layers based on <b>temperature, oxygen levels, and sunlight penetration</b>, such as:</p> <ul style="list-style-type: none"> <li>• <b>Epilimnion (Surface Layer)</b>: Warm, well-oxygenated, and influenced by atmospheric interactions.</li> <li>• <b>Metalimnion (Thermocline)</b>: A transition zone where temperature changes rapidly with depth.</li> <li>• <b>Hypolimnion (Bottom Layer)</b>: Cold, oxygen-depleted, and less affected by surface conditions.</li> </ul> <p>Understanding the <b>dynamics of the water column</b> is crucial for <b>monitoring aquatic health, managing pollution, supporting fisheries, and assessing climate change impacts on freshwater and marine environments</b>.</p>
<b>Water Pollution</b>	<p><b>Water Pollution</b> refers to the <b>contamination of water bodies such as lakes, rivers, oceans, and groundwater due to the discharge of pollutants without adequate treatment</b>. This pollution can result from <b>industrial, agricultural, and domestic activities</b>, introducing harmful substances that degrade water quality and threaten ecosystems, human health, and biodiversity.</p> <p>Common sources of water pollution include:</p> <ul style="list-style-type: none"> <li>• <b>Industrial waste</b> (heavy metals, chemicals, toxins)</li> <li>• <b>Agricultural runoff</b> (pesticides, fertilizers, animal waste)</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Sewage and wastewater discharge</b> (untreated or poorly treated effluents)</li> <li>• <b>Plastic and microplastic pollution</b></li> <li>• <b>Oil spills and chemical leaks</b></li> </ul> <p>Water pollution can lead to <b>loss of aquatic life, waterborne diseases, ecosystem imbalance, and reduced freshwater availability</b>. Addressing water pollution requires <b>effective wastewater treatment, sustainable agricultural practices, strict industrial regulations, and active water conservation efforts</b> to ensure <b>clean and resilient water systems</b> amid climate challenges.</p>
<b>Water Stress</b>	<p><b>Water Stress</b> occurs when <b>the demand for freshwater exceeds the available supply, limiting socio-economic development and ecosystem health</b>. It is commonly measured by the ratio of <b>water withdrawals to renewable water resources, with a threshold of 20% indicating water stress</b>.</p> <p>Key drivers of water stress include:</p> <ul style="list-style-type: none"> <li>• <b>Over-extraction of groundwater and surface water</b></li> <li>• <b>Climate change impacts, such as altered rainfall patterns and droughts</b></li> <li>• <b>Population growth and rapid urbanization</b></li> <li>• <b>Unsustainable agricultural and industrial water use</b></li> <li>• <b>Pollution reducing the availability of clean water</b></li> </ul> <p>Water stress can lead to <b>water scarcity, food insecurity, energy shortages, and geopolitical tensions</b>. Addressing water stress requires <b>efficient water management, conservation practices, wastewater reuse, and climate adaptation strategies</b> to ensure <b>sustainable water access and resilience</b>.</p>
<b>Water Use Efficiency</b>	<p><b>Water Use Efficiency (WUE)</b> refers to the <b>amount of carbon gained through photosynthesis per unit of water lost via evapotranspiration</b>. It measures how effectively plants or agricultural systems use water to produce biomass or yield.</p> <p>WUE can be expressed at different scales:</p> <ul style="list-style-type: none"> <li>• <b>Short-term basis:</b> Ratio of <b>photosynthetic carbon gain to transpirational water loss</b> in plants.</li> <li>• <b>Seasonal or ecosystem level:</b> Ratio of <b>net primary production (biomass growth) or agricultural yield to the total water available</b>.</li> </ul> <p>Improving <b>water use efficiency</b> is crucial for <b>sustainable agriculture, ecosystem resilience, and climate adaptation</b>, particularly in <b>water-scarce regions</b>. Strategies to enhance WUE include <b>drought-resistant crops, precision irrigation, soil moisture conservation, and agroforestry practices</b>.</p>

<b>Water Vapor</b>	<p><b>Water Vapor</b> is the <b>gaseous form of water present in the atmosphere and the most abundant greenhouse gas</b>. It plays a crucial role in the <b>natural greenhouse effect</b>, regulating Earth's temperature by trapping heat.</p> <p>While human activities do not directly increase water vapor concentrations, it contributes to the <b>enhanced greenhouse effect</b> through <b>positive feedback mechanisms</b>. As global temperatures rise due to increased greenhouse gas emissions (<b>such as CO<sub>2</sub> and CH<sub>4</sub></b>), more water evaporates, further amplifying warming.</p> <p>In addition to its greenhouse gas role, water vapor influences the <b>planet's climate system</b> by forming <b>clouds and precipitation</b> when it condenses into water droplets or ice. These cloud formations can have <b>both cooling and warming effects</b> depending on their altitude, thickness, and composition.</p> <p>Understanding <b>water vapor dynamics</b> is essential for <b>climate modelling, weather prediction, and assessing climate change impacts</b>.</p>
<b>Weather</b>	<p><b>Weather</b> refers to the <b>short-term atmospheric conditions in a specific location</b>, influenced by various <b>meteorological components</b>, including:</p> <ul style="list-style-type: none"> <li>• <b>Temperature</b></li> <li>• <b>Wind speed and direction</b></li> <li>• <b>Precipitation (rain, snow, hail, etc.)</b></li> <li>• <b>Cloud cover</b></li> <li>• <b>Barometric pressure</b></li> <li>• <b>Humidity</b></li> <li>• <b>Sunshine hours</b></li> <li>• <b>Visibility</b></li> </ul> <p>Weather patterns <b>do not occur in isolation</b>—they are interconnected, meaning <b>changes in one region can influence weather conditions hundreds or even thousands of kilometers away</b>. This is evident in <b>global weather systems, such as monsoons, jet streams, and ocean currents, which drive weather variability and extreme events</b>.</p> <p>A simple way to differentiate Climate and Weather:</p> <ul style="list-style-type: none"> <li>• <b>"Climate is what you expect"</b> (e.g., cold winters).</li> <li>• <b>"Weather is what you get"</b> (e.g., a sudden blizzard).</li> </ul> <p>Understanding <b>weather dynamics</b> is essential for <b>climate forecasting, disaster preparedness, agriculture, and water resource management</b>, especially in the context of <b>climate change, which is increasing the frequency and intensity of extreme weather events</b>.</p>



<b>Weather Forecast</b>	<p><b>Weather Forecast</b> refers to the <b>scientific process of predicting future atmospheric conditions at a specific time and location using technology and meteorological data.</b></p> <p>It involves <b>collecting quantitative information</b> on factors such as:</p> <ul style="list-style-type: none"> <li>• <b>Temperature</b></li> <li>• <b>Air pressure</b></li> <li>• <b>Humidity</b></li> <li>• <b>Wind speed and direction</b></li> <li>• <b>Cloud cover</b></li> <li>• <b>Precipitation</b></li> </ul> <p>Using this data, <b>computer models and scientific principles</b> are applied to estimate how the atmosphere will evolve over time.</p> <p>Humans have attempted to predict the weather <b>informally for millennia</b> and <b>formally since the 19th century</b> with the development of meteorology. Today, weather forecasting plays a critical role in <b>disaster preparedness, agriculture, transportation, and climate resilience.</b></p>
<b>Wildfire</b>	<p><b>Wildfire</b> is an <b>uncontrolled and rapidly spreading fire</b> that occurs in <b>natural environments such as forests, grasslands, and shrublands.</b> These fires can ignite due to <b>natural causes</b> (e.g., lightning strikes, volcanic eruptions, extreme heat) or <b>human activities</b> (e.g., unattended campfires, discarded cigarettes, arson, power lines).</p> <p>Once ignited, wildfires can <b>spread quickly, consuming vegetation, trees, wildlife, human settlements, and structures</b> in their path. They pose serious threats, including:</p> <ul style="list-style-type: none"> <li>• <b>Destruction of ecosystems and biodiversity</b></li> <li>• <b>Soil erosion and water contamination</b></li> <li>• <b>Pose serious risks</b> to human life, property, and air quality.</li> <li>• <b>Release large amounts of carbon dioxide (CO<sub>2</sub>) and air pollution,</b> from smoke and carbon emissions contributing to climate change</li> </ul> <p><b>Climate change, rising temperatures, droughts, and strong winds</b> have increased the frequency and intensity of wildfires globally. Effective <b>fire prevention, land management, and emergency response strategies</b> are crucial to <b>mitigate wildfire risks and protect communities and ecosystems.</b></p>
<b>Wind</b>	<p><b>Wind</b> refers to the <b>movement of air on a large scale, driven by differences in atmospheric pressure.</b> On Earth, wind is caused by the uneven heating of the planet's surface by the Sun, which creates pressure differences that set air in motion.</p> <p>Key factors influencing wind include:</p>

	<ul style="list-style-type: none"> <li>• <b>Atmospheric pressure gradients</b> (air moves from high to low pressure areas).</li> <li>• <b>Earth's rotation (Coriolis effect)</b>, which influences wind direction.</li> <li>• <b>Temperature variations</b> between land and water bodies.</li> </ul> <p>Winds play a crucial role in:</p> <ul style="list-style-type: none"> <li>• <b>Weather patterns and climate regulation.</b></li> <li>• <b>Transporting heat, moisture, and pollutants.</b></li> <li>• <b>Generating renewable energy (wind power).</b></li> <li>• <b>Shaping landscapes through erosion and deposition.</b></li> </ul> <p>Depending on their <b>scale and intensity</b>, winds can range from <b>gentle breezes</b> to <b>destructive storms, such as hurricanes, cyclones, and tornadoes.</b></p>
<b>Wind Erosion</b>	<p><b>Wind Erosion</b> is the <b>process of soil, sand, and rock particles being worn away, transported, and deposited by wind.</b> It occurs when strong winds lift and carry loose particles from the surface, particularly in <b>dry, arid, or exposed landscapes.</b></p> <p>Key factors influencing wind erosion include:</p> <ul style="list-style-type: none"> <li>• <b>Lack of vegetation cover</b> (plants help anchor soil).</li> <li>• <b>Dry and loose soil conditions</b> (common in deserts and overgrazed lands).</li> <li>• <b>High wind speeds</b> that can lift and transport particles.</li> </ul> <p><b>Effects of Wind Erosion:</b></p> <ul style="list-style-type: none"> <li>• <b>Soil degradation</b> and loss of fertile land.</li> <li>• <b>Desertification</b>, reducing agricultural productivity.</li> <li>• <b>Air pollution</b> due to dust storms (e.g., sandstorms, haze).</li> <li>• <b>Damage to infrastructure</b> (e.g., roads, buildings, and machinery).</li> </ul> <p>Wind erosion is a significant environmental challenge, particularly in <b>climate-vulnerable regions</b>, and requires <b>integrated land management strategies to maintain soil health and prevent degradation.</b></p>
<b>Winter</b>	<p><b>Winter</b> is the <b>coldest season of the year</b>, occurring between <b>autumn and spring</b> in <b>temperate and polar regions.</b> It is marked by <b>low temperatures, shorter daylight hours, and longer nights.</b></p> <p><b>Key Characteristics of Winter:</b></p>

	<ul style="list-style-type: none"> <li>• Begins with the <b>winter solstice</b>, when the <b>daylight hours are shortest and nights are longest</b>.</li> <li>• In many regions, it brings <b>snowfall, frost, and freezing temperatures</b>.</li> <li>• Influences <b>ecosystem behavior</b>, with animals hibernating and plants entering dormancy.</li> <li>• Affects <b>human activities</b>, including agriculture, transportation, and energy consumption.</li> </ul> <p>Winter varies by <b>geographical location</b>, with <b>harsher conditions in higher latitudes</b> and <b>milder winters in coastal or equatorial regions</b>. Climate change is impacting <b>seasonal patterns</b>, affecting winter temperatures, snowfall, and extreme weather events.</p>
<b>WRE Profiles</b>	<p><b>WRE Profiles</b> are <b>carbon dioxide (CO<sub>2</sub>) concentration pathways designed to achieve atmospheric stabilization, developed by Wigley, Richels, and Edmonds (1996)</b>. These profiles explore different scenarios for <b>how CO<sub>2</sub> levels can be stabilized over time</b>, depending on emission reduction strategies and policy choices.</p> <p><b>Key Aspects of WRE Profiles:</b></p> <ul style="list-style-type: none"> <li>• They outline <b>multiple pathways</b> for CO<sub>2</sub> stabilization at different concentration levels.</li> <li>• Each profile represents a <b>different rate and timing of emission reductions</b>.</li> <li>• They help assess <b>long-term climate impacts</b> and guide <b>climate policy and mitigation strategies</b>.</li> </ul> <p>WRE Profiles are widely used in <b>climate modelling, scientific assessments, and policy planning</b> to understand the <b>potential consequences of different emissions scenarios on global warming and climate stability</b>.</p>
<b>Zoning</b>	<p><b>Zoning</b> is a <b>land-use planning tool</b> used by <b>local governments</b> to regulate how land can be developed and utilized. It involves <b>dividing land into designated zones</b>, each with specific regulations on land use, building height, lot coverage, and other development aspects.</p> <p><b>Key Features of Zoning:</b></p> <ul style="list-style-type: none"> <li>• <b>Use-Based Zoning:</b> Specifies the permitted land uses (e.g., residential, commercial, industrial, agricultural).</li> <li>• <b>Form-Based Zoning:</b> Regulates physical characteristics such as <b>building height, density, and lot coverage</b>.</li> <li>• <b>Mixed-Use Zoning:</b> Allows a combination of residential, commercial, and recreational spaces in the same area.</li> </ul> <p><b>Key Purpose of Zoning:</b></p> <ul style="list-style-type: none"> <li>• Ensures <b>organized urban growth</b> and prevents land-use conflicts.</li> <li>• Promotes <b>public safety, environmental protection, and sustainable development</b>.</li> <li>• Guides <b>infrastructure planning</b> and supports <b>climate resilience</b>.</li> </ul>