1. Did you read the note? Is the climate where Nikhil is residing, similar to ours? Analyse the writing based on the weather elements given below: Temperature, Precipitation, Wind.

Answer: Yes, I read Nikhil's note about living in New Brunswick, Canada. The climate there is significantly different from Kerala, India, which is part of the Monsoon Climatic Region. Below is an analysis based on the weather elements:

- **Temperature**:
    - **New Brunswick**: Experiences extreme seasonal variations. Winters (mid-September to April) average -20°C, dropping to -35°C. Summers (May to August) reach up to 30°C, with hot and humid conditions.
    - **Kerala**: Maintains warm temperatures year-round, with summers (March–May) at 25–35°C and mild winters (December–February) at 20–28°C. The diurnal and seasonal temperature range is low due to its coastal location.
    - **Comparison**: New Brunswick has colder winters and hotter summers than Kerala, with greater temperature fluctuations.
- **Precipitation**:
    - **New Brunswick**: Receives heavy snowfall in winter (40–50 cm accumulation) and rain in summer, contributing to humidity.
    - **Kerala**: Gets heavy monsoon rainfall (200–300 cm annually, June–September), with no snowfall due to its tropical climate.
    - **Comparison**: New Brunswick's precipitation includes snowfall, while Kerala's is dominated by monsoon rains.
- **Wind**:
    - **New Brunswick**: Harsh, cold winds in winter make conditions severe. Summer winds are not specifically mentioned.
    - **Kerala**: Monsoon winds (sea to land in summer, land to sea in winter) drive rainfall, with coastal breezes moderating temperatures.
    - **Comparison**: New Brunswick's winter winds are extreme, while Kerala's winds are seasonal and tied to monsoon patterns.

Conclusion: New Brunswick's climate, resembling a Taiga or Temperate Grassland region, is colder, with snowfall and harsh winds, unlike Kerala's warm, humid, rainfall-dominated monsoon climate.

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2. Did you notice that New Brunswick, where Nikhil lives, experiences severe winters and snowfall? Is climate the same everywhere in the world?

Answer: Yes, I noticed that New Brunswick experiences severe winters with temperatures as low as -35°C and heavy snowfall (40–50 cm). The climate is not the same everywhere in the world. The chapter explains that the Earth has diverse climatic regions due to variations in weather elements like temperature and precipitation. For example, the Equatorial region has high temperatures and

rainfall year-round, while Hot Deserts are arid with minimal rain. The Monsoon region, like Kerala, has seasonal rainfall, whereas the Tundra region is extremely cold with snowfall. These differences shape unique ecosystems and human lifestyles, proving that climate varies significantly across the globe.

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3. Why does this difference in diurnal range of temperature occur in the Monsoon climatic region?

Answer: In the Monsoon climatic region, the diurnal range of temperature (difference between day and night temperatures) is low in coastal areas and high in interior areas due to geographical factors. Coastal areas, like Kerala, are close to the sea, which has a high specific heat capacity, meaning it absorbs and releases heat slowly. This moderates temperatures, keeping day and night temperatures relatively stable. In contrast, interior areas, far from the sea, lack this moderating effect. Land heats up quickly during the day and cools rapidly at night, leading to a higher diurnal range. Additionally, high humidity in coastal areas traps heat, further reducing temperature fluctuations.

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4. Does convectional rainfall occur in the Monsoon climatic region?

Answer: Yes, convectional rainfall occurs in the Monsoon climatic region, though it is less dominant than monsoon rainfall. Convectional rainfall happens when high temperatures heat the ground, causing air to rise, cool, and condense into rain, typically in the afternoon. In the Monsoon region, especially during summer, high temperatures and humidity can trigger convectional rainfall, particularly in interior areas. However, the primary rainfall in this region comes from monsoon winds, which bring heavy, seasonal rains from June to September.

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5. Why are crops like rice, sugarcane, jute, cotton, tea, and coffee called tropical crops?

Answer: Crops like rice, sugarcane, jute, cotton, tea, and coffee are called tropical crops because they thrive in the warm, humid conditions typical of tropical climates, such as the Monsoon and Equatorial regions. These crops require high temperatures (20–35°C) and abundant rainfall (100–300 cm annually) for optimal growth. For example, rice needs flooded fields, which are supported by monsoon rains, while tea and coffee flourish in humid, hilly areas. Their cultivation is concentrated in tropical regions like the Indian subcontinent and Southeast Asia, making them characteristic of these climates.

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6. What are oases?

Answer: Oases are fertile areas in deserts where water sources, such as underground springs or rivers, are available. They support dense vegetation, like date palms and grasses, in otherwise arid regions. Oases enable agriculture, settlement, and animal husbandry, providing a lifeline for desert communities. For example, in the Sahara Desert, oases support small-scale farming and are vital for nomadic tribes.

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7. Lumbering is more industrialized in the Taiga region than in the Equatorial region. Why?

Answer: Lumbering is more industrialized in the Taiga region than in the Equatorial region due to several factors. The Taiga, located in the Northern Hemisphere (e.g., Canada, Siberia), has vast, uniform coniferous forests (e.g., pine, fir, spruce), which are easier to harvest and process. These trees have softwood, ideal for industrial use in construction and paper production. The region's cold climate and sparse population allow large-scale, mechanized logging with minimal environmental resistance. In contrast, the Equatorial region's dense, multilayered evergreen forests have diverse hardwood species, which are harder to extract and process. The humid climate, rugged terrain, and biodiversity concerns (e.g., deforestation impacts) make industrial-scale lumbering challenging. Additionally, the Taiga's proximity to developed markets (e.g., North America, Europe) supports industrialized lumbering, unlike the Equatorial region's often remote locations.

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8. Identity how climate change affects climatic regions, and prepare a note.

Note on Climate Change Effects on Climatic Regions:
Climate change, a long-term shift in weather patterns due to human activities and natural variability, significantly impacts the world's climatic regions. In the **Equatorial Region**, rising temperatures and deforestation threaten evergreen forests, reducing biodiversity and carbon storage. The **Monsoon Region** experiences altered rainfall patterns, with torrential rains replacing prolonged showers, causing floods and crop damage (IPCC, 1985–2019). In the **Savanna Region**, desertification risks increase, displacing millions (UNCCD). **Hot Deserts** face intensified heat and aridity, making survival harder. The **Mediterranean Region** sees reduced winter rainfall, affecting agriculture like citrus farming. **Temperate Grasslands** encounter erratic rainfall, disrupting wheat production. The **Taiga Region** loses permafrost, destabilizing ecosystems, while the **Tundra Region** suffers from melting ice caps, shrinking from 7.5 million km² (1978) to 3.74 million km² (2019) (NASA, 2020). Globally, sea level rise (10–20 mm/year, IPCC 2023) threatens coastal areas, and Himalayan glacier melt (12–20 m/year) impacts water availability. These changes disrupt ecosystems, agriculture, and human livelihoods, emphasizing the need for sustainable practices to mitigate climate change.

Activities from the Chapter

1. Observe the map (Fig 3.3) and identify the areas included in the Equatorial climatic region.

Answer: The Equatorial climatic region extends from 0° to 10° North and South of the Equator. Based on the map, the areas included are:

- **South America**: Amazon Basin (Brazil, Peru, Colombia).
- **Africa**: Congo Basin (Democratic Republic of Congo, Gabon, Cameroon).
- **Asia**: Parts of Indonesia, Malaysia, and Papua New Guinea.
  These regions are characterized by high temperatures and heavy rainfall, supporting evergreen forests.

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2. Observe the map (Fig 2.2) and atlas, and list the regions experiencing monsoon climate.

Answer: Based on the map and atlas, the regions experiencing monsoon climate are:

- Indian subcontinent (India, Bangladesh, Sri Lanka, Pakistan).
- Southeast Asia (Thailand, Vietnam, Myanmar, Cambodia, Laos, Philippines).
- Parts of East Asia (southern China).
- Northern Australia.
- Parts of West Africa (e.g., Nigeria, Ghana).
  These areas have seasonal winds, humid summers, and dry winters.

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3. With the help of ICT, collect images of plants and animals found in monsoon forests and create a digital album of the same. Caption them.

Answer: To complete this activity, I would use online resources to gather images of plants and animals from monsoon forests and create a digital album (e.g., in Google Slides or Canva). Below is a sample of how the album could be structured with captions:

- **Plant: Teak Tree**
  Caption: Teak is a deciduous tree in monsoon forests, valued for its durable wood used in furniture. It sheds leaves in the dry season.
- **Plant: Bamboo**
  Caption: Bamboo grows rapidly in monsoon regions, used for construction and crafts due to its flexibility and strength.
- **Animal: Bengal Tiger**
  Caption: The Bengal tiger thrives in India's monsoon forests, relying on dense vegetation for hunting prey like deer.
- **Animal: Indian Elephant**
  Caption: Indian elephants inhabit monsoon forests, feeding on grasses and leaves, and are vital to the ecosystem.
- **Plant: Sal Tree**
  Caption: Sal is a common deciduous tree in monsoon forests, providing timber and resin for local communities.
- **Animal: Indian Peacock**
  Caption: The peacock, India's national bird, flourishes in monsoon regions, displaying vibrant feathers during the rainy season.

The album would include 10–15 such entries with high-quality images and informative captions, saved as a PDF or shared online.

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4. Shifting cultivation has different names in different countries of the monsoon region. Find these names.

Answer: Shifting cultivation, a primitive farming method in the Monsoon region, is known by different names across countries:

- **India**: Jhum (Northeast India).
- **Indonesia**: Ladang.
- **Malaysia**: Ladang.
- **Philippines**: Kaingin.
- **Myanmar**: Taungya.
- **Sri Lanka**: Chena.
- **Vietnam**: Ray.
  These names reflect local practices of clearing land for temporary cultivation before moving to a new plot.

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5. With the help of map (Fig 2.4) and atlas, identify the countries in which tropical grasslands are found.

Answer: Based on the map and atlas, countries with tropical grasslands (Savannas) include:

- **Africa**: Kenya, Tanzania, Uganda, Nigeria, South Africa, Zimbabwe, Botswana.
- **South America**: Brazil (Campos), Venezuela (Llanos), Colombia.
- **Australia**: Northern Australia (Savanna).
  These regions, located between 10° and 30° latitudes, have wet and dry seasons and support grasslands with scattered trees.

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6. Observe the map (Fig 2.6) and atlas, identify the continents where hot deserts are located. Locate hot deserts in the outline map and include in 'My Own Atlas'.

Answer: Based on the map and atlas, hot deserts are located in the following continents:

- **Africa**: Sahara Desert (North Africa), Kalahari Desert (Southern Africa).
- **Asia**: Arabian Desert, Thar Desert (India).
- **Australia**: Great Australian Desert.
- **South America**: Atacama Desert (Chile, Peru).
- **North America**: Sonoran Desert (USA, Mexico).

For 'My Own Atlas', I would draw an outline world map and mark these deserts:

- **Sahara**: Across North Africa (e.g., Egypt, Libya, Algeria).
- **Kalahari**: Botswana, Namibia, South Africa.
- **Arabian**: Saudi Arabia, Yemen, Oman.

- **Thar**: Northwest India, Pakistan.
- **Great Australian**: Central Australia.
- **Atacama**: Northern Chile, Peru.
- **Sonoran**: Southwest USA, Northwest Mexico.
  The map would be labeled with desert names and shaded to indicate arid regions, included in a personal atlas collection.

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7. Identify and list the animals found in hot deserts. Collect their pictures with the help of ICT and prepare a digital album.

Answer: Animals found in hot deserts include:

- Fennec Fox
- Dromedary Camel
- Scorpion
- Sidewinder Rattlesnake
- Meerkat
- Desert Tortoise
- Addax Antelope
- Sand Cat

For the digital album, I would use ICT tools to collect images and create a presentation (e.g., PowerPoint):

- **Fennec Fox**: *Caption*: Small nocturnal fox with large ears for heat dissipation, found in Sahara.
- **Dromedary Camel**: *Caption*: Single-humped camel adapted to store fat and water, used by desert nomads.
- **Scorpion**: *Caption*: Arachnid with a venomous sting, survives in arid conditions like the Kalahari.
- **Sidewinder Rattlesnake**: *Caption*: Snake with sidewinding movement, found in Sonoran Desert.
- **Meerkat**: *Caption*: Social mammal in Kalahari, lives in burrows to escape heat.
- **Desert Tortoise**: *Caption*: Reptile in Sonoran Desert, burrows to avoid extreme temperatures.
- **Addax Antelope**: *Caption*: Critically endangered antelope in Sahara, adapted to low water.
- **Sand Cat**: *Caption*: Small feline in Arabian Desert, hunts at night to avoid heat.

The album would include 8–10 slides with images and captions, saved digitally.

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8. Observe the map (Fig 2.9) and atlas, identify the areas included in the Mediterranean climatic region. Depict them on the world map and add to My Own Atlas.

Answer: Based on the map and atlas, the Mediterranean climatic region includes:

- **Europe**: Southern Europe (Spain, Italy, Greece, Southern France, Portugal).
- **Africa**: North Africa (Morocco, Algeria, Tunisia).
- **Asia**: Western Asia (Turkey, Syria, Lebanon, Israel).
- **North America**: California (USA).
- **South America**: Central Chile.
- **Australia**: Southwestern and Southern Australia.

For 'My Own Atlas', I would draw a world map and shade these areas:

- Southern Europe along the Mediterranean Sea.
- North African coast.
- Western Asia's coastal regions.
- California's western coast.
- Central Chile's coastal strip.
- Southwestern Australia.
  The map would be labeled "Mediterranean Climatic Region" and included in my atlas collection.

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9. Observe the map given below. Find out the continents where grasslands are located and complete the table below.

Table: Temperate Grasslands

Continent	Name of the Grassland
North America	Prairies
South America	Pampas
Asia	Steppes
Africa	Velds
Australia	Downs

Answer: Based on the map, temperate grasslands are located in:

- **North America**: Prairies (USA, Canada).
- **South America**: Pampas (Argentina, Uruguay).
- **Asia**: Steppes (Russia, Mongolia, Kazakhstan).
- **Africa**: Velds (South Africa).
- **Australia**: Downs (Eastern Australia).

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10. Observe the map (Fig 2.12) to identify the continents where Taiga region is located, and include it in My Own Atlas.

Answer: Based on the map, the Taiga region is located in:

- **North America**: Canada, Alaska (USA).
- **Europe**: Scandinavia (Norway, Sweden, Finland).
- **Asia**: Siberia (Russia).

For 'My Own Atlas', I would draw a world map and shade the Taiga region across:

- Northern Canada and Alaska.
- Northern Scandinavia.
- Vast stretches of Siberia in Russia.
  The map would be labeled “Taiga Climatic Region” and added to my atlas.

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11. Complete the table given below, based on their characteristics.

Table: Climatic Regions

Climatic Region	Location	Climate	Vegetation	Human Activities
Equatorial Climatic Region	0°–10° N/S	High temp (25–30°C), high rainfall (200–300 cm), humid	Evergreen forests	Hunting, gathering, logging
Monsoon Climatic Region	Indian subcontinent, SE Asia	Humid summers (25–35°C), dry winters (15–25°C), 50–1000 cm rain	Tropical deciduous forests	Intensive agriculture (rice, tea), shifting cultivation
Savanna Climatic Region	10°–30° N/S	Wet/dry seasons, 20–30°C, 50–150 cm rain	Tropical grasslands	Pastoralism, agriculture, tourism
Hot Deserts	15°–30° N/S, western margins	High temp (~30°C, up to 58°C), <25 cm rain	Cacti, shrubs, oases	Nomadic herding, mining (gold, petroleum)

Mediterranean Climatic Region	30°–45° N/S	Dry summers (20–25°C), wet winters (10–16°C), 30–75 cm rain	Evergreen trees, shrubs	Fruit cultivation, vineyards, tourism
Temperate Grasslands	40°–50° N/S	Hot summers, cold winters (2–13°C), 25–60 cm rain	Grasslands	Commercial grain farming (wheat), animal husbandry
Taiga Region	55°–70° N	Short summers (15–20°C), long winters (-13°C to -25°C), 50–70 cm rain/snow	Coniferous forests	Lumbering, wool industry
Tundra Region	Arctic Circle	Cold winters (-25°C to -40°C), cool summers (~10°C), low snowfall	Shrubs, mosses	Semi-nomadic life, scientific research

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12. Organise a discussion in the class on the changes to be brought about in industrial and other developmental activities enabling sustainable resource utilisation.

Discussion Plan:
Topic: Changes for Sustainable Resource Utilization in Industrial and Developmental Activities
Discussion Points:

- **Promotion of Energy Efficiency**:
  - Use energy-saving technologies like LED lighting and efficient machinery in industries.
  - Benefit: Reduces fossil fuel consumption, lowering greenhouse gas emissions.
- **Protection of Forests**:
  - Enforce strict anti-deforestation laws and promote reforestation.
  - Benefit: Forests act as carbon sinks, mitigating climate change and preserving biodiversity.
- **Change in Technology**:
  - Adopt clean technologies like carbon capture and electric vehicles in industries.
  - Benefit: Reduces pollution and dependence on non-renewable resources.
- **Encouragement of Nonconventional Energy**:
  - Invest in solar, wind, and hydropower for industrial and urban use.
  - Benefit: Sustainable energy sources reduce emissions and ensure long-term energy security.

Class Activity:

- Divide the class into four groups, each assigned one discussion point.
- Each group researches their topic, prepares a 5-minute presentation, and suggests local examples (e.g., solar panels in schools).
- Follow with a Q&A session to debate feasibility and challenges.
- Conclude by drafting a class pledge for sustainable practices (e.g., reducing plastic use).

Extended Activities

1. Compare the climate and life of people in different climatic regions and prepare a note. For this, information about climate and life of people in different regions of world can be collected with the help of IT.

Note: Comparison of Climate and Life in Different Climatic Regions
Using online resources, I compared three climatic regions: Monsoon (Kerala, India), Mediterranean (Southern Spain), and Taiga (Canada).

- **Monsoon Region (Kerala)**:
  - **Climate**: Humid summers (25–35°C), dry winters (15–25°C), 200–300 cm rainfall during monsoon (June–September).
  - **Life of People**: Dense population relies on agriculture (rice, tea, spices). Farmers use monsoon rains for irrigation. Coastal communities fish, and festivals like Onam celebrate the harvest. Houses have sloped roofs for heavy rain.
- **Mediterranean Region (Southern Spain)**:
  - **Climate**: Dry summers (20–25°C), wet winters (10–16°C), 30–75 cm rainfall.
  - **Life of People**: Agriculture focuses on citrus fruits and vineyards, with Spain exporting wine. Tourism thrives due to mild winters and sunny beaches. People live in stone houses to stay cool in summer. Festivals celebrate wine and olives.
- **Taiga Region (Canada)**:
  - **Climate**: Short summers (15–20°C), long winters (-13°C to -25°C), 50–70 cm rain/snow.
  - **Life of People**: Sparse population engages in lumbering and wool industries. Communities use heaters and insulated homes for harsh winters. Indigenous groups hunt and trap. Winter sports like ice hockey are popular.

Conclusion: The Monsoon region supports dense, agriculture-based populations, the Mediterranean region balances farming and tourism, and the Taiga region has sparse, resource-based communities. Climate shapes housing, occupations, and culture in each region.

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2. Collect indigenous climate knowledge by interviewing senior citizens in different areas. Prepare a questionnaire for this. Find out, changes that have taken place in the current climate.

Questionnaire for Interviewing Senior Citizens:

1. What was the rainfall pattern in your area 30–40 years ago (e.g., duration, intensity)?
2. Have you noticed changes in summer or winter temperatures over the decades?
3. Were there any extreme weather events (e.g., floods, droughts) in the past that are more or less frequent now?
4. How have local crops or vegetation changed due to climate shifts?
5. Have you observed changes in the timing of seasons (e.g., early or late monsoons)?
6. What traditional practices did people use to predict or adapt to weather changes?
7. How have water sources (e.g., rivers, wells) been affected over time?
8. Are there any local festivals or activities influenced by past climate patterns that have changed?

Sample Findings (Hypothetical Based on Kerala):
After interviewing senior citizens in Kerala, I found:

- **Rainfall**: 40 years ago, monsoon rains were steady from June to August, lasting longer. Now, rains are heavier but shorter, with floods more common.
- **Temperature**: Summers were cooler (28–30°C); now, they reach 35°C with higher humidity. Winters are less distinct.
- **Crops**: Paddy yields were higher due to reliable rains; now, erratic rains affect harvests. Coconut trees show reduced productivity.
- **Water Sources**: Wells and rivers had consistent water; now, many dry up in summer.
- **Seasons**: Monsoons arrived predictably in June; now, they may start in May or July.
- **Traditional Practices**: Elders used cloud patterns and bird migrations to predict rains, practices less reliable now.

Conclusion: Climate in Kerala has become less predictable, with shorter, intense monsoons, hotter summers, and water scarcity, impacting agriculture and lifestyles.