GEOGRAPHY 8

Based on Single National Curriculum 2022

Punjab Curriculum and Textbook Board, Lahore

بِسۡمِ اللّٰہِ الرَّحۡمٰنِ الرَّحِیۡمِ

(In the Name of Allah, the Most Compassionate, the Most Merciful.)

GEOGRAPHY

8

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Based on Single National Curriculum 2022

ONE NATION, ONE CURRICULUM

PUNJAB CURRICULUM AND TEXTBOOK BOARD, LAHORE

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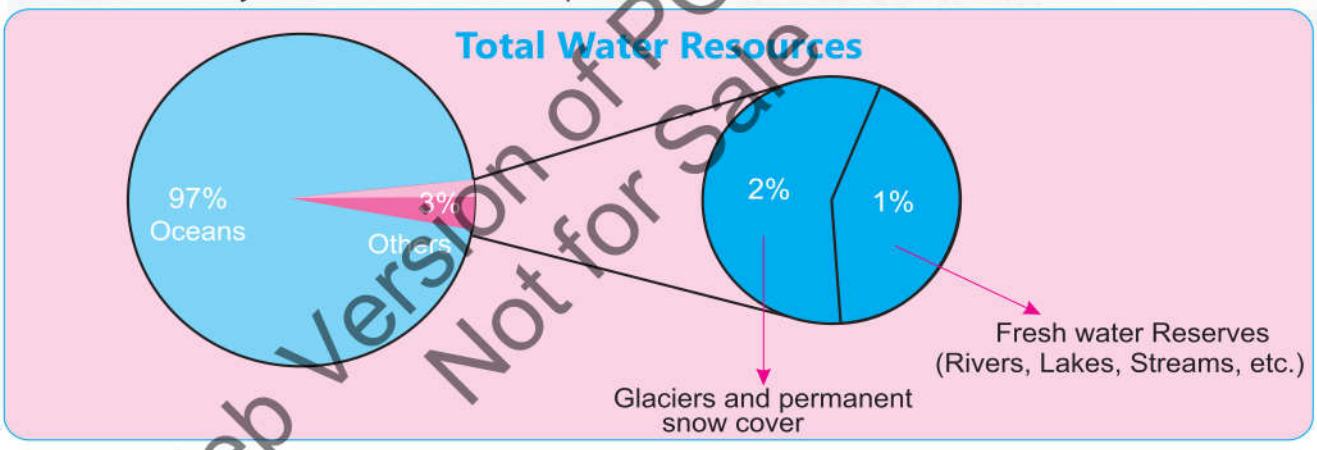
Chapter 1

OCEANS AND SEAS

Students' Learning Outcomes:

- Differentiate between oceans and seas.
- Describe the location, total area, temperature and marine life of major oceans of the world.
- Describe and differentiate between various sea features such as peninsula, isthmus, gulf, bay, strait.
- Explain the movements of ocean water.
- Explain the importance of oceans in our lives.
- Identify ways in which ocean acts as a source of food for the world.
- Identify the role of marine biodiversity on our environment.
- List down all possible threats the oceans are facing nowadays.

Water covers **71%** of the Earth surface, **97%** of all the water on the Earth is in oceans and remaining **3%** is fresh water. Oceans have a significant influence over the Earth's weather and climate. They also stabilize the temperature on land.



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Oceans and Seas

Ocean is a huge body of salt water on the Earth's surface whereas sea is the part of ocean partly enclosed by land. The largest body of water on the surface of the Earth is called ocean and an adjacent smaller body of water located on the margins of the ocean is called sea. There are five oceans in the world. The details are given below:

(i) Pacific Ocean

It is the largest ocean of the world. Its area is about 166 million square kilometres. Its average depth is about 4280 metres. Pacific ocean is located between four continents, Asia and Australia in the west, north and south America in the east. Starting from equator, it extends beyond both arctic and antarctic circles in the north and south respectively. It is the largely tropical ocean. Panama Canal which links Pacific Ocean with the Atlantic Ocean is among the important trade routes in the world.

(ii) Atlantic Ocean

It is the second largest ocean. Its area is about 82 million square kilometres and average depth is about 3900 metres. It is also the most important and busiest trade route of the world. Atlantic Ocean is also located between four continents, north and south America in the west, Europe and Africa in the east. Starting from equator, it extends beyond both arctic and antarctic circles in the north and south respectively. Mid-oceanic ridge, which is the result of eruption of magma at the divergent plate boundary is the significant feature of this ocean.

Do you know?

Mariana Trench is the deepest point of the Earth surface which is located in the Pacific Ocean. Its depth is about 36,201 feet.

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(iii) Indian Ocean

It is the third largest ocean. Its area is about 73 million square kilometres and its average depth is 3900 metres. It is located between Africa in the west, Asia on the north, Australia on the east, and Antarctic Ocean in the south.

It has become an important trade route between western and eastern hemispheres due to the construction of Suez Canal which links Red Sea with the Mediterranean Sea through Indian Ocean. The Indian Ocean is home to several unique types of animals, including sea turtles, sharks, sea snakes, dugongs, and whales.

(iv) Antarctic Ocean/Southern Ocean

It is the fourth largest ocean in the world. It is located across the Antarctic circle and extends up to the Antarctica continent. It covers an area of about 22 million square kilometres and with average depth of about 3200 metres. It has no distinct boundary with the Pacific, Atlantic and Indian Oceans. Extreme cold water and huge icebergs are main features of this ocean.

(v) Arctic Ocean

Arctic Ocean is situated around the North Pole. It has an area of about 15 million square kilometres with average depth of about 1200 metres. Shallow waters, low salinity and frozen surface are main features of this ocean.

Arctic Ocean

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Marine Biodiversity

Life in the oceans shows patterns of both similarities and diversity. These oceans are the habitat of lot of species of fish, seals, walruses, sea lions, corals and mollusks, etc. Antarctica and Arctic oceans have their maximum stretch beyond the arctic and antarctic circles. Almost 235 marine species are found in both Antarctica and the Arctic, ranging in size from whales and birds to small marine, snails and sea cucumbers etc. There are twelve species of marine mammals that regularly inhabit in the Arctic. Four species of whales, the polar bear, the walrus, and six species of ice-associated seals. Several additional species like whales, blue whales and fin whales etc. are also there.

Sr. No	Name of Ocean	Area (Million sq. km)	% of All Water
1	Pacific	166	46
2	Atlantic	82	23
3	Indian	73	20
4	Antarctic	22	7
5	Arctic	15	4

Temperature of the Ocean Water

Temperature of the ocean water is not only the prime factor controlling the abundance and variety of marine life but also maintains the temperature of the coastal areas.

Temperature of the ocean water decreases with increase in depth. Like atmosphere oceans have a layered structure with respect to variations in the temperature. These layers are:

1. Warm Surface Layer, which has an average temperature of 20° to 25°C.
2. Middle Layer, which has an average temperature of 5° to 20°C. It is also called Thermocline.
3. Cold Deep Layer, which has an average temperature of 0° to -5°C.

In Arctic and Antarctic oceans, this three layered structure is replaced by single layer of cold water.

Different Features Associated with Sea

There are number of major features associated with sea like:

(i) Peninsula

An area of land which is surrounded by ocean water from three sides except for an isthmus which connects it with the mainland on one side is called peninsula i.e., Arabian and Indian Peninsula.

(ii) Isthmus

A narrow strip of land which connects two large masses of land and separates two water bodies is called an isthmus, i.e. Isthmus of Panama which connects north and south American continents and the isthmus of Suez which connects Asia with Africa.

Peninsula

Isthmus

(iii) Gulf

A large but narrow part of ocean which invades farther inland is called gulf, i.e., Persian Gulf and Gulf of Mexico, etc.

(iv) Bay

Contrary to gulf, large and vast part of ocean which invades farther inland is called bay, i.e., Bay of Bengal and Hudson Bay etc.

Gulf

Bay

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(v) Strait

A narrow channel of water which connects two large bodies of water i.e. oceans or seas is called strait i.e. Strait of Gibraltar which connects Atlantic Ocean with Mediterranean Sea.

(vi) Island

An area of land surrounded by water from all sides is called an island, i.e., Srilanka, and Greenland.

Strait

Island

Activity Corner!

Use available sources such as maps, GIS and Google Maps to identify different seas and oceans of the world.

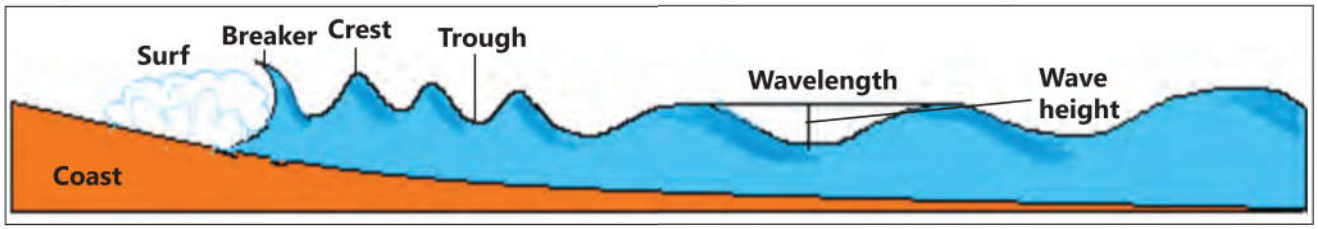
Sr. No	Name of Sea	Area (Million Sq. km)
1	South China Sea	2.9
2	Caribbean Sea	2.5
3	Mediterranean Sea	2.5
4	Black Sea	0.5
5	Arabian Sea	0.4

Movement of Oceanic Water

Ocean water never remains stagnant. It tends to move. Main types of this movement are waves, currents and tides. Let us have a look on its nature and causes of these movements.

(i) Waves

The movement of surface water due to winds is called wave. Waves in an ocean are generated due to different natural factors. Actually, it is the movement of energy which is transferred in water particles from one to another. The top of the wave is called crest and the bottom is called trough. The vertical distance between crest and trough is called wave height.



Wave

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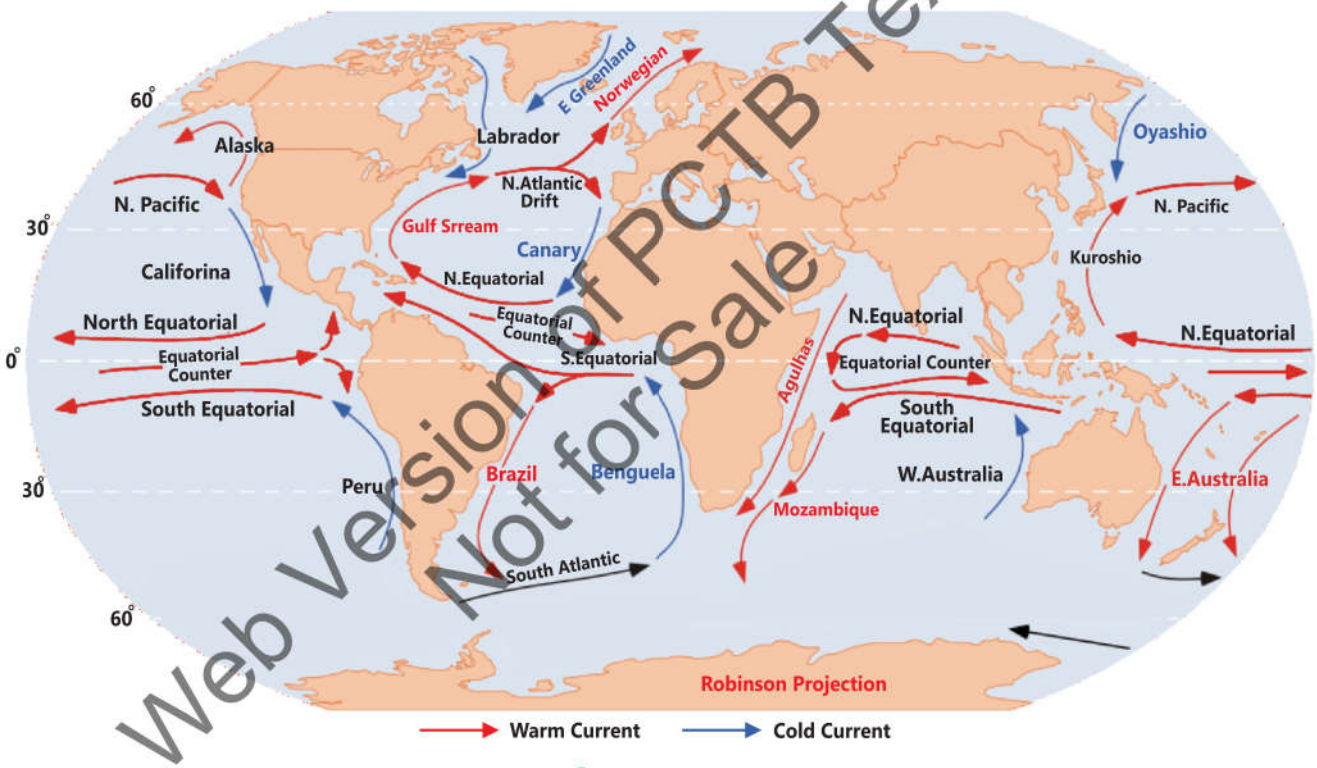
The horizontal distance between two crests or troughs is called wavelength. Winds are the main cause of generating waves. Cyclones and tornadoes which originate and travel across the oceans also create waves. An earthquake near coastal areas or beneath the ocean floor can also generate huge waves.

(ii) Currents

Permanent flow of Ocean water in a specific direction (like river flow on land) is called current. The currents which flow from equator to polar areas are called warm currents. They increase the temperature of coastal areas e.g. Gulf stream along the eastern coast of North America in the Atlantic Ocean is a warm current. The currents which flow from polar areas to equator are called cold currents e.g. Labrador current in Atlantic and Kamchatka current in the Pacific Ocean are cold currents. Currents move clockwise in the northern hemisphere and anti-clockwise in the southern hemisphere. A larger current formed by joining of two currents is called drift.



Ocean currents

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Causes of Ocean Currents

Following are the major causes of current circulation:

(a) Permanent Winds

The most important cause of current circulation are permanent winds. Winds force the ocean water to circulate in their general direction e.g. trade winds blow from east to west, while western winds blow from west to east. So the currents move eastwards under trade winds and vice versa under western winds.

(b) Salinity of Oceanic Water

Salinity variation also a causes of the ocean water to circulation. Water of inland seas is more

saline than the water of open seas and oceans. So more saline water due to its higher density sinks downwards while less saline water moves upwards. This variation of salinity causes current circulation.

(c) Temperature of the Oceanic Water

Temperature difference is another cause of current circulation. Warmer water of equatorial regions moves upwards, while colder water of polar regions sinks downwards due to greater density.

Do you know?

When earthquake originates beneath the ocean floor, it generates huge waves called Tsunamis.

(iii) Tides

There is a continuous rise and fall in the sea level. Twice a day, the sea level rises and falls as well. This is called tides. The basic cause of tides is the gravitation of Moon. This reality was presented by Newton in his "Theory of Gravitation" in the 17th century. According to this theory, every two celestial bodies attract each other. So, the Moon, which is nearest to the Earth, creates tides on the Earth. So, the effect of Sun's gravitation is 46% of the Moon's gravity on the Earth.

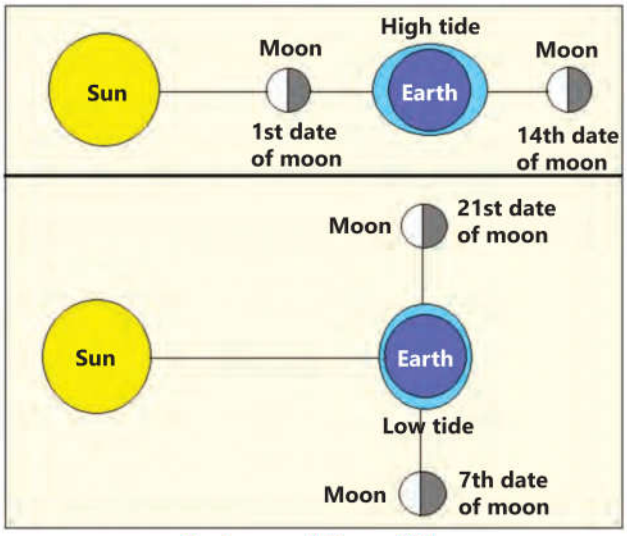
According to nature, there are two types of tides, daily and monthly tides. Daily tides occur twice with the interval of 12 hours and 25 minutes. The effect of gravitation is maximum on the portion of the Earth which is in front of the Moon and is minimum on the other side. But the centrifugal forces of the Earth maintain balance of tides on the other side too. So, the effect of gravitation is equal on both sides of the Earth. Monthly tides are of two types

(a) Spring Tides

The Earth revolves around the Sun and the Moon revolves around the Earth. During this revolution it happens twice on the 1st and 14th date in a lunar month that the Moon, Earth and Sun are in the same plane. The combined gravitation of Sun and Moon creates very high tides in the sea. These are called spring tides.

(b) Neap Tides

Twice in a lunar month on the 7th and 21st date, it happens that the Moon and Sun are perpendicular to each other with reference to the Earth. Gravitation of both bodies counter act each other resulting in the creation of low tides in the seas. These are called neap tides.



Spring and Neap Tides

Activity Corner!

Explore the relationship of moon with Spring and neap Tides.

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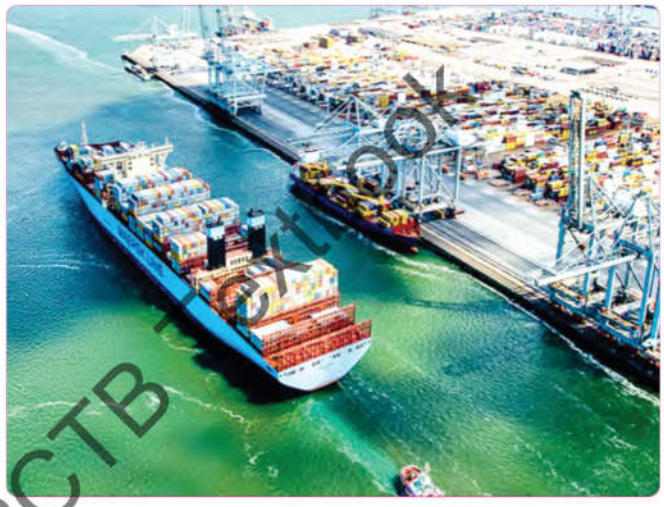
Importance of Ocean's Water in our Lives

Earth is a water world. Life owes its existence on the Earth because of presence of a huge reservoir of water. This makes the Earth unique from other planets of the solar system. The importance of oceans can be summarized in following points :

- Oceans have a great potential for wave and tidal power.
- Oceans have vital economic importance due to tourism, particularly island-countries like Sri Lanka.
- Oceans are a source of minerals like oil, gas and salt.
- Oceans are rich source of fishes.
- Oceans are the world highways. Transportation of oil, minerals, consumer goods and food are transported through oceans.
- Phytoplankton is a microscopic plant. Basically, these tiny little organisms act in the same way as tree leaves do on land. Phytoplankton absorbs carbon dioxide and releases oxygen.
- Many creatures depend and live in the oceans.
- The oceans are home for the abundance of organisms on our planet.



Sea Port

Oceans as Source of Food

The oceans have always been a source of food for human. But until now only about one percent of mankind's food comes from the sea and much of it is fish. Oceans have always been an important and reliable source of food.

The importance of seafood in the human diet varies greatly around the world. One of the main services provided by the oceans to human societies is the service of food. So, the utilization of fish and aquaculture resources should be made sustainable in order to safeguard future benefits.

Source of food

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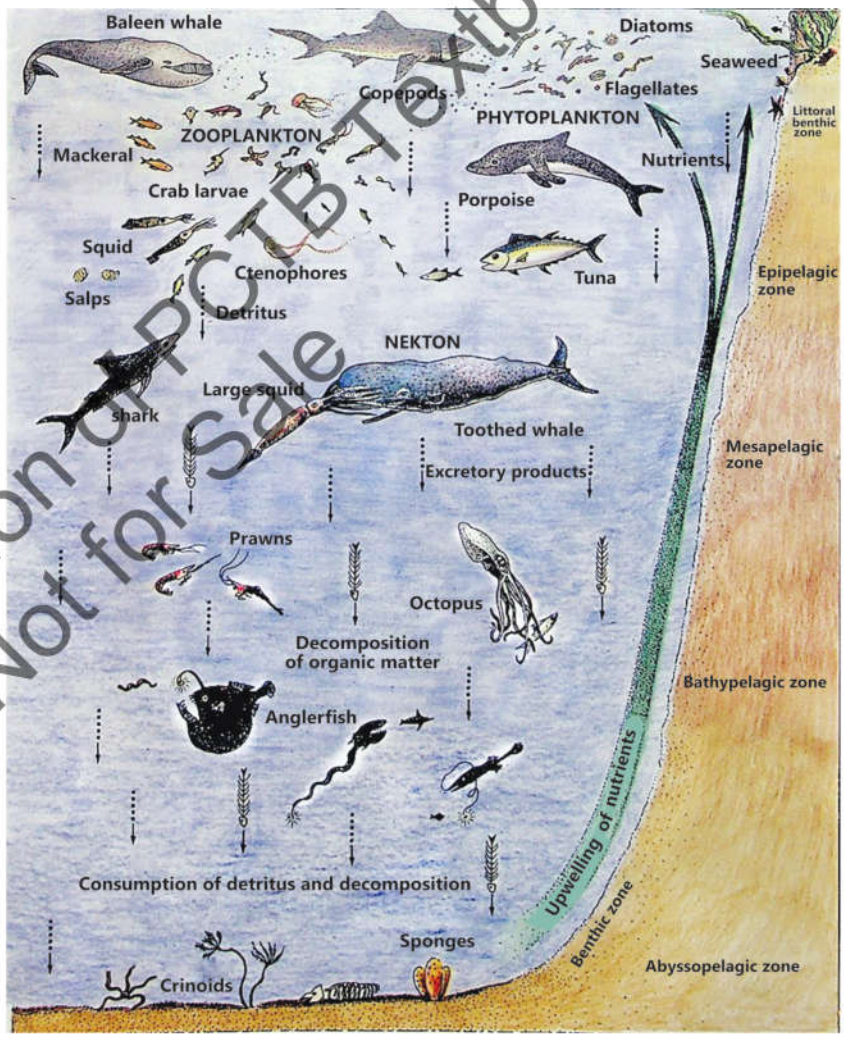
Do you know?

There are about 20,000 kinds of fishes living in the sea. We eat only a few kinds.

Role of Marine Biodiversity on Our Environment.

Marine biodiversity may be determined as because the variety of life found in the ocean and seas. It has great importance for the three fundamental pillars (economic, social and environmental) of sustainable development. The role of marine biodiversity in our environment can be discussed in following points:

- The ocean is one of the main bank/reservoirs of the world's biodiversity. It constitutes over 90% of the habitable space on the planet and contains some 250,000 known species.
- The ocean, and the life therein, are critical to the healthy functioning of the planet, supplying half of the oxygen we breathe and absorbing annually about 20% of the anthropogenic carbon dioxide (CO_2) emitted into the atmosphere.
- The fishery and aquaculture sectors are a source of income for hundreds of millions of people, especially in low-income families.
- It is contributing directly and indirectly in the food security.
- Marine ecosystems provide many services for coastal communities around the world such as livelihoods, clean water, forest products etc.



Ocean's Biodiversity

Therefore, no body can deny that oceans and biodiversity therein is contributing a large in our environment.

Activity Corner!

Divide class into two groups and compare the Indian Ocean with the Pacific Ocean.

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Threats That Oceans are Facing Now-a-Days

Human activities are threatening the health of Earth's oceans. Due to these activities, marine ecosystems are changing very rapidly. Some of the rapidly increasing threats are :

(i) The rapid urban growth and munciple waste water is polluting the marine water. This pollution adversely affecting the marine biodiversity.

(ii) More than 80% of marine pollution comes from land-based activities. Due to this, entire marine ecosystems are changing rapidly .

(iii) Global warming is causing alterations in ocean composition which is threatening many species of marine animals.

(iv) Factories and industrial plants discharge sewage and other run off into the oceans which are harmful for fishing and to marine diversity.

(v) Spilling of oil from the ships is polluting the oceans.

(vi) Overfishing is also a threat to marine species.

Ocean's Threats

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How We Can Minimize the Threats

There are some measures to reduce the threats which ocean are facing.

(i) Establish marine parks to protect biodiversity.

(ii) Reduce destructive fishing practices such as trawling.

(iii) Minimize the use of military sonar that can harm or kill whales and other marine mammals.

(iv) Help fishers to maintain their livelihoods by incorporating conservation efforts.

(v) Promote sustainable fishing harvest.

(vi) Raise public awareness to keep the coasts clean.

Teacher Guide

Discuss and formulate questions about the use of ocean water as a source of food. Evaluate some sustainable ways of that use.

Key Points

- Oceans are largest bodies of salt water on the surface of the Earth.
- Marine biodiversity includes sea otters, fishes as salmon, tuna, cod, halibut, marlin etc.
- Deep trenches are also present in oceans.
- A narrow strip of land which connects two large masses of land is called an isthmus.
- Ocean water never remains stagnant. It tends to move. Main causes of this movement are waves, currents and tides.
- The ocean produces more oxygen than a rainforest.
- The ocean has always been a source of food for man. But until now only about 1% of mankind's food comes from the sea and much of it is fish.
- Human activities are threatening the health of world's oceans.

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Exercise

1. Tick (✓) the correct answer:

i. One of the largest oceans of the world:

a. Pacific ocean b. Indian ocean
c. Atlantic ocean d. Antarctic ocean

ii. The largest salt water body on the surface of the Earth is called:

a. ocean b. sea
c. strait d. bay

iii. Connects Atlantic Ocean to Mediterranean Sea:

a. Malacca Strait b. English Channel
c. Barring Strait d. Gibraltar Strait

iv. Moon, Earth and Sun are in same plane on:

a. 1st date of lunar month b. 7th date of lunar month
c. 21st date of lunar month d. 29th date of lunar month

v. The continuous rise and fall of sea level is called:

a. currents b. tides
c. surf d. waves

2. Write short answer to the following questions:

(i) Define gulf.
(ii) Differentiate between spring and neap tides.
(iii) Differentiate between ocean and sea.
(iv) What is the difference between strait and isthmus?

(v) What is meant by ocean current?
(vi) Give two major threats that oceans are facing now a days.
(vii) Differentiate between Bay and Gulf.

3. Write detailed answer to the following questions:

(i) Discuss characteristics of some important oceans.
(ii) Evaluate the importance of oceans.
(iii) How ocean act as a source of food?
(iv) Explain the role of marine biodiversity on our environment.
(v) What are the causes of ocean currents?

Learning Activities:

The Teacher will:

- Inquire how climate change is affecting oceans.
- Inquire and gather data about various seas and oceans around the world.
- Evaluate the consequences of the rising of sea level.

Critical Thinking Questions:

- Suggest some ways to reduce marine pollution.
- Why do we care our water resoures?
- What can we do to save marine biodiversity?
- How can we use oceans to generate electricity?

Project For Students:

- Draw a model of spring and neap tides and present in your classroom.

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Chapter 2

LIVING WITH CLIMATE

Students' Learning Outcomes:

- Investigate some examples of the extreme weather on the Earth and its reasons.
- Recall the main causes of climate change.
- Identify the consequences of global warming.
- Explore ways in which we can prevent global warming.
- Explain the relationship between extreme weather and climate change.
- Discuss the main threats of climate change.
- Identify ways in which climate change affects life in general.
- Differentiate the climatic patterns of a national and international city.
- Describe ways in which the climate of coastal areas and river plains affect the lifestyles of people living there.
- Compare and contrast the lifestyle of people living in polar regions with those living in tropical region.

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Weather is the conditions of the atmosphere over a short period of time while the climate is describing the long term (minimum 30 years) an average weather conditions of a specific region. **Examples:** maritime climate, cold-dry desert climate, tropical climate etc. It means weather refers to short-term changes in the atmosphere and climate describes what the weather is like over a long period of time in a specific area.

Extreme Weather on the Earth and its Reasons

Since industrial revolution, our Earth is experiencing extreme weather events. Extreme weather is a weather event, significantly different from the average or usual weather patterns. This may take place over one day or a period of time. Some of the examples are given below for extreme weather conditions:

Heat Wave

A severe heat wave with temperature of 49 °C (120 °F) struck southern Pakistan in June, 2015. It caused the deaths of about 2,000 people. Heat waves are also causing forest-fire and dehydration in the world.

Lack of Rainfall Leading to Drought

When an area or region experiences below-average rainfall, it leads to drought. Soil can dry out and plant can die (Example: Thar in sindh).

Heavy Rainfall

Heavy rainfall leads towards flash flooding in urban and rural areas. For example some areas of Sindh, Balochistan and Southern Punjab suffered sever flood in 2022. The flood water damaged lives and properties .

Strong Winds and Storms

Stormy weather also causes heavy damage to lives and properties.

Cold Spell

On 7th January 2022, a snowstorm occurred in Murree, dropping more than 4 feet (1.2 m) of snow, unfortunately, 23 tourists were killed.

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Activity Corner!

Inquire how climate change is affecting human life in terms of food supply and farming?

Reasons for the Extreme Weather Conditions

The extreme weather conditions which are prevailing in the world have some certain reasons. These are listed below:

(I) Earth's rising temperature is fueling longer and hotter heat waves. More frequent droughts, heavy rainfall, and more powerful hurricanes have become common.

(ii) The Earth's oceans temperature is getting warmer too which means that tropical storms will be more disastrous.

(iii) Extreme heat waves due to global environment change have caused tens of thousands deaths around the world in recent years.

(iv) Global warming may lead to adverse climatic changes. The weather could be extremely hot. Heavy rainfalls, floods, droughts, snowfall, heat waves, as well as ocean acidification are some of the by-products of global warming.

Main Causes of Climate change

Climate change refers to long-term shifts in temperature and weather patterns. The climate on the Earth has been changing since it formed 4.5 billion years ago. Climate change is caused by an increase of carbon dioxide (CO_2) and other greenhouse gases in the Earth's atmosphere mostly from fossil fuel emissions. In Pakistan, the environmental degradation and climate change are adversely affecting the economy, livelihood of the people and to sustainable development.

Concept of Climate Change

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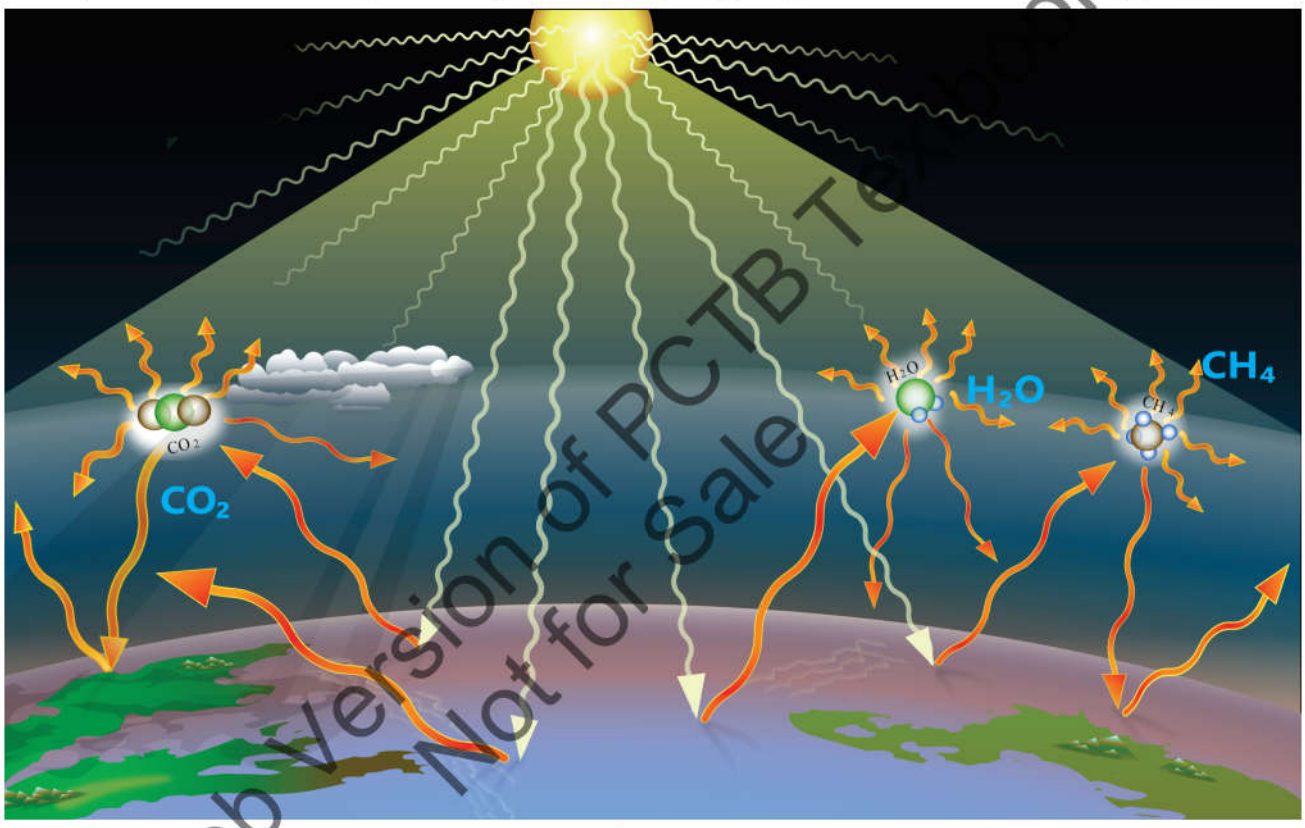
On the one hand, growing population, unplanned urban expansion and dependence on natural resources puts immense pressure on environment that triggered climate change. Moreover, lack of public awareness regarding environmental issues and mismanagement of water and solid waste has aggravated the situation. But however, human activities have been the main driver of climate change and global warming. There are following other causes of climate change are as under:

(i) Greenhouse Gases

The main factor of climate change is the greenhouse gases. Some gases in the Earth's atmosphere act a bit like glass in a greenhouse, trapping the Sun's heat and stopping it



Greenhouse Gases

from escaping back into space are causing rise in global temperature. Many of these greenhouse gases occur naturally, but human activities are increasing the concentrations of some of them in the atmosphere, in particular:

(a) carbon dioxide (CO_2)
(b) Water Vapours (H_2O)
(c) Ozone (O_3)
(d) Methane (CH_4)

Activity Corner!

Explore how people adopt various climatic conditions in Pakistan.

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(ii) Deforestation

Deforestation is responsible for 15% of the greenhouse gases in the atmosphere.

(ii) Industrial Activity

Since the Industrial Revolution, humans have been burning fossil fuels such as coal and petroleum for energy, which releases carbon dioxide into the atmosphere. This addition of carbon dioxide in the atmosphere is warning our globe.

Deforestation

Industrial Activity

(iii) Agricultural Activity

The agricultural practices that produce food for the people on the Earth is another cause of climate change. The use of both commercial and organic fertilizers releases nitrous oxide, a powerful greenhouse gas which is contributing in climate change.

Agricultural Activity

(iv) Other Causes

Natural influences on the climate change include volcanic eruptions, changes in the orbit of the Earth, and shifts in the Earth's crust (known as plate tectonics). In conclusion, the world's scientific community is in agreement that our planet is becoming warmer and human activities are the main factors of global warming and climate change. As for as the situation of climate change in Pakistan is concern, our country continues to suffer from a plethora of natural and human induced hazards that are threaten the lives and livelihood of its citizens. Natural disasters including floods, earthquakes, landslides, cyclones and droughts have become common in our country.

Teacher Guide

Use physical maps or GIS/ Google Maps to identify different climatic regions of the world.

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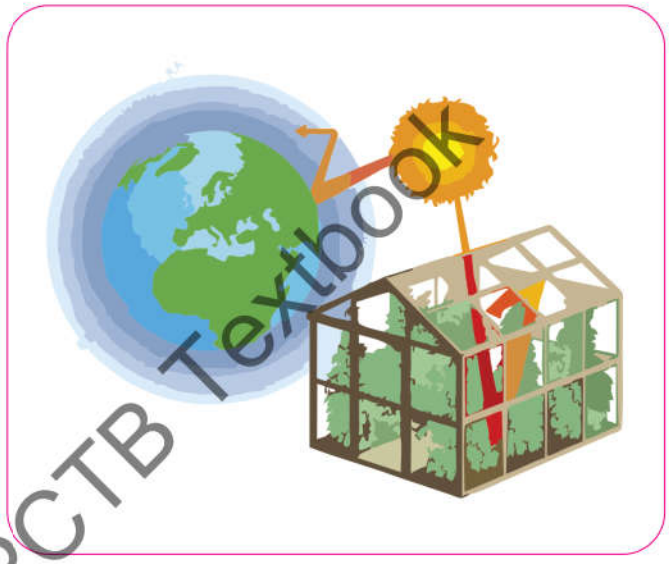
Global Warming and its Consequences

Global warming refers to the rising surface temperature of the Earth. The decade from 2011-2020 was the warmest decade ever recorded, with rising global average temperature. As compared to the temperature in pre-industrial times which is associated with no serious negative impacts on the natural environment and human health. However, since the Industrial Revolution in the 1800s, the global temperature has increased at a much faster rate. By burning fossil fuels and changing how we use the land, human activities have quickly become the leading cause of changes to our climate.



Greenhouse Effect

Greenhouse Effect

When short-wave radiation from the Sun reaches the Earth, most of it passes straight through and hits the surface. The Earth absorbs most of this radiation and gives off longer-wavelength infrared radiation.

The greenhouse gases absorb some of this infrared radiation, instead of it passing straight out into space. The atmosphere then emits radiation in all directions, sending some of it back to the surface, causing the planet to heat up. This process is known as the 'Greenhouse Effect'.

The greenhouse effect is critical to our survival. In fact, without greenhouse gases, our Earth would be about 30 degrees colder than it is today. Without greenhouse gases and their warming effect, we wouldn't be able to survive. However, since the Industrial Revolution, we have been adding more and more greenhouse gases into the air, trapping even more heat. Instead of keeping the Earth at a warm, stable temperature, the greenhouse effect is heating the planet at a much faster rate. We call this the 'enhanced greenhouse effect' and it is the main cause of climate change

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Consequence of Global Warming

Each year scientists learn more about the consequences of global warming and climate change. Similarly we also get new evidence of its devastating impacts on people and on planet. As the heat waves, droughts, and floods are associated with climate change resulting more frequent and more intense humans are suffering and death tolls is also rising.

(i) If we are unable to reduce our emissions, scientists believe that climate change would lead to the deaths of more than 250,000 people around the globe every year and force 100 million people into poverty by 2030.

(ii) Disappearing glaciers, early snow melt, and severe droughts will cause more dramatic water shortages and continue to increase the risk of wildfires.

(iii) Rising sea levels will lead to even more coastal flooding. Humans will suffer as a whole particularly living in port cities.

(iv) Forests fires, urban and coastal flooding will become more common.

(v) Disruption of habitats such as coral reefs and alpine meadows could drive many plant and animal species to extinction.

(vi) Allergies, asthma, and infectious disease outbreaks will become more common. spread of conditions favorable to pathogens and mosquitoes.

(vii) Though everyone is affected by climate change, not everyone is affected equally. Inequities built into our housing, health care and labour systems make these communities more vulnerable to the worst impacts of climate change.

Major Threats of Climate Change and its Effects on Life

Human and wild animals are facing new challenges for survival because of climate change. More frequent and intense drought storms, heat waves, rising sea level, floods, melting glaciers and warmer oceans can directly affect living organisms. Climate change may destroy the places where they live, it may disrupts to food chain and will increase epidemics (malaria, dengue etc.) These changes in climate threaten our health by affecting the food we eat, the water we drink, the air we breathe and the weather we experience. Following effects are due to climate change:

(i) Economic Impacts of Rising Sea Level

Over half of the human population lives within 100 kilometres of the sea. Most of this population lives in urban areas that serve as seaports. A measurable rise in sea level will have a severe economic impact on low-lying coastal areas and islands. A rapid rise in sea-level of several metres would flood large sections of the Earth's coastal plains including many of the world great cities. This will not affect human life and also marine biodiversity.

(ii) Climate Change and Agriculture

Agriculture is a major element in the world economy. Recently, during the droughts, floods, stroms, heavy rain fall etc. agricultural yields declined.

Do you know?

Smog is a kind of air pollution, originally named for the mixture of smoke and fog in the air. In the 1950s a new type of smog, known as Photochemical Smog, was first described.

(ii Effects on Biodiversity

Historic climate changes, such as the ice ages, have led to extinction of many species. Recently, human activities have accelerated the rate of species extinction. Natural ecosystems may suffer in negative ways and in ways that we cannot predict.

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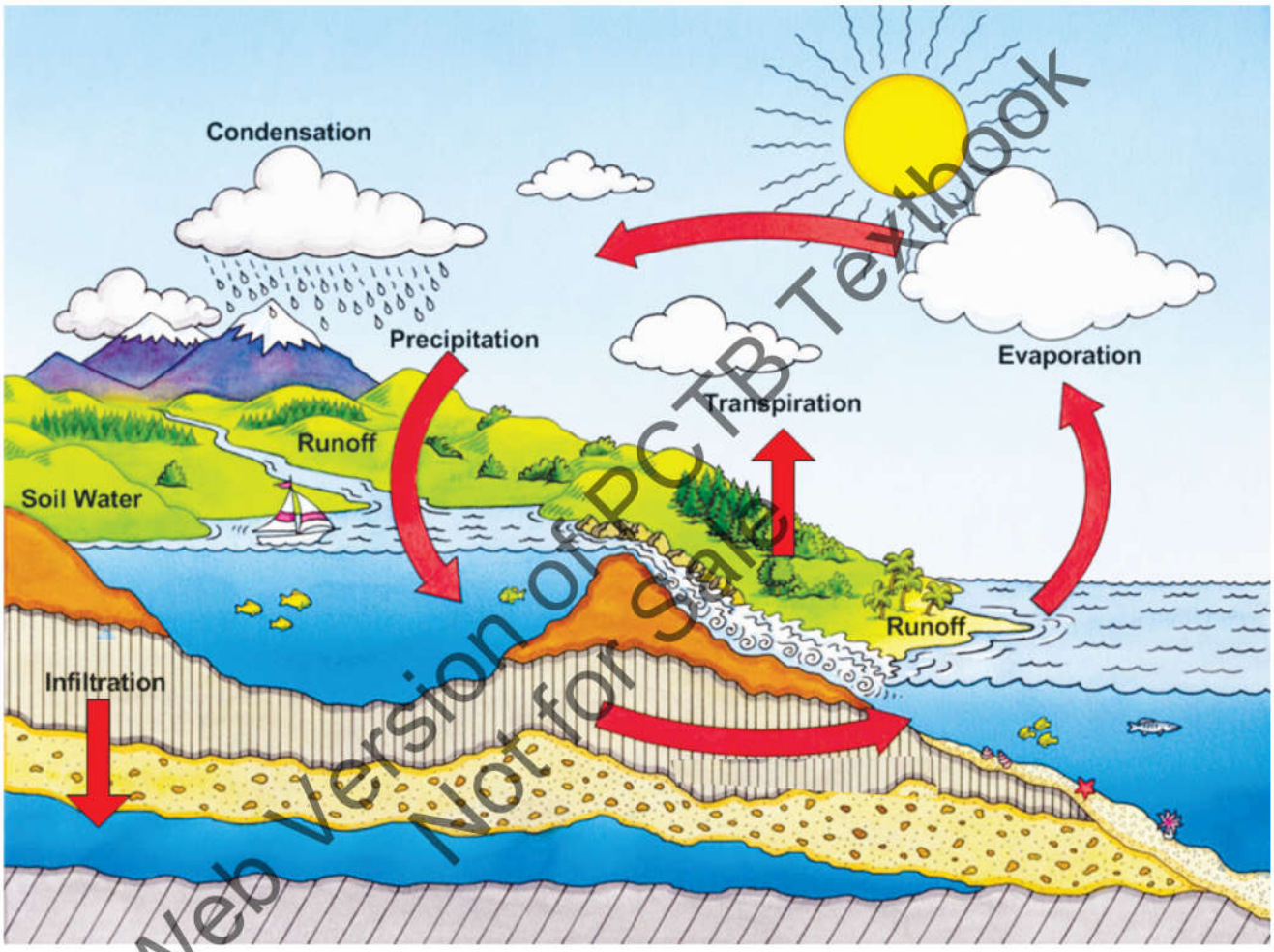
(v) Effects on the Hydrologic Cycle

Global precipitation is likely to increase. However, it is not known how regional rainfall patterns will change. Some regions may have more rainfall, while others may have less. Furthermore, higher temperatures would probably increase evaporation. These changes would probably create new stresses for many water management systems.



Hydrologic Cycle

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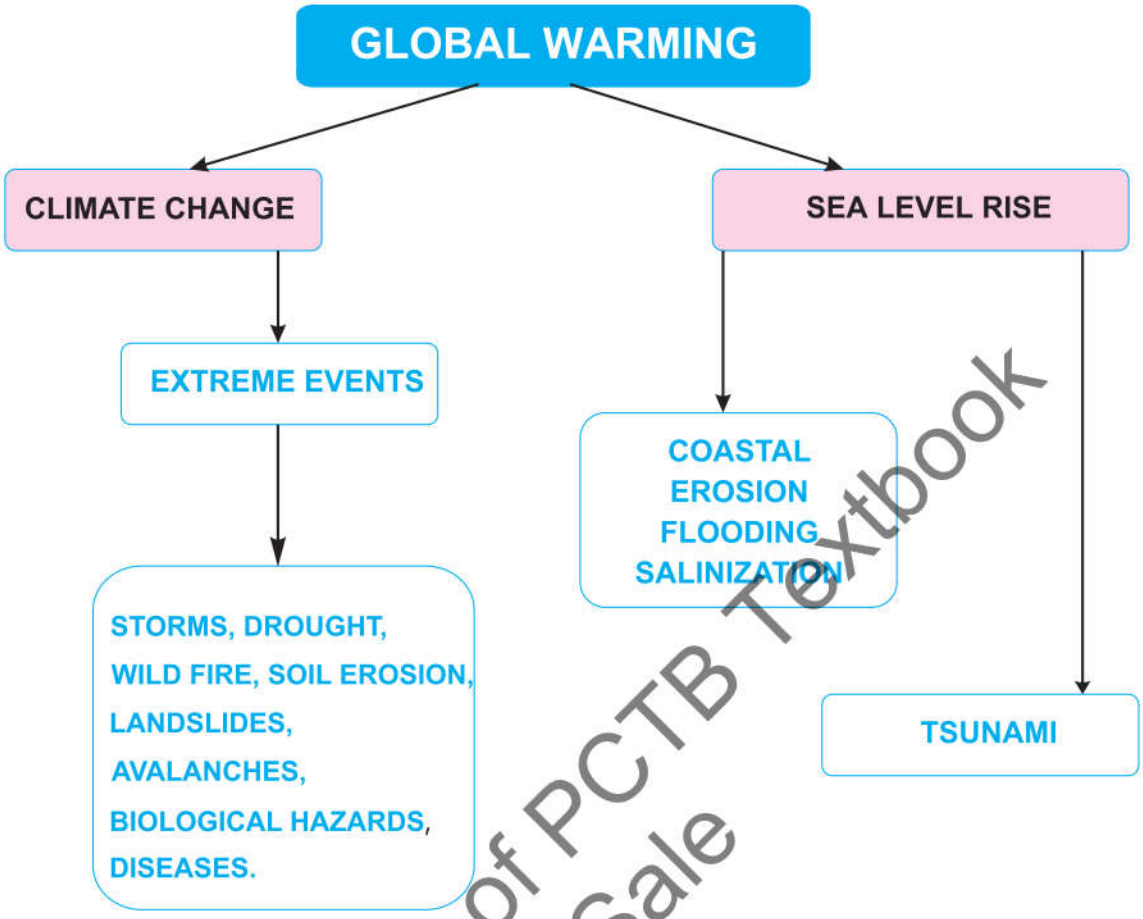
(vi) Effects on Demand on Electric Power

Changes in climate, technology, and economic growth is enhancing the demand of electricity.

(vii) Effects on Air Quality

Air pollution caused by emissions from industrial and transportation sources is a problem in the whole world. By reducing emissions over the last two decades, considerable progress has been made in improving air quality.



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DIVERGING VIEWS OF THE IMPACT OF GLOBAL WARMING

Global warming is not a very important issue to most people in the world. There are much more pressing issues for individuals and families. Unemployment, crime, basic health care, and poverty are far more real problems. There are a number of groups of people most concerned about the potential of global warming. Among these are academics whose job is to provide information about global warming and the planners that must deal with the problem.

Remedies to Overcome of Global Warming and Climate Change

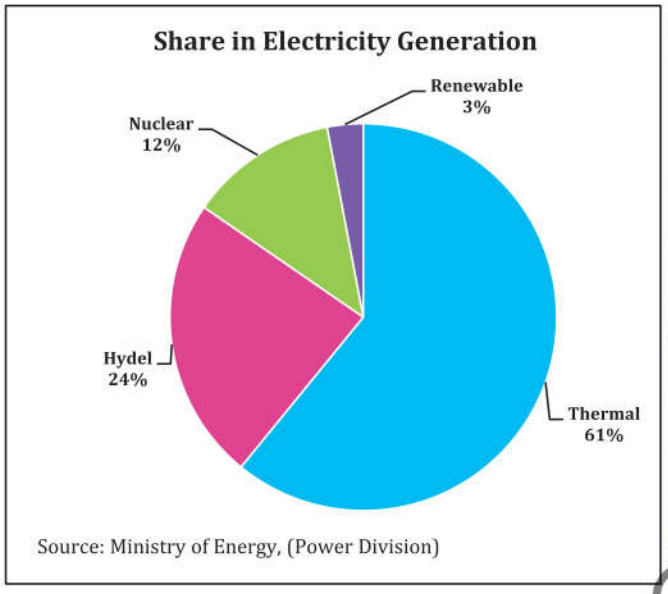
Following are remedies to reduce the threat of global warming and climate change:

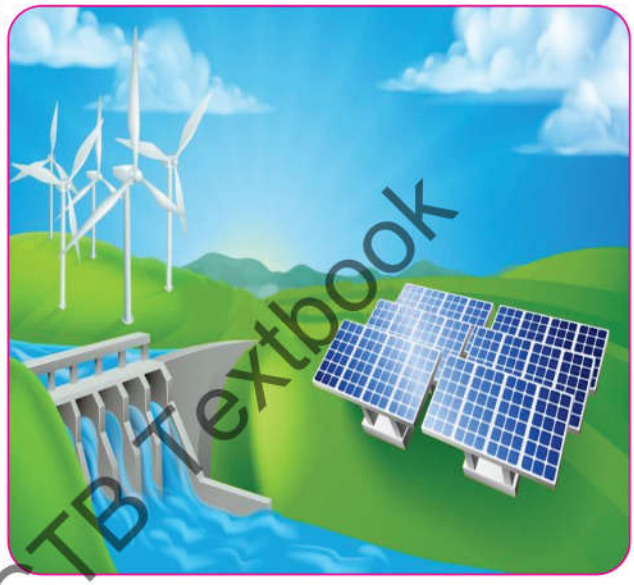
(i) Less use of Fossil Fuels:

Reduce the use of fossil fuels especially carbon-intensive coal is essential to tackle climate change. There are many ways to begin this process. Key action steps include: not building any new coal-burning power plants, initiating a phased shutdown of coal plants. The most important and feasible would be switching to renewable energy resources.

(ii) Use of Renewable Energy Resources

By using renewable sources of energy is more efficient global warming. Energy production from solar, wind, tidal, biomass is more clean and renewable. They have least effects if the electricity is produced from alternative sources of energy.





Renewable Energies

(iii) Use of Low Carbon and Zero-carbon Technologies

Research and development of the next generation of low carbon technologies are helpful in reduction of global emissions. Current research on battery technology, new materials for solar cells, and other innovative areas could provide important breakthrough.

(vi) Forestation

Role of forests in climate change is two-fold. They act both as a cause and a solution for greenhouse gas emissions. Forests are a stabilizing force for the climate. They regulate ecosystems, protect biodiversity, play an integral part in the carbon cycle, and support livelihoods. To maximize the climate benefits of forests, we must keep more forest landscapes intact, and restore more of those landscapes which we have lost.

Forestation

Fertilizers

(v) Less Use of Fertilizers and Pesticides

Agricultural practices need to be changed in developing countries. The developed countries have modern technologies and production methods. They have reduced the usage of fertilizers and pesticides yet the developing countries are relying on conventional methods and using fertilizers and pesticides. The developed nations should facilitate by providing the technologies and methodologies.

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Climatic Patterns of Karachi and New York Cities

Karachi has an arid climate. It is located on the coast of Arabian Sea and as a result has a relatively mild climate.

(i) **Seasons:** Karachi has two main seasons; summer and winter, while spring and autumn are very short. Summer season persists for longest period during the year.

(ii) **Rainfall:** Karachi have rainy season (Monsoon) from July to September.

(iii) **Climate:** The city experiences a tropical climate encompassing warm winters and hot summers.

(iv) **Humidity:** The humidity levels usually remain high from March to November, while very low in winter as the wind direction in winter is northeasterly.

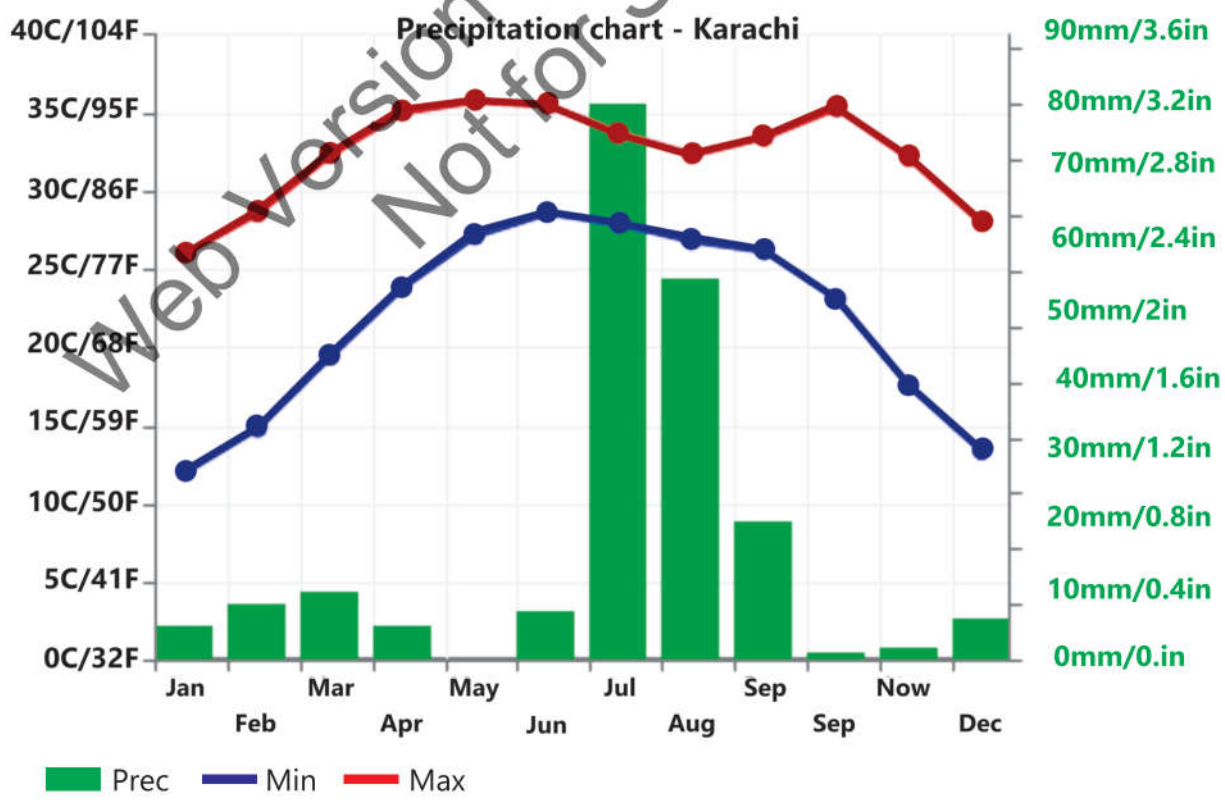
(v) **Temperature:** The temperature in winter season sometimes goes below 10°C and day temperature is about 26°C.

(vi) **Tropical Cyclones in Karachi**

Though cyclones are rare in the Arabian Sea which is a part of Indian Ocean. Cyclones in the Arabian Sea are formed mostly from mid-of-May till mid-of-July and then in the month of October. Monsoon season plays a vital role for the formation of cyclone in this basin.

Due to "climate change", now the frequency of tropical cyclones formation in the Arabian Sea has been increased.

Karachi



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Do you know?

Acid rain, or acid deposition, is a broad term that includes any form of precipitation with acidic components, such as sulphuric or nitric acid that fall to the ground from the atmosphere in wet forms.

New York: New York City is located where the Hudson River meets the Atlantic Ocean. It is the most populous city in the United States (USA).

(i) **Seasons:** In New York City, the summers are warm, humid, and wet; the winters are very cold, snowy, and windy; and it is partly cloudy year-round.

(ii) **Rainfall:** Rain falls throughout the year in New York City. The month with the most rain in New York City is April, with an average rainfall of 3.7 inches. The month with the least rain in New York City is February, with an average rainfall of 2.2 inches.

New York City

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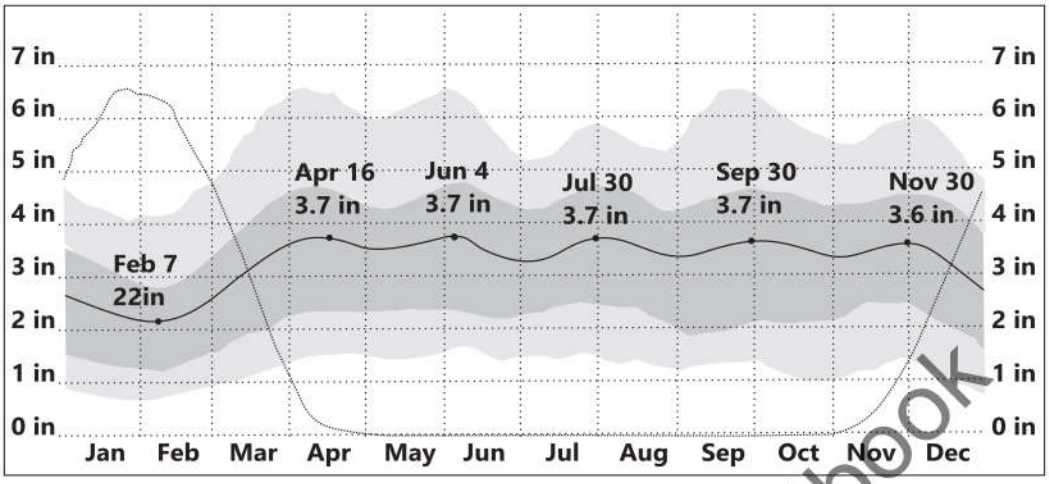
(iii) **Climate:** The climate of New York City features a humid sub tropical variety, with parts of the city transitioning into a humid continental climate.

(iv) **Humidity:** New York City experiences extreme seasonal variation in the perceived humidity.

(iv) **Temperature:** The warm season lasts for 3.5 months, from June 2 to September 16, with an average daily high temperature above 25°C. The hottest month of the year in New York City is July, with an average high of 29 °C and low of 22°C.

The cold season lasts for 3.3 months, from December 3 to March 12, with an average daily high temperature below 9°C. The coldest month of the year in New York City is January, with an average low of –2°C and high of 4°C.



Graph of Rainfall in New York

Effects of Climate of Coastal Areas and River Plains on the Lifestyles of People

Coastal regions, are the home of a large and growing proportion of the world's population. Coastal and ocean activities, such as marine transportation of goods, fishing, offshore energy drilling, resource extraction, recreation, and tourism are integral to the economy of the nation. Coastal areas are also home to species and habitats that provide many benefits to society and natural ecosystems. Climate change affects coastal areas in a variety of ways. Coasts are sensitive to sea level rise, changes in the frequency and intensity of storms, increases in precipitation, and warmer ocean temperatures. In addition, rising atmospheric concentrations of carbon dioxide (CO_2) are causing the oceans to absorb more of the gas and become more acidic. This rising acidity have significant impacts on coastal and marine ecosystems.

Growing populations and development along the coasts increase the vulnerability of coastal ecosystems to sea level rise.

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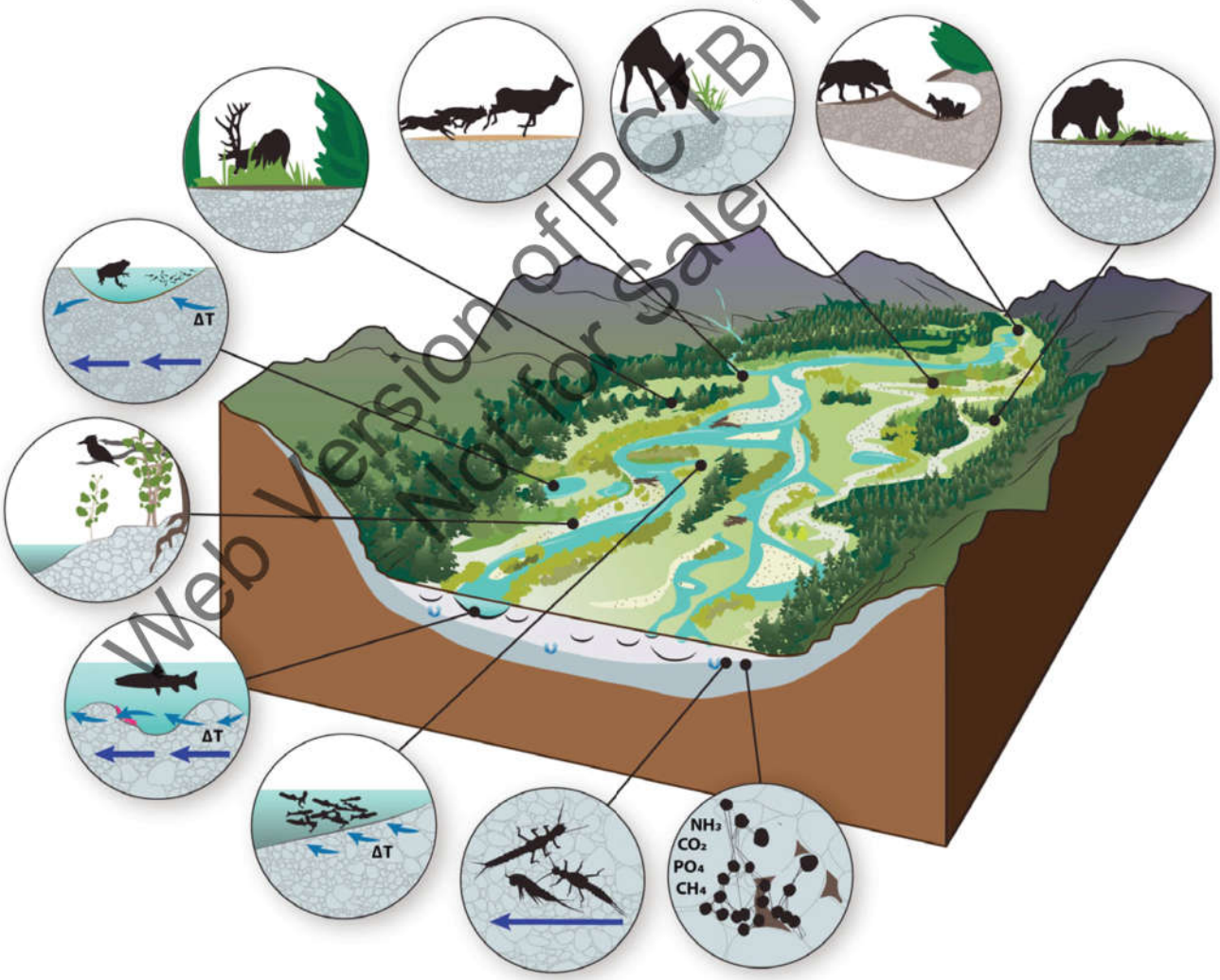
A Scene of Coastal Area

Importance of the River for the People:

- **Water:** Rivers carry water and nutrients to areas all around the Earth. They play a very important role in the water cycle, acting as drainage channels for surface water.
- **Habitats:** Rivers provide excellent habitat and food for many of the earth's organisms. Many rare plants and trees grow by rivers. Ducks, voles, otters and beavers make their homes on the river banks. Other animals use the river for food and drink. Birds such as kingfishers eat small fish from the river. River deltas have many different species of wildlife. Insects, mammals and birds use deltas for their homes and for food.
- **Transport:** Rivers provide travel routes for exploration, commerce and recreation.
- **Farming:** River valleys and plains provide fertile soils. Farmers in dry regions irrigate their cropland using water carried by irrigation ditches from nearby rivers.
- **Energy:** Rivers are an important energy source in terms of hydro power. Today steep rivers are still being used to generate hydro electric energy through turbines.



River Habitate

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Do you know?

The trees on Amazon basins are called selves. Here the umbrella type of vegetative cover is called Roof Garden.

Impacts of Climate on River

- More frequent droughts and shifting precipitation patterns, make lower water levels in river, lakes and streams.
- Rivers provide innumerable ecosystem services to mankind. However, human activities and climate changes have affected the riverine ecosystems.
- For Example, in the Indian context, where a river such as the Ganga is already suffering from industrial and municipal waste disposal, unhygienic rituals, other activities and effects of climate change may further aggravate the situation.
- Climate change will not only result in disasters, but affects on water quality, biodiversity, and other ecological processes.

Comparison of Lifestyle of People Living in Tropical and Polar Climate

Tropical and Polar Climate

Tropical zone lies between the Tropic of Cancer (23 north) and Tropic of Capricorn (23 south) on the both side of the equator. Within the tropical climate zone, there are variation to the hot and wet climate, i.e. the equatorial and tropical monsoon climates. The polar regions surround Earth's North and South Poles. The area around the North Pole is called the Arctic and the area around the South Pole is called Antarctica. These regions have unique climates.

Tropical		Polar
Equatorial	**Monsoon**	
• Between 10°N and 10°S of equator. • The areas of Amazon Basin, Congo River Basin , Central America, Malaysia, Indonesia, etc. **Human Activities** • Indonesia and Malaysia have great importance in industrial sector. These countries have oil refineries, coconut oil, etc.	• Between 10° and 25° north and south of equator. • The areas of southeast India, Sri-Lanka, Bangladesh, Myanmar, south west Africa, French Guinea, northeast and southeast Brazil, etc. **Human Activities** • Agriculture is a main occupation of this region.	• Between Arctic and North Pole. • Between Antarctic and South Pole. • Short summer and long winter. • Low annual temperature • Precipitation is in the form of snow. • Areas: North Canada, North Siberia, northern Russia and northern Norway etc. are located in this region.

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<table>
<tr><th colspan="2">Tropical</th><th>Polar</th></tr>
<tr><th>Equatorial</th><th>Monsoon</th><td rowspan="2"></td></tr>
<tr><td>• Ships and many rubber making factories are also here.
• In rain forest rice, sugarcane, rubber, tea, Tobacco, banana, coffee and coconut are cultivated.</td><td>• Rice, grams mustered and tea are the main crops of this region.
• Many crops like tobacco, sugarcane, cotton, and wheat are also produced in some areas.
• China produces the world most of the rice.
• Philippine produces coconut and coconut oil.
• Cuba is famous for sugarcane.
• Coal is found in Pakistan and India.</td></tr>
<tr><td colspan="2">• Hot and wet throughout the year.
• Annual range of temperature is low.
• High rainfall.
Vegetation
• Tall, dense and evergreen forests which are due to temperature and excessive rainfall.
• Rubber tree is the most important among all. Many other trees like coco, rubber, sankona, cane. are found in these regions</td><td>Human Activities
• There is less population in this region. People prey / Polar beer, whale and fish.
• Mostly people live nomadic life.
• Farming and mining is very difficult here due to extremely cold weather.
• People living in Tundra region build their houses with ice which are called igloo.

Vegetation
• The Lichen and Kai are common vegetation of this region.</td></tr>
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Key Points

- Extreme weather occurs is when a weather event is significantly different from the average usually weather pattern.
- Climate change refers to long-term shifts in temperatures and weather patterns. The climate on Earth has been changing since it formed 4.5 billion years ago.
- Greenhouse gases come from both human and natural sources.
- A measurable rise in sea level will have a severe economic impact on low-lying coastal areas and islands.
- Reducing the use of fossil fuels especially carbon-intensive coal is essential to tackle climate change.
- Monsoon season plays a vital role for the formation of cyclone indus basin.
- The rising acidity can have significant impacts on coastal and marine ecosystems.
- Rivers provide innumerable ecosystem services to mankind.

Exercise

1. Tick (✓) the correct answer:

i. Climate is a condition of atmosphere, over a:

a) short period of time b) long period of time
c) weak period d) none of these

ii. Main cause of climate change and global warming is:

a) oxygen gas b) hydrogen gas
c) greenhouse gases d) nitrogen gas

iii. The average temperature of the Earth surfaces is:

a) increasing b) decreasing
c) no changing d) fluctuating

iii. Rising sea level will lead to:

a) glacier melting b) coastal flooding
c) severe drought d) none of them

v. Increasing surface temperature is called:

a) greenhouse effect b) temperature change
c) flooding d) global warming

2. Write short answer to the following questions:

(i) Define extreme weather condition.
(ii) What are the two major threats of climate change?
(iii) What is greenhouse effect?
(iv) How we can improve air quality?
(v) Define global warming.

3. Write detail answer to the following questions:

(i) Explain the main causes of climate change.

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(ii) How we can save our Earth from global warming and climate change?
(iii) What is the difference between the climate of Karachi and New yark City?
(iv) Discuss the life style of people living in coastal areas.
(v) Explain the importance of river for humans.

Learning Activities:

The Teacher will:

- Explore the ways to reduce the impacts of global warming.
- Examine the consequences of climate change in developing countries.
- Arrange a debate among student regarding effect of climate change on agriculture.

Critical Thinking Questions:

- How the lifestyle of the people effects with climate change?
- Why do we care about Ozone depletion?
- What can we do to stop climate change?
- How can we use the renewable energy to reduce the emission of greenhouse gases?

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Chapter 3

ENVIRONMENTAL POLLUTION

Students' Learning Outcomes:

Students' Learning Outcomes:

- Explain the link between the climate change and pollution.
- Describe the harmful effects of water, land, air, noise and light pollution on our environment.
- Compare and contrast the connections between different types of pollution and suggest ways to reduce them.
- Describe the effects of greenhouse gases on our planet and relate them to global warming.
- Suggest ways to prevent the further thinning of the ozone layer.
- Explore the short and long term effects of global warming on our planet and suggest measures to reduce them.
- Classify the health consequences of air and water pollution on the biodiversity on the Earth.

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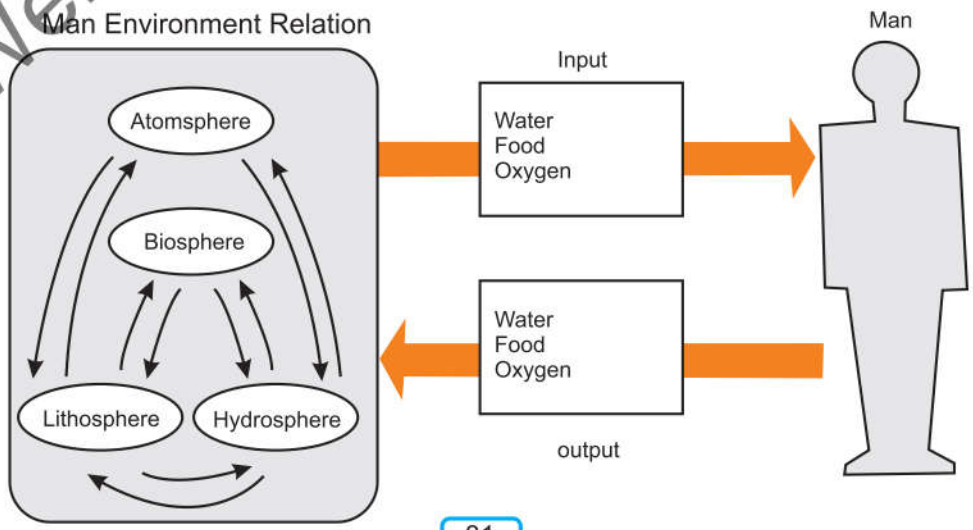
All the things around us (living and non living) make our environment. This includes everything that make it possible for us to live on our planet. The air we breathe, the water we drink, the land and oceans that produce our food, the houses we live in, the transport we use and the schools, factories and offices where we work all these things shape our environment. Our environment has two parts. First, Natural environment includes all living and non-living things that occur naturally on the Earth and in the air that surrounds us.

- the atmosphere (the air)
- the hydrosphere (the water)
- the biosphere (vegetation and animals)
- the lithosphere (soils and rocks).

Second the Human environment consists of features made by men like buildings, roads, transport, etc.



Relation Between Pollution and Climate Change

Human activities are responsible for most of the pollution on the Earth and climate change. Pollution is the addition of harmful material into the environment. These harmful substances are called pollutants. Pollutants can be natural, such as volcanic ash. They can also be created by human activity, such as trash or smoke produced by factories and vehicles. Pollutants damage the quality of air, water, and land. In other words we can say irregular presence of any unwanted substance which is harmful for human life is referred as environmental pollution. The domestic, industrial waste and emissions from combustion of vehicles, trains and air traffic, pollute our natural environment. These are responsible for noise pollution as well as air pollution. All these types of pollution particularly air pollution is also contributing in climate change. Emissions of pollutentents into the air like carbon dioxide (CO_2), sulpher dioxide (SO_2) etc. result a change of climate. Let us have a look on these forms of environmental pollution their similarities and contrast among them.

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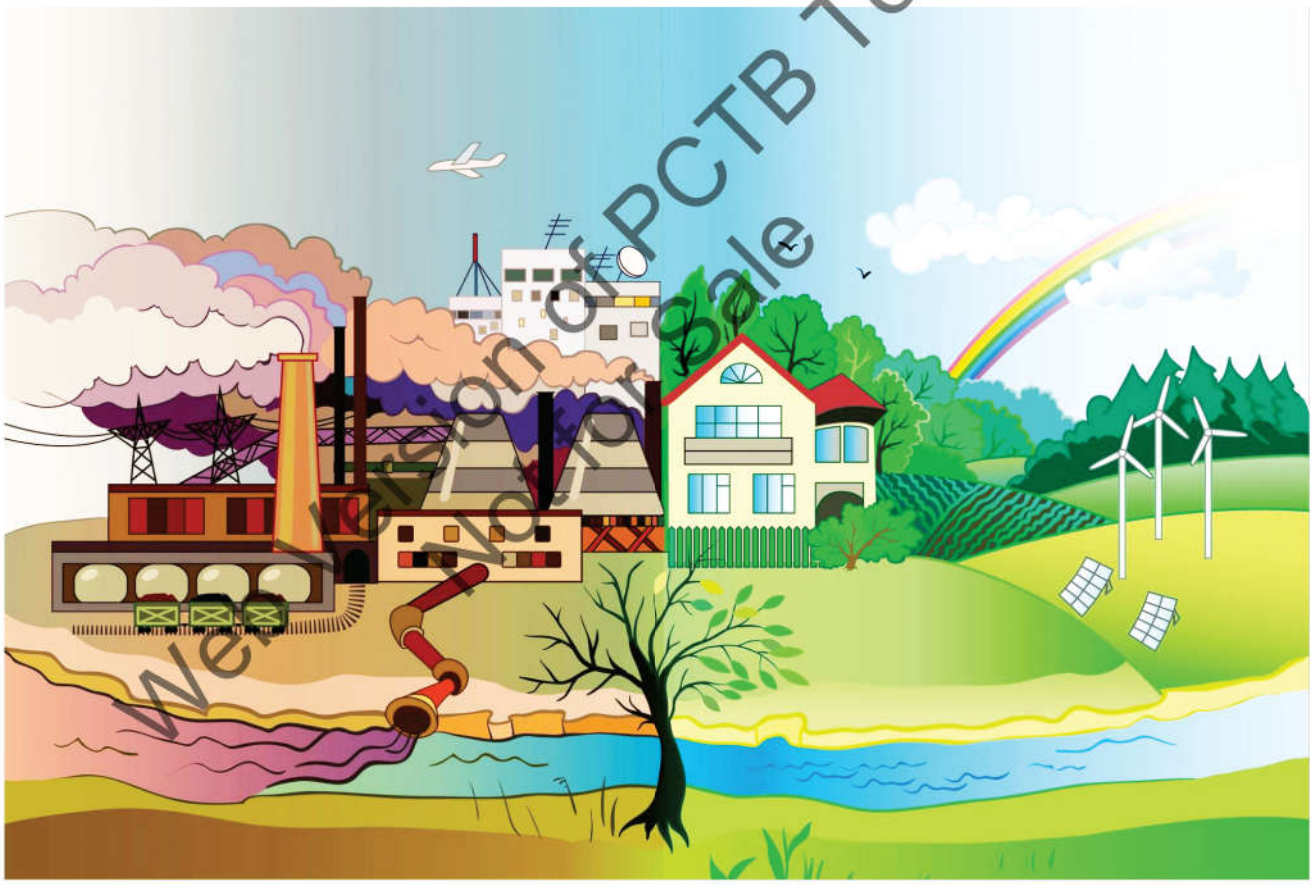

Concept of Pollution and Climate change

Do you know?

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Types of Pollution Their Causes and Effects

There are five major types of pollution. The details are as under:

(i) Water Pollution

The unwanted change in physical or chemical composition of water is referred to as water pollution. This causes damage to human life as well as adversely affects the plants and animals lives. In these days, our water resources are rapidly being polluted due to the causes of human activities.

A Scene of Water Pollution

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Farming

Pesticides and herbicides used by farmers are washed from the land into rivers and lakes. The poisons kill creatures and plants that live in the water, and this in turn causes the amount of oxygen in the water to be reduced. Chemicals that farmers use can also seep into underground water supplies. This water is stored in layers of porous rock beneath the Earth's surface.

Oil Spills

Accidental spillages of oil from oil ships often affect only local wildlife, but they can spread for long distances. Oil kills fish; it also sticks to the feathers of seabirds, and poisons them as they try to clean themselves. This is a problem in coastal areas of Pakistan, especially near oil refineries.

(a) Causes

The use of chemical fertilizers, pesticides, herbicides, unsafe and inefficient agricultural practices, the disposal of untreated domestic and industrial effluents in fresh water resources, acid rains, open dumping and disposal of solid waste in coastal areas, the spillage and leakages from marine traffic, hospital waste are the main cause of water pollution.

(b) Effects

Water pollution not only affects human life but it creates negative impacts on all form of life. This reduces biological diversity on our planet. Water pollution accelerates and promotes water borne diseases among mankind in the form of cholera, diarrhea, typhoid and hepatitis. The use of polluted water causes abdominal problems, liver and kidney failures. Every year, an over whelming portion of human population becomes a victim of water borne diseases.

(ii) Land/ Soil Pollution

The undesired physical or chemical change in the composition and structure of soil components that negatively impacts the organic life on the surface of the Earth is referred as soil pollution.

A Scene of Soil Pollution

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(a) Causes

According to environmentalists, the major reasons for soil pollution include untreated domestic, industrial, commercial and hospital waste disposal. The careless use of chemical fertilizers, insecticides and herbicides in agriculture, deforestation, unplanned urbanization and careless constructional activities are causes of soil pollution.

(b) Effects

The impacts of soil pollution are more visible in high density urban areas as compared to low density urban and rural areas. The widespread impacts of soil pollution are visible in the form of growing health problems. Soil pollution not only contributes to water pollution but also leads to increase rate and scale of air pollution.

(iii) Air Pollution

The atmosphere is composed of different gases which envelop our Earth's surface. This envelope of gasses protects us from harmful portion of incoming solar radiation and also keeps

Teacher Guide

Gather, organize, and interpret data to investigate reasons for pollution in oceans.

the thermal balance of our planet which is essential for survival of life. The natural and human interventions are responsible for increasing the level of harmful gases, dust, smoke, water vapours, chemical compounds and impacts of ultraviolet radiations.

(a) Causes

Volcanism, wild forest fires, tsunamis in the oceans, storms, unplanned industrialization, transportation and communication, deforestation, unsafe solid waste disposal, inefficient

A Scene of Air Pollution

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agricultural practices, wars and marine traffic are the main causes of air pollution in these days.

(b) Effects

The humanity is facing different problems as a result of air pollution. Acid rains, the depletion of ozone layer are causing health problems. These include cataract, nose, throat and ear infections, headache, allergies and heart problems.

(iv) Noise Pollution

In our daily lives, we hear different types of sounds. Some of these are pleasant and audioable while the others being high pitched, become unbearable. When the volume and speed of these high pitched sounds create a disturbance for our hearing abilities, it is termed as noise pollution.

Noise Pollution

(a) Causes

The unnecessary and careless use of modern audio/ video equipments, sub-standard home appliances in our domestic life promote noise pollution. It is opinioned that the non-observance of procedures for reducing noise pollution in commercial, industrial, constructional activities and various means of transportation are the major sources of noise pollution.

(b) Effects

In these days, the negative impacts of noise pollution on human health are widespread and observable in the form of hearing deformities, sleeplessness, headaches, high blood pressure and prevalence of psychological issues.

(v) Light Pollution

Light pollution or artificial light at night, is the excessive or poor use of artificial outdoor light, and it disrupts the natural patterns of wildlife, contributes to the increase in carbon dioxide (CO_2) in the atmosphere, disrupts human sleep, and obscures the stars in the night sky.

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Light Pollution

Teacher Guide

Use physical maps or GIS/ Google Maps to identify different pollution affected areas/regions.

(a) Causes

Light pollution is caused by inefficient or unnecessary use of artificial light. Specific categories of light pollution include light trespass, over-illumination, glare, light clutter, and skyglow.

(b) Effects

It affects normal human physiology in a profound way such as sleep and growth. With light we can affect mood, improve sleep and treat depression. But light also has a direct alerting effect and can affect productivity, learning and memory consolidation.

Do you know?

Smog can affect everyone's health. When we breathe in air pollutants, they can enter our bloodstream and contribute to coughing or itchy eyes and cause breathing and lung diseases.

Some Ways to Reduce Pollution

There are following measures to reduce pollution:

- Factories and industries should be shifted away from the cities.
- Industrial wastes should be treated and made ineffective before releasing into the atmosphere.
- Industrial waste and sewage should not be added into the fresh water of rivers or other water bodies.
- Domestic rubbish and other solid wastes should not be thrown into the streets or open places. They must be disposed of properly
- Reduce the number of vehicles on roads.
- Recycle the plastic wastes (cans, bottles and shopping bags.
- Reduce deforestation as trees absorb carbon dioxide (CO_2) and other air pollutants.
- Reduce the used of chlorofluorocarbons (CFCs) as release of CFCs damage the ozone layer.

(a) Responsibilities as Individuals

i. In order to reduce the impacts of pollution, we should abide by some rules. The main rules that are implemented in the modern world are 3Rs, detail is as under:
ii. The 3R's are reduce, refuse and recycle.
iii. Reduce the amount of waste which are created by ourselves.
iv. Build the habit of reusing the items.
v. Try to recycle the items, if possible.

Activity Corner!

Ask the students to work in pairs and interview other class students whether their lives were affected by any type of pollution and what were the results.

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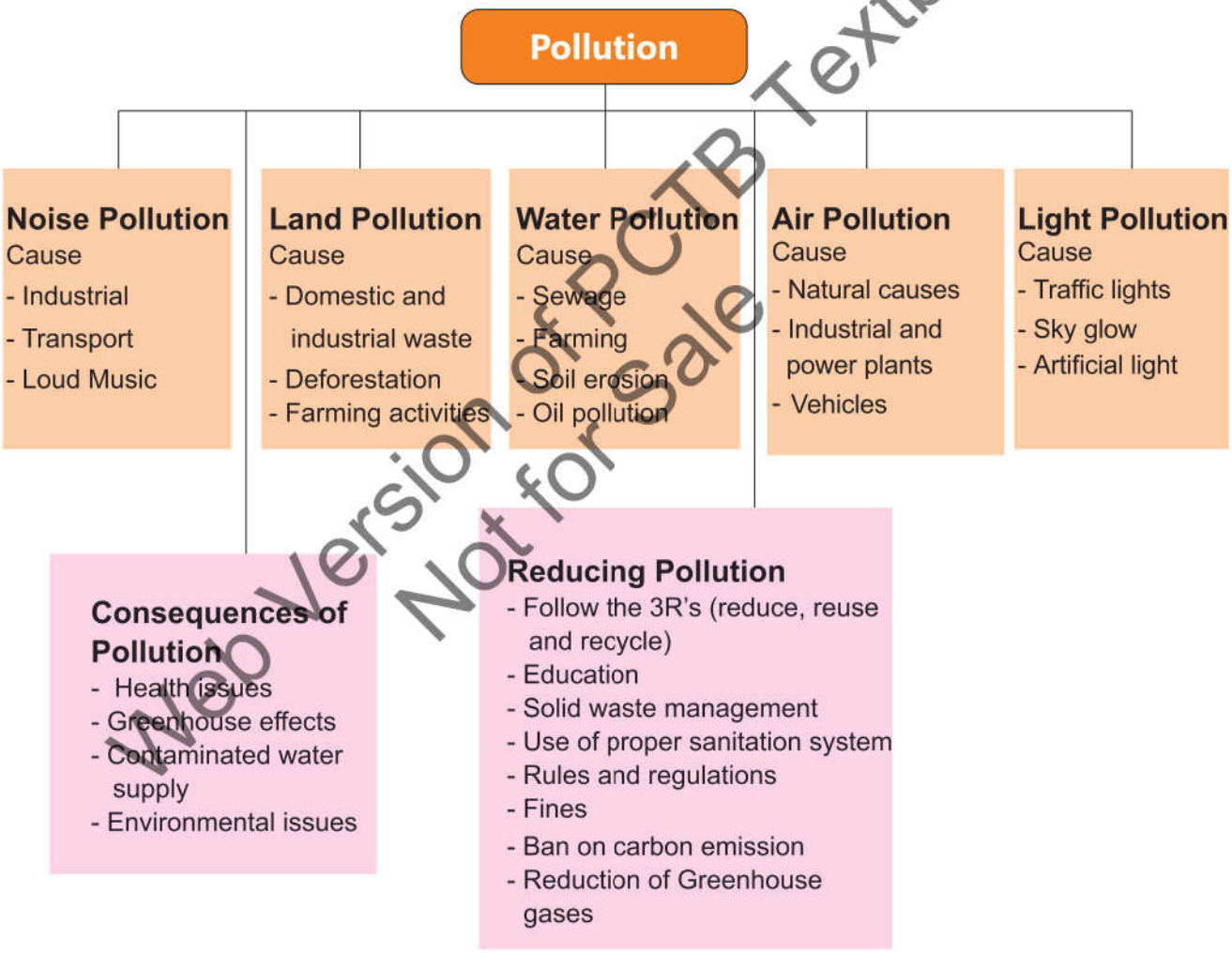
(b) Responsibilities as a Country

It is the responsibility of the Government of a country to take serious steps and to make rules and regulations for controlling pollution. A check and balance on factories, vehicles and sanitation system should be upgraded.

(c) Global Responsibilities

International community, specially the developed countries should take responsibility to stop the global warming. A massive amount of carbon dioxide (CO_2) released by these countries make climate warmer, resulting rise of sea levels and glaciers melting. This has made the weather more extreme. Climate change agreement there was signed in almost 196 countries of the world in 2015, in Paris, France. It needs complete implementation to reduce pollution for the future of our coming generations.



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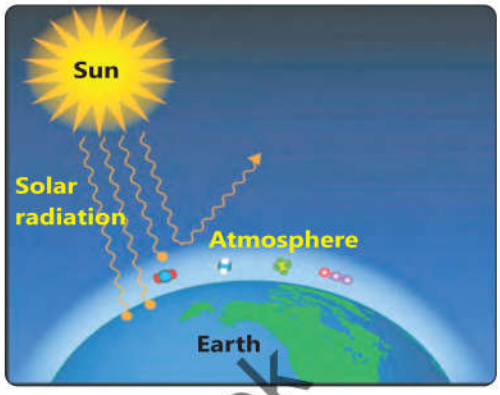
Greenhouse Gases and Global Warming

The natural forces have developed a protective gaseous envelop (Ozone layer) around the sphere of Earth. The human activities are responsible for changing the structure and composition of this protective layer. The resultant gradual increase in terrestrial temperature as a result of human interference in the natural environment is referred to as global warming.

(a) Causes of Global Warming

The environmentalists enlist the reasons for global warming. According to them, the emission of greenhouse gases from the process of combustion as result of commercial, industrial, transportational and domestic activities are responsible for the depletion of ozone layer. Deforestation, land and air pollution are also the main contributors for global warming.



Global Warming

(b) Impacts of Global Warming

Global warming negatively impacts the natural environment by increasing the sea level, glaciers melting, floods and droughts. Increase in global temperature, prevalence of the health problems among organisms, deforestation and fluctuations in the cycle of precipitation are the impacts of global warmaing.

(c) Greenhouse Effect

Carbon dioxide (CO_2), water vapours and dust particles absorb the terrestrial heat emission and keep the lower atmosphere warm for life. The process is called greenhouse effect. It keeps the terrestrial temperature suitable at 15^0 C for life. The uncontrolled increase in the amount of carbon dioxide, methane, choloroflorocarbons (CFCs), dust particles and water vapours cause air pollution which ultimately promotes the process of global warming and damages the protective ozone (O3) layer. The industrial revolution speeded up the carbon emission by increased burning of fossil fuels in industrial and mechanical activities.

Some Harmful Effects of Ozone Layer Depletion

- It causes Ultraviolet rays to reach the Earth which affect the living organisms.
- It may causes to skin cancer in humans.
- Ozone depletion damage our immune system by lowering the body's resistance to diseases.
- It may lead to many diseases in animals.
- It may also lead to damage to plants.

Do you know?

Green travel is a type of travel which has minimum impacts on environment, such as travel by bicycle or walking. This is also called sustainable travel.

Some Ways to Prevent Ozone Layer

The following steps may prevent further thinning of ozone layer:

- Avoid the consumption of gases dangerous to the ozone layer like chlorofluorocarbons (CFCs).
- Minimize the use of cars.(The best transport option in urban, bicycle, or walking).
- Minimize the use of detergents that are harmful to the environment.
- Maintain air conditioners, as their malfunctions cause CFCs to escape into the atmosphere. Use eco-friendly home appliances.
- Buy such air-conditioning and refrigeration equipment that do not use HCFCs as refrigerant.

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- Conduct regular inspection and maintenance of air-conditioning and refrigeration appliances to check refrigerant leakage.

Effects of Air and Water Pollution on Biodiversity

Air and water pollution have great effects on biodiversity. Following consequencesdue are to air and water pollution on biodiversity:

- Pollutants such as sulphur can lead to excess levels of acid in lakes and streams, and damage trees and soils.
- Mercury (present in smoke) and other heavy metal compounds emitted as exhaust from fuel combustion can eventually accumulate in plants and animals, some of which are consumed by people. This cause certain health issues.
- Eutrophication, the process of accumulation of nutrients, including nitrogen, in water bodies, often results from air pollution.
- Nutrient overloads in aquatic ecosystems can cause algae blooms and ultimately a loss of oxygen and life.
- Millions of other species, including humans, depend on fresh water to drink. When an area loses a large percentage of its fresh water, many animals die off. In some cases, species entirely extinct. This leads to a decrease in the region's biodiversity.
- Toxicity which is a result of water pollution leads to death of aquatic life .

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Key Points

- Human activities are responsibilities for most of the pollution on the Earth and climate change.
- The 3Rs, policy can reduce the impacts of pollution.
- Water pollution causes negative impacts on human, terrestrial and aquatic life.
- All types of waste material and careless use of pesticides and chemical fertilizers causes soil pollution.
- Greenhouse effect keeps the terrestrial temperature suitable.
- Average temperature of the Earth is 15°C.
- Noise pollution negatively impacts on the physical and psychological health of the listener.
- The gradual increase in terrestrial temperature is called global warming.

Exercise

1. Tick (✓) the correct answer:

i. Noise pollution causes:

a) weakness of eyesight b) lungs Problem
c) hepatitis d) high blood pressure

ii. Glaciers are melting due to:

a) soil Pollution b) water Pollution
c) global Warming d) noise Pollution

iii. Made up of different gases:

a) lithosphere b) hydorphere
c) atmposhere d) biosphere

iv. Ozone layer is depleting due to:

a) water Pollution b) soil Pollution
c) noise Pollution d) air Pollution

v. Toxic gases enter the atmosphere due to:

a) noise Pollution b) deforestation
c) waste combustion d) use of Chemical fertilizers

vi. In 2015, countries signed an agreement regarding climate change:

a) 166 b) 176
c) 186 d) 196

2. Write short answer to the following questions:

i. What is meant by pollution?
ii. What are the causes of greenhouse effect?
iii. Name the types of pollution.
iv. Suggest strategies to reduce air pollution.
v. What is meant by global warming?
vi. Enlist the causes of noise pollution.

3. Write detail answer to the following questions:

i. Describe the causes and impacts of water pollution.
ii. Write the causes and impacts of soil pollution.
iii. Describe the causes and impacts of global warming.
iv. Explain the causes and impacts of air pollution.
v. Describe the impacts of noise pollution on human beings.
vi. How can we reduce effects of green house gases causing global warming.
vii. Describe effects of air and water pollution on biodiversity.

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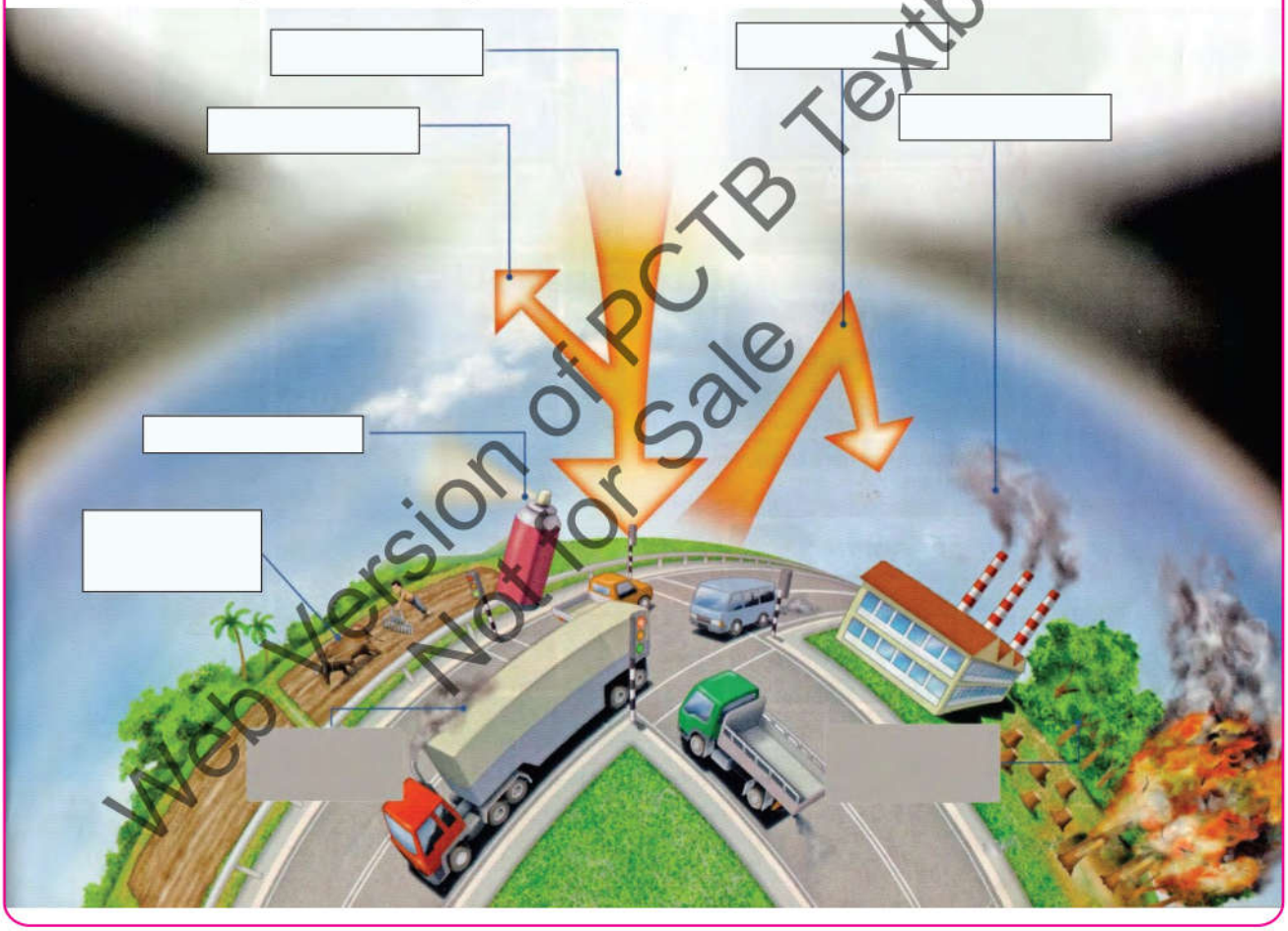
Learning Activities:

- Collect and interpret some local data related to pollution and climate change.
- Collect and organize data about local campaigns in their respective cities for countering climate change and pollution.

Activity Corner!

Label the diagram in context of global warming.



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Critical Thinking Questions:

- Suggest some ways to reduce plastic use in daily life.
- Why do we care about our planet Earth?
- What can we do to stop threats facing Earth biodiversity?

Chapter 4

INDUSTRIALIZATION AND INTERNATIONAL TRADE

Students' Learning Outcomes:

- Identify the main industries of Pakistan.
- Indicate links between industrialization, immigration and urbanization.
- Highlight the important industrial products of Pakistan.
- Explore the development of the textile industry of Pakistan with its four stages.
- Describe the significant role of the cottage industry in the lives of the people of Pakistan.
- Explain the importance for a country to establish regulations for carrying imports and export smoothly.
- Enlist the top four export and import goods of Pakistan.
- Suggest ways which can help Pakistan to earn more revenue from export.
- Suggest ways to reduce the imports of Pakistan.
- Suggest some ways Pakistan can adopt to compete with its international trade counterparts.
- Explain how bilateral trade between Pakistan and China can contribute to sound economic development for both countries.
- Explore how development in science and technology can help to develop the industrial boom in Pakistan.
- Justify how Pakistan can succeed in industrial development if import needs are reduced.
- Justify how economic stability can help a nation to encounter different foreign challenges.

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Industrialization and international trade have long been regarded as the most important tools of development for many countries. It is obvious that industrialization affects the composition of goods that a nation can produce, which then affects what goods that nation can trade.

Main Industries of Pakistan

Pakistan has enough variety of raw material to develop various industries. The major industries of Pakistan includes textile, fertilizer, cement, sugar, iron and steel and chemical industries.

Textile Industry

Steel Industry

Sugar Industry

Cement Industry

Relation Between Industrialization, Immigration and Urbanization

Industrialization

Industrialization is the process by which an economy is transformed from an agricultural economy to an industrial-based economy. Individual manual labour is often replaced by mechanized mass production. It is a major field of human activities. In this process people change the raw material into useful finished goods through various processes by machines and tools. In order to transform raw material into finished goods, different human activities and processes are involved which are grouped as "inputs", "processes" and "outputs" to provide a system of industrial planning. The table below shows industry as a system:

Inputs	Process	Output
■ **Capital (money)** ■ **Raw Material** ■ **Labour** ■ **Transport** ■ **Power**	Using machines/tools to change raw material into finished goods.	Finished goods to be taken to the market to be sold in order to generate revenues.

Immigration

Immigration is a process through which individuals become permanent residents or citizens of another country. This is due to industrialization in which the industrial system attracts a large number of people to be employed according to their knowledge and skills. People start moving towards industrial areas to get better-paid jobs and facilities to improve their living standards. This situation causes immigration within the country, e.g. rural-urban migration, inter-provincial migration. People from Pakistan migrate to the Middle East, USA, UK, etc. They are called immigrants in other countries.

Pakistan International Airlines

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Urbanization

Urbanization is the growth and development of cities. when a large number of people become permanently settled in relatively small areas forming cities. For example, a large number of people are moving from the surrounding villages to bigger cities increasing the density of population leading to agglomeration of population. Mostly industries attract people to move to these areas for better-paid jobs and better quality of life.

A View of Lahore City

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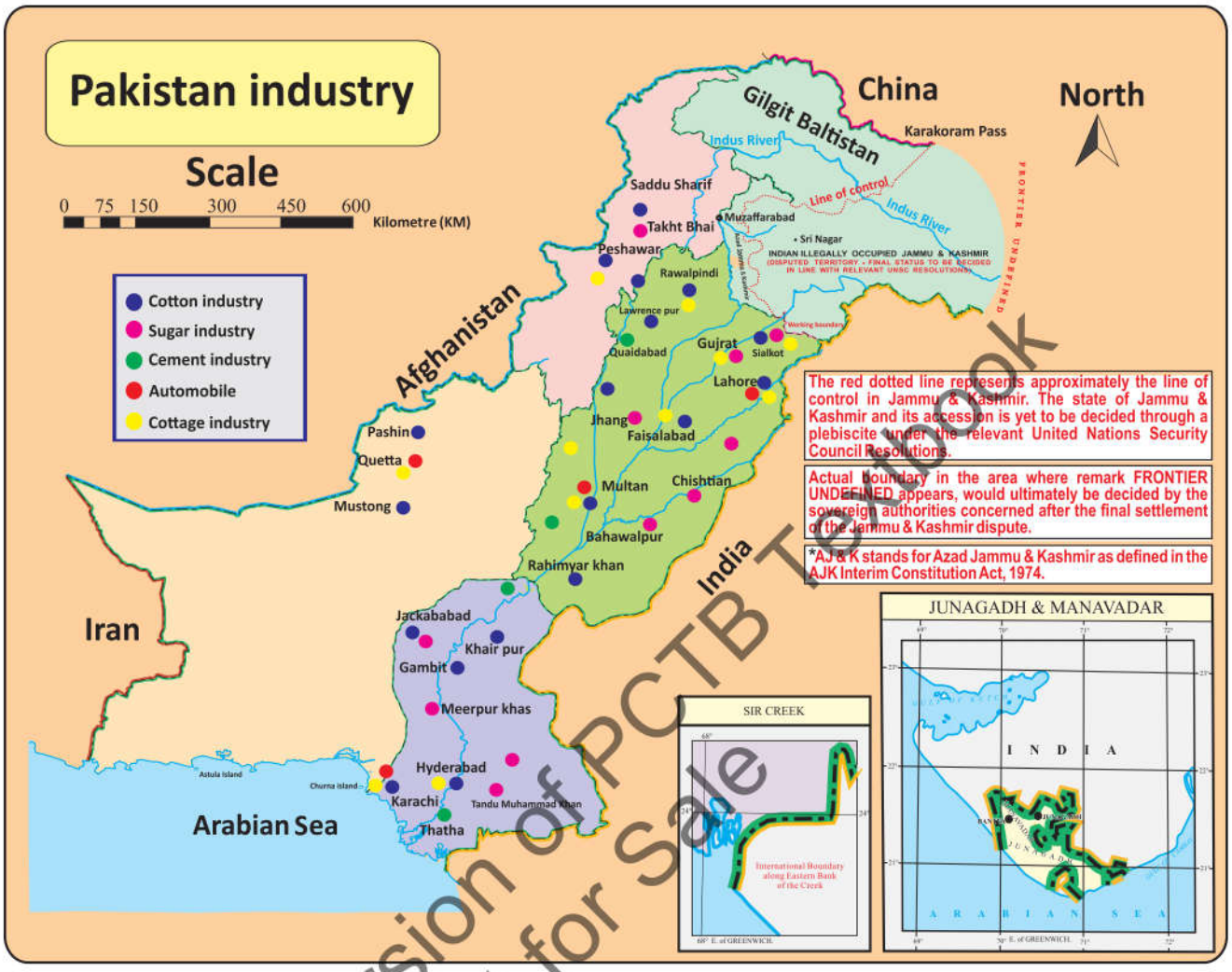
Important Industrial Products of Pakistan

Textile Industry

The textile industry is the most important large-scale industry in Pakistan. There are more than five hundred textile mills in the country. One of the best quality cotton grows in Pakistan.The areas of Punjab and Sindh province due to availability of raw cotton, the textile industry has become an important industry in Pakistan.

The most important manufacturing industry is cotton textiles. Half of the country's industrial workers are employed in it and about 40% of all exports are cotton products including clothing, tents, canvas, cloth, raw cotton, and yarn. Cotton is grown mainly in the Punjab and Sindh. Even the richest soils have to be fertilized to get decent cotton crops. The ripe cotton boll (the seed head) is a mass of threads 2 - 5 cm long, each fastened to a seed.



Growing and Harvesting → Ginning → Spinning → Weaving

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When the cotton bolls are harvested, they go through the following processes:

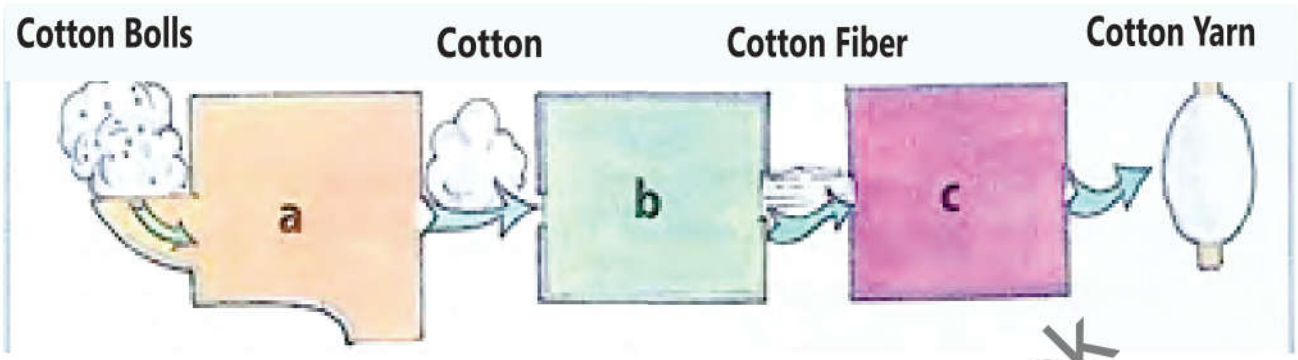
(i) The seeds are removed from the threads in a machine called a gin. These seeds are then crushed to get their oil. The waste that is left behind is fed to the animals.

(ii) The tangled cotton threads then go to a carding machine where spinning combs straighten out the threads.

(iii) The combed cotton threads are then put into a drawing machine, which turns them into soft lengths of untwisted cotton, rather like cotton wool and about the size of a pencil.

(iv) These are put through a spinning machine which twists the fibres together to make yarn or thread.

(v) The yarn can then be made into rolls of cloth, towels, sheets, or canvas, on a weaving machine, or can be exported to other countries.



Cotton is processed all over Pakistan but the main centres are at Karachi (by far the largest), Hyderabad and in Faisalabad. Many other smaller towns produce cotton cloth and clothing for the area around them.

That is why a variety of textiles are manufactured in the country i.e., cotton yarn, cloth, garments, bed linen, knitwear, towels, etc. This industry has a great export potential and contributes towards 60% of exports of Pakistan. Lahore, Karachi, and Faisalabad are the major centres.

Do you know?

Ginning is to separate seeds from cotton bolls.

Spinning is the processing of making yarn from raw cotton.

Weaving is the production of cloth from yarn.

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Cottage Industry of Pakistan

Cottage industry is very popular in all the provinces of Pakistan. They not only provide employment to the people but also use cheap local raw material and traditional skills to make a variety of products. This group mostly uses hand tools and small machines. These industries meet the local demand, responsible rural-urban migration and contribute a sufficient ratio to the national earnings. These industries play a great role to eliminate poverty in the country.

Activity Corner!

Note the location of the cities on the map and share the reasons for the development of industries in these areas.

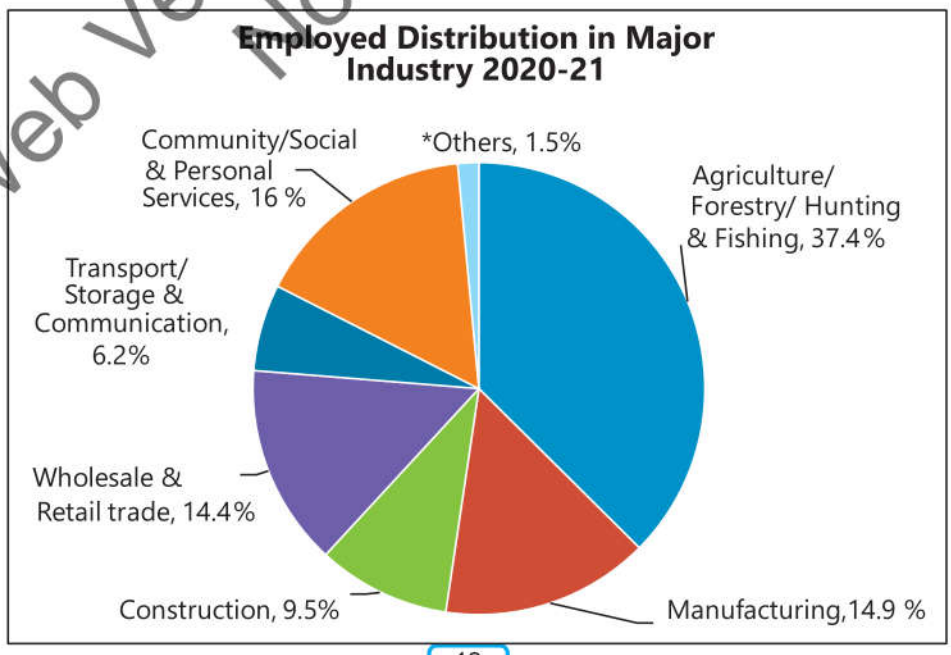



Cottage Industry

Leather Products

Garments	Jackets	Footwears	Bags	Footballs

The significant products manufactured are handicrafts e.g., carpets, pottery, embroidery, etc. Small scale industry includes electric fans, cutlery, sports goods, leather goods, sanitary ware, ceramics etc.



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Major Imports and Exports of Pakistan

Trade is an exchange of import (buying) and export (selling) of goods and services between different countries.

Regulations for Trade, are laws to carry out the smooth movement of goods. There are different national and international organizations to establish standards that have to be obeyed by every country. World Trade Organization (WTO) sets the rules for the member countries to transport their goods by following their rules. Pakistan has established the Trade Development Authority of Pakistan (TDAP) to ensure rules set by WTO for the improvement and standardization of its trade goods.

Table : Pakistan's Major Exports — **Percentage Share**

Commodity	2018-19	2019-20	2020-21	July-March 2020-21	July-March 2021-22 P
Cotton Manufactures	56.4	56.6	59.0	58.8	59.2
Leather**	3.7	3.6	3.3	3.3	3.0
Rice	9.0	10.2	8.1	8.4	7.7
Sub-Total of three Items	**69.1**	**70.4**	**70.4**	**70.5**	**69.9**
Other items	30.9	29.6	29.6	29.5	30.1
Total	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**

P: Provisional, ** Leather and leather manufactured.
Source: PBS (Pakistan Bureau of Statistics)

Imports

Edible oil (for cooking), crude oil (for transport), IT related products (mobiles and computers, etc) mining and agriculture machinery, steel and iron ore, etc.


Exports

Cotton and cotton Products, fish, sports goods, leather goods, surgical instruments, carpets and handicrafts, etc.




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Table : Structure of Imports

Particulars		Units	July-March Value in US$ million		% Change in Value	July-March Quantity		% Change in Quantity
			2020-21	2021-22 (P)		2020-21	2021-22 (P)	
	Total		39,489.3	58,867.6	49.1			
A.	**Food Groups**		6,121.4	7,067.7	15.5			
	Milk & Milk food	M.T	76.8	74.3	-3.3	43,675	35,796	-18.0
	Wheat Un milled	M.T	938.3	795.3	-19.1	3,612,638	2,206,880	-38.9
	Dry Fruits	M.T	69.7	54.0	-22.5	66,766	77,902	16.7
	Tea	M.T	435.1	487.1	12.0	194,961	199,807	2.5
	Spices	M.T	157.6	176.0	11.7	138,407	115,414	-16.6
	Edible Oil (Soyabean and Palm)	M.T	1,909.3	2,834.0	48.4	2,516,070	2,325,117	-7.6
	Sugar	M.T	127.5	190.9	49.7	279,604	311,031	11.2
	Pulses	M.T	448.4	477.7	6.5	842,643	720,433	-14.5
	Other Food Items		1,913.8	1,978.6	3.4			
B.	**Machinery Group**		4,481.0	5,565.7	24.2			
	Power generating Machines		1,356.1	1,235.9	-8.9			
	Office Machines		332.7	464.0	39.5			
	Textile Machinery		381.9	624.8	63.6			
	Const. & Mining Machines		104.6	138.5	32.4			
	Aircrafts, Ships and Boats		373.4	532.9	42.7			
	Agriculture Machinery		66.0	90.6	37.3			
	Other Machinery Items		1,866.4	2,479.1	32.8			
C.	**Petroleum Group**		5,471.0	10,944.7	100.0			
	Petroleum Products	M.T	3,447.6	7,290.0	111.4	10,439,837	12,532,860	20.0
	Petroleum Crude	M.T	2,023.4	3,687.7	82.3	6,422,166	6,647,166	3.5
D.	**Consumer Durables**		2,623.6	4,181.5	59.4			
	Road Motor Vehicles		1,545.6	2,693.8	74.3			
	Electric Mach. and Appliances		1,077.9	1,487.7	38.0			
E.	**Raw Materials**		7,160.7	9,596.6	34.0			
	Raw Cotton	M.T	1,032.1	1,205.5	16.8	624,945	533,871	-14.6
	Synthetic Fibre	M.T	441.0	562.3	27.5	346,248	291,364	-15.9
	Silk Yarn (Synth &Arti)	M.T	499.8	650.2	30.1	317,440	293,191	-7.6
	Fertilizer Manufactured	M.T	440.2	675.2	53.4	1,256,943	1,231,926	-2.0
	Insecticides	M.T	129.9	135.7	4.0	28,509	24,379	-14.5
	Plastic Material	M.T	1,771.1	2,324.9	31.3	1,449,276	1,452,426	0.2
	Iron & steel scrap	M.T	1,418.8	1,856.1	30.8	3,830,128	3,128,070	-18.3
	Iron & steel	M.T	1,427.8	2,186.7	53.1	2,309,097	2,782,458	20.5
F.	**Telecom**		1,913.7	2,125.4	11.1			
G.	**All Other Items**		11,718.0	19,353.5	65.2			

P : Provisional

Source : PBS (Pakistan Bureau of Statistics)

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Activity Corner!

Compare exports and imports of Pakistan given in the table. Identify products that are more expensive. Also highlight the reasons why our export are less and imports are more?

Challenges to Improve Revenue From Exports

Every country in the world tries to grow its exports to improve its balance of trade for economic progress. Unfortunately, Pakistan mostly imports raw material and manufactured goods. To increase its exports and to earn more foreign exchange, Pakistan should take the following measures to improve its balance of payment:

- Increase the exports of higher value-added goods.
- Improve the quality control of its exports according to international standards.
- Explore more markets for export.

- Improve the marketing system through global demand and IT solutions.
- Improve Tourism Industry.

Challenges to Reduce the Imports in Pakistan

Every country in the world tries to reduce its imports to improve its balance of trade for economic progress. Pakistan should take the following measures to improve its balance of payment:

- Needs to increase production of high value-added goods.
- Reduce the import of luxury items.
- Needs to be self-sufficient in agriculture to restrict the import of food items.
- Better training and education for the quality and quantity of its production.
- Need to control its population.

Balance of Trade

Competition with International Trade Counterparts

Pakistan has always shown good relations to its trade partners to meet their demand for the trade items.

- The basic demand for the goods is to maintain quality control to meet their expectations.
- To meet the time schedule given by the trade partners.
- Meet international standards provided by WTO to maintain quality controls.
- Maintain a better ratio of currency exchange between the trading partners.
- Trade delegations to be sent to member countries for the promotion of the trade.

Activity Corner!

Apply the understanding of exports and imports by giving a relatable examples from everyday life.

Bilateral Trade Between Pakistan and China

China is Pakistan's neighboring country and has always been a good trade partner. Karakoram highway was established by the mutual economic and technical support of both countries. Pakistan has become an important market for the mass production of cheaper goods. Pakistan exports rice, fish, carpets, and many other small items to China. China provides technical assistance to Pakistan to improve its agricultural output. Recently, CPEC has become a very important economic corridor and an excellent example of bilateral relations of both the countries. Some major projects developed by China in Pakistan are the Gwader Port, Chashma Nuclear Power Project , Taxila Heavy Mechanical Complex, and Kamra Aeronautical Complex.

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Pak-China Border (Khunjrab)

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Do you know?

Per capita income or total income measures the average income earned per person in a given area in a specified year. It is calculated by dividing total income by its total population. Per capita income is a national income divided by population size.
For example, the per capita income of Pakistan was 1465 US dollars in 2021 CE.

Role of Science and Technology for the Industrial Development

Many countries provide financial and technical assistance to help Pakistan to improve its economy. Russia provided such assistance to establish a Steel Mill in Karachi. Canada provided similar assistance for the Nuclear Power Plant in Karachi. China has many projects on the list to improve the economy of Pakistan. Recently , through the development of software technology, Pakistan has been able to establish better marketing, media style, and distance learning. In all the provinces of Pakistan, due to the Government assistance in the field of science and technology, there has been great improvement in the industrial products to meet the challenges of the present time.

Technology

Do you know?

The sports industry of Pakistan flourished from cottage industry. Now this industry is earning major source of Foreign Exchange Reserves for Pakistan.

Justifications to Reduce Import Needs for Economic Stability

The hallmark of Pakistan's development is to reduce its loans which have emerged as a big barrier to its economic progress. The country needs to be less dependent on loans and be self-sufficient by improving the quality and quantity of its products which will be able to decrease its dependence on imports. Pakistan has a very low per capita income. Pakistan has sufficient skilled human resources which can be a big asset for the country to improve its economy. Pakistan also needs to decrease the import of many luxury items to improve its trade balance.

Activity Corner!

Explore how economic stability can help to encounter Foreign challenges?

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Key Points

- Industrialization and international trade have long been regarded as the most important tools of development for many countries.
- Pakistan has enough variety of raw material to develop various industries.
- Industrialization is the process by which an economy is transformed from an agricultural economy to an industrial-based economy.
- Immigration is a process through which individuals become permanent residents or citizens of another country.
- Urbanization is the growth and development of cities when a large number of people become permanently settled in relatively small areas forming cities.
- The textile industry is the most important large-scale industry of Pakistan.
- Cottage and small-scale industries are very popular in all the provinces of Pakistan.
- Trade is an exchange of import (buying) and export (selling) of goods and services between different countries.

Exercise

1. Tick (✓) the correct answer:

i. A city famous for the cotton and textile industry:

a) Faisalabad b) Lahore
c) Rawalpindi d) Sialkot

ii. One of the major imports of Pakistan:

a) Mineral oil b) Sports goods
c) Fruits d) Fish

iii. A process of separation of seeds from the cotton boll:

a) Spinning b) Ginning
c) Weaving d) None of these

iv. One of the major exports of Pakistan:

a) Sugar b) Textile goods
c) Cement d) Sports goods

v. Physical growth of cities is called:

a) Immigration b) Urbanization
c) Industrialization d) None of these

2. Give short answers to the following questions:

i. Enlist the main industries of Pakistan.
ii. Give three examples of small-scale industries.
iii. Define bilateral trade.
iv. Define Urbanization.

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v. Write the names of five exports of Pakistan.
vi. Suggest two ways to reduce imports of Pakistan.

3. Give detailed answers to the following questions:

i. Explain the role of textile industry in the development of Pakistan.
ii. How science and technology can help in our development?
iii. How we can increase our exports?
iv. Explain the importance of cottage industry in Pakistan.
v. Write a note on bilateral trade between Pakistan and China.

Learning Activities:

- Evaluate the impact of industrialization on the economy of Pakistan.
- Collect data related to technological advancements, industrialization, urbanization, and immigration and their impact on Pakistan.
- Explore the major challenges to the textile industry of Pakistan.
- Analyze the use of alternate energy for the development of the industrial sector of Pakistan.
- Analyze the role of geopolitical decisions in the development of a region.

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Project For Students:

Make a chart of imports and exports of Pakistan and display it in the classroom.

Imports	Exports

Chapter 5

TRANSPORT AND ITS IMPORTANCE

Students' Learning Outcomes:

- Identify different forms of modern transportation and their characteristics.
- Explain some of the reasons for development of transport systems in urban and rural areas.
- Explain dependence of international trade on an effective transport system
- Explain the importance of transport system in development of economic activity.
- Outline the role of transportation system in national and international trade.
- Identify major modes of transportation and trade routes in Pakistan.
- List some of the major exports and imports through CPEC and silk route Chaman, Turkhem, Port Qasim, Karachi Port and Gawader Port.
- Explain some of the strengths and weaknesses of the transport infrastructure in Pakistan.

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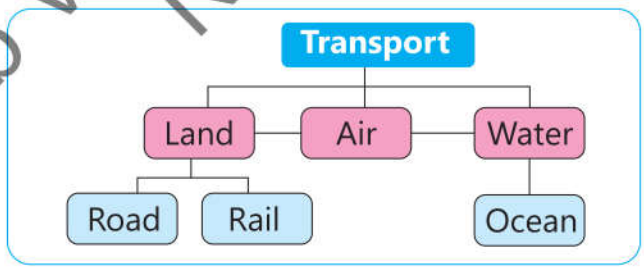
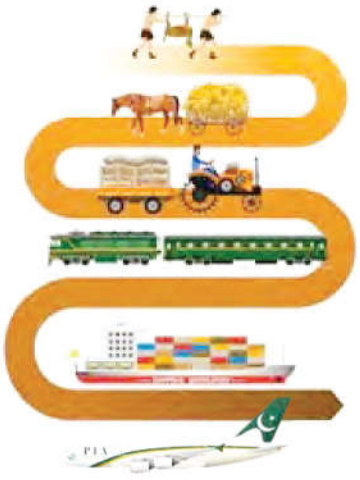
In the modern world of today, a country depends upon other countries, in the same way as a town depends on the rural areas to supply its needs in terms of food, raw material and manufactured goods. Besides, each country or part of a country has certain products to sell to others. This dependence on one another results in the exchange of goods and services which we call trade. For this transportation is of great importance. Transport, therefore, is essential in a world that depends on trade for its development.

Modern Transportation and Their Characteristics

There are three main types of transport to be considered: land, water and air transport; and all three are used to move goods and people from one place to another, from city to city and from country to country. Their detail and characteristics are as under:





(i) Land Transport

People move from one place to another through roads and rails, and land transport is further divided into two types:

(a) Road Transport

Apart from primitive methods of land transport found in certain underdeveloped parts of the world, modern land transport needs well-planned systems of roads and railways.

In developed and some under developed countries, there are close networks of good roads both in cities as well as in the rural areas. In West Germany, the United States, Britain and a few other countries, there are wide long distance roads called highways or motorways which have been specially constructed for very fast-moving traffic. In less developed countries like Pakistan, the good roads are also found like motorway. In most countries, road transport in the form of cars and buses, are important for carrying passengers. However, road transport is becoming increasingly important for carrying of goods in competition with the railways. Besides, they can provide a door-to-door service. The most common mode of transportation in logistics, is road. Due to continous improvement of vehicles and road infrastructure, transportation by road is the most versatile of the three main modes.

Road Transport

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(b) Rail Transport

In countries of large size, where distances of several thousand kilometres separate one end of the country from another, railways are clearly a very important means of transport. Railways in the United States, Canada and the Russia have led to the opening up of large undeveloped parts of the countries. In these countries, railways are still largely used for transporting heavy loads such as coal, grain, timber and metal ores, cheaply and quickly over great distances. In modern practice, rail is used more exclusively for the largest and heaviest payloads (bulk cargo) traveling across land.

In south America, there is a network of railways in the wheat and cattle lands of Argentina (the Pampas), while another network is to be found in the coffee lands of south-eastern Brazil. In Europe, there are very large networks of railways in Britain and in other countries. In Asia, China, Japan, India and Pakistan have good rail transport system.

Railway

Activity Corner!

Use maps or google maps to observe some major transport routes of the world.

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Characteristics of Land Transportation

- This is widely used within a region or country.
- This is inexpensive and readily available.
- Road transport has large load capacity.
- Its operating cost is generally low.
- It is highly flexible.

(ii) Water Transport (Sea or Ocean Transport)

For international trade through oceans, ships are the major forms of transport. This is cheap and efficient source than land and air transport. Countries separated from each other by sea can send their goods either by sea or by air. But most commercial goods are too bulky (great in size) and expensive to be sent by air. So they are transported over very long distances at comparatively low cost by ships. Shipping through water has been in practised for thousands of years and remains important today's global trade. Most of the trade is accomplished through maritime transportation.

Water Transport

Chief Ocean Routes

The North Atlantic Route

This route, between western Europe and the eastern seaboard of north America, is the busiest of all ocean routes. The main types of goods transported are wheat, machinery, equipment, clothing and other goods.

The East-West Route

This is the route between Europe and the Far East (India, China and Japan) which passes through the Mediterranean Sea and the Suez Canal. Goods such as oil, rubber and timber to Europe and manufactured goods from Europe to the East.

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Do you know?

In many countries rivers play an important role in transportation i.e. the Amazon, in Brazil, Tames in London and Yangtze in China.

Characteristics of Water Transportion

- This mode of transportation is highly economical.
- Mostly used for transporting supplies from abroad.
- This mode of transport need access to a harbor or port.
- It carries large load capacity.

(iii) Air Transport

The most modern mode of transportation is air. Airplanes are becoming increasingly important in journey as well as in domestic and international trade. Air transportation is the fastest growing and most time efficient shipping mode.

Modern aircrafts are so fast that can cross continents and oceans in hours as it formerly took weeks and months to cross them by other forms of transport. Compared with ships, trains and road vehicles, aircraft can travel practically anywhere and over any type of land surface. For these reasons, air travel and transport are comparatively costly. Thus only air mail and goods of small bulk and high value, or goods urgently required are transported by air.

Air Transport

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Characteristics of Air Transportations

- It is widely used in urgent need.
- It is also used where no other way to reach.
- It is costly mode of transportion.
- It is quick and reliable mode of transport.
- It can reach far-away areas like mountainous and snow covered areas, etc.

Development of Transport System in Rural and Urban Areas

The development of transport system can bring various benefits. For a country's development, transport can be classified in three categories, economic, social and political which are given below:

- Economic point of view, an efficient transport system brings buyers and sellers into contact with each other, resulting in expansion of trade.
- With the development of transport, rural and urban areas come into contact. Surplus agricultural goods are transported to the cities and manufactured goods moved to the villages.

- An efficient transport system also leads to a specialization in production. Rural areas specialize in the production of agricultural goods and urban areas in industrial goods. By means of transport, agricultural goods are supplied to urban areas and industrial goods to rural areas.
- Transport also helps to mobilize the workforce, particularly from rural to urban areas. This reduces extra pressure on land and unemployment in the villages.

A Scene of Village Road

- Mineral wealth of the more remote regions could be explored, extracted and sold in markets.
- From a social point of view, transport helps to spread education. For example, students can travel to distant educational institutions for quality education.
- As people of different areas (from rural to urban or from urban to rural) come into contact with each other, cultural interaction increases and promotes unity, helping to reduce prejudices and hatred.

Mode of Transport	Principal Advantages	Use
Railways	Minimum resistance to movement, general flexibility, dependability, and safety.	Bulk-commodity and general-cargo transport, inter-city; of minimum value for short distance traffic.
Highways	Flexibility, especially of routes; speed and ease of movement in inter-city and intracityas well as local services.	Individual transport; also transport of merchandise and general cargo of medium size and quantity: pickup and delivery service; short-to-medium inter-city transport;feeder service.
Waterways	High productivity at low horse power per ton	Slow-speed movement of bulk, and low-grade freight where waterways are available; general cargo transport where speed is not a factor or where other means of transport are not available.
Airways	High speed	Movement of any traffic where time is a factor-over medium and long distances; traffic with a high value in relation to its weight and bulk.

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- Politically an efficient system helps the Government to maintain law and order, even in remote areas. This helps to promote close contact between the Government and the people.

Transport System and Economic Development

In modern times, a safe and efficient transport system is the basis for a nation's progress. Its importance can be summed up as follows:

(i) **Development of Trade:** A well-developed network of transport is necessary to promote internal and foreign trade. It brings buyers and sellers in contact with one another. Soft agricultural goods, if not transported quickly, perish before reaching the market.

(ii) **Utilization of Material Resources:** The distribution of material resources is not uniform in a country. For their proper utilization, a system of effective and cheap means of transport is necessary to have an easy access to the areas rich in different material resources.

(iii) **Link Between Industry and Raw Material:** A well-developed means of transport encourage the areal specialization of agricultural products and industrial manufactures.

(iv) **Mobility of Labour:** Mobility of labour is a vital factor to achieve a high rate of economic growth which is not possible without effective transport system in a country. It also helps to achieve a higher level of employment.

(v) **Stability in Prices:** The stability in prices of goods can only be achieved by well-developed means of transport because they carry the products of high growth areas to areas of low growth.

(vi) **Increase in State Income:** An efficient means of transport creates proper coordination among different parts of a country and keep balanced development of all people. It boosts the economic growth and raises the standard of living of the people that increases the income of the state from various taxes and revenues.

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Role of the Transport System in Internal (Local) and International Trade

Transport plays a vital role in the development of internal (local) and international trade.

1. Transport and logistics services facilitate international trade and play an important role in the growth and development of the local economy as well global economy.
2. Transport system provides sectoral connections within the local economy. It also connects the domestic economy to the international economy.
3. It connects various inter-dependent production sectors (agriculture, manufacturing, agri-food, tourism) of the domestic economy is strengthened through an efficient transport systems.

Transport Logistic

4. Similarly, the domestic producer's ability to participate and reap the benefits of the growing global value chains this is possible only due to effective transport system.
5. The transport and logistic sector is an integral part in terms of facilitating international trade. It allows firms to effectively complete imports and exports of goods and services and associated transactions.

Transport System in Pakistan

The major components of Pakistan's transport system include roads network, railways system, air transport services, ports and water transport (shipping services).

(i) Roads Networks

Road transport is the most popular means of transport. It includes motor vehicles such as buses, trucks, cars, taxis, rickshaws, jeeps and motor cycles. Road transport carries 82% of the total passenger traffic and 54% of the total freight traffic in the country. Pakistan has around 260,000 km of roads. There are 48 National Highways, Motorways and Strategic Roads. The remaining roads are classified as Provincial, District, or Municipal Roads.

Nowadays Pakistan has a well-developed road transport system. Pakistan is an agricultural country, therefore roads are essential for carrying goods from villages to markets, raw material to factories, and for distributing the manufactured products to the nearby villages.

Road Transport

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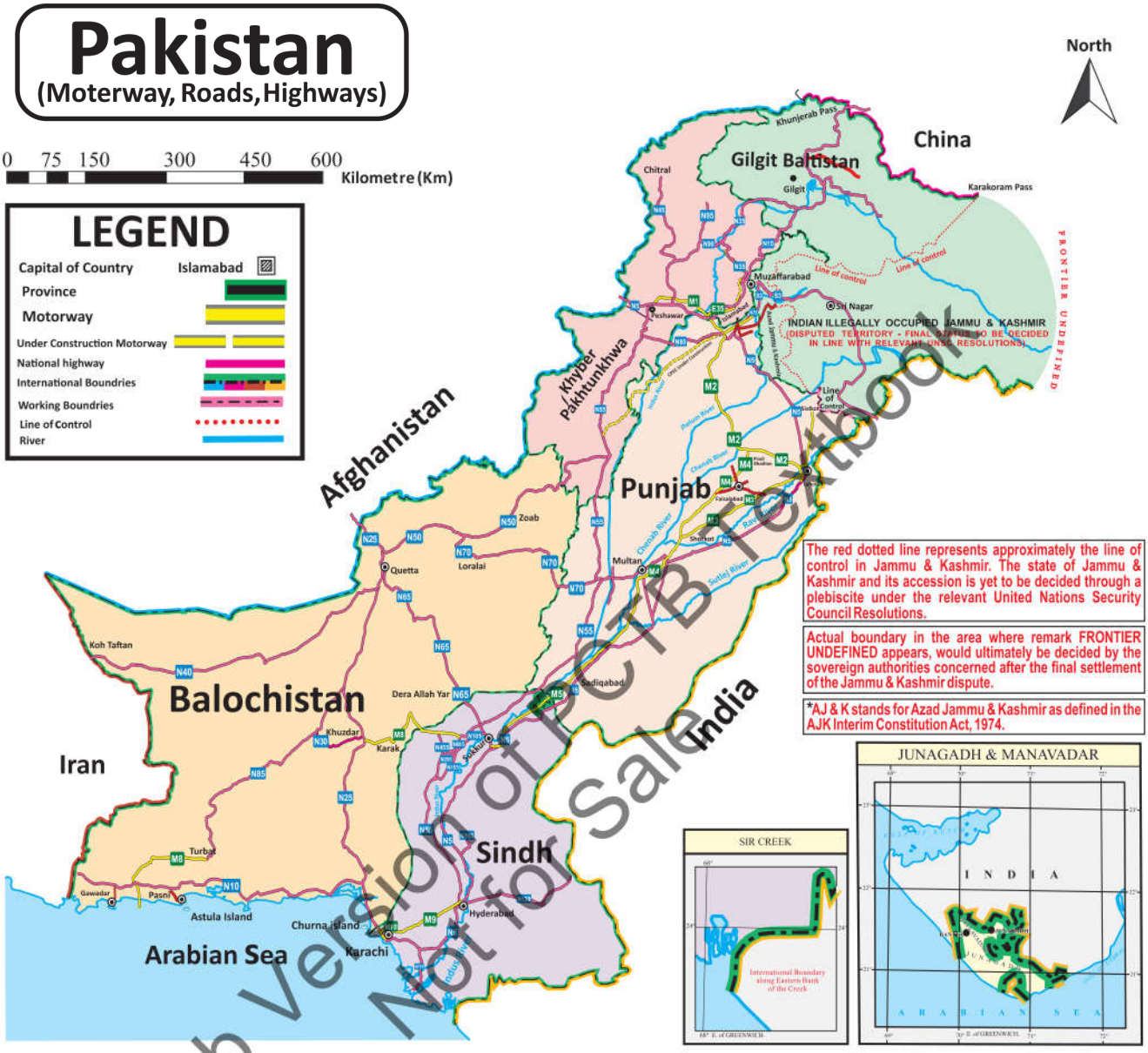

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The highest traffic density is on Grand Trunk (G.T) Road running from Peshawar to Karachi, and Super Highway from Karachi to Hyderabad.

The National Highway Authority (NHA) was established to plan, promote, organize and implement programmes, development operations, and repairs and maintenance of national highways and strategic roads. The Grand Trunk Road, running from Peshawar to Lahore, is of vital economic and strategic importance. It passes through densely populated areas and is heavily travelled on account of its linking Lahore with the federal capital. In Balochistan, the road transport system has a very low density because of the rugged landscape and lack of investment. In the mountainous north, few roads have been built. They reach the main districts, e.g. Swat, Dir, Chitral, Gilgit which links Pakistan and China through the Khunjerab Pass. It has been developed during recent years to improve trade and diplomatic relations between Pakistan and China.

(ii) Pakistan Railways

Railway system in Pakistan was introduced in the sub-continent on May, 1861, when Karachi and Kotri, two stations about 155 km apart, were linked by rail. Pakistan railway system is a huge and complex organization employing over thousands of workers and makes significant contribution to the economic development of the country. It has quite well equipped carriages and Wagons Workshop at Mughalpura (Lahore). The Carriage and Wagon workshops are fully equipped. There is a dense rail network in Punjab and a medium-density network in Sindh. A dense railway network in Punjab and Sindh, especially along rivers, since tracks are easier to build on flat land. In Balochistan, Quetta is the centre of the rail network and is connected to Sindh and other parts of Balochistan. Places in the mountainous north and north-west, like Chitral, Gilgit, Skardu, Mingora and Kalam are not accessible by rail.

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Pakistan's Railway

Recent Developments in Pakistan's Railways

- Several new services have been launched, resulting in an increase in revenue as freight and passengers transport.
- A new railway track is planned, linking Gwadar with Mastung. It is part of the China - Pakistan Economic Corridor (CPEC), and will connect Gwadar's deep-sea port with the central Asian States.
- The ticketing system is being computerised and the reservation system is being improved to cease black marketing of tickets.

Do you know?

KCR (Karachi Circular Railway) made operational on 14 km-long Orangi-City route KARACHI: Following last week's test runs, the City Railway Station to Orangi Station track of the Karachi Circular Railway (KCR) was made operational and accessible to the public.

(iii) Air Transport

Air transport is effective for low-volume and high value goods that need to be transported quickly. Pakistan has an extensive domestic air network linking all the key cities and major district centres. It also plays an important role in linking up Pakistan with the outside world. For Pakistanis, PIA (Pakistan International Airlines) is a symbol of national pride. The Civil Aviation Authority (CAA) manages and develops civil aviation in Pakistan.

Pakistan International Airlines

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Factors Contributing to the Development of Air Transport

The use of air transport has increased significantly.

- **Internal Factors:** The rail and road networks are concentrated in the plains. In mountainous regions like the northern area, not all the roads are metalled and frequent landslides hamper traffic. PIA's air routes to places like Gilgit and Skardu make these areas more accessible.
- **External Factors:** Now-a-days, air cargo transport has increased to the Middle East and consists mainly of perishable items like fruit and vegetables.

Improvement in communication has turned the world into a global village, with more passengers from all walks of life using air travel. Migration has also increased.

Activity Corner!

Contrast the usage of different forms of modern transportation.

PIA's International Routes	
European Countries	UK, Germany, France, Italy, Russia, Denmark, Norway and Spain, etc.
U.S.A.	New York, Chicago, Washington DC, etc.
Middle East UAE (Sharjah, Abu Dhabi and Dubai) Bahrain, Oman	India, Malaysia, Philippines, Bangladesh, Singapore, Sri-Lanka, Thailand, China and Hong Kong, etc.

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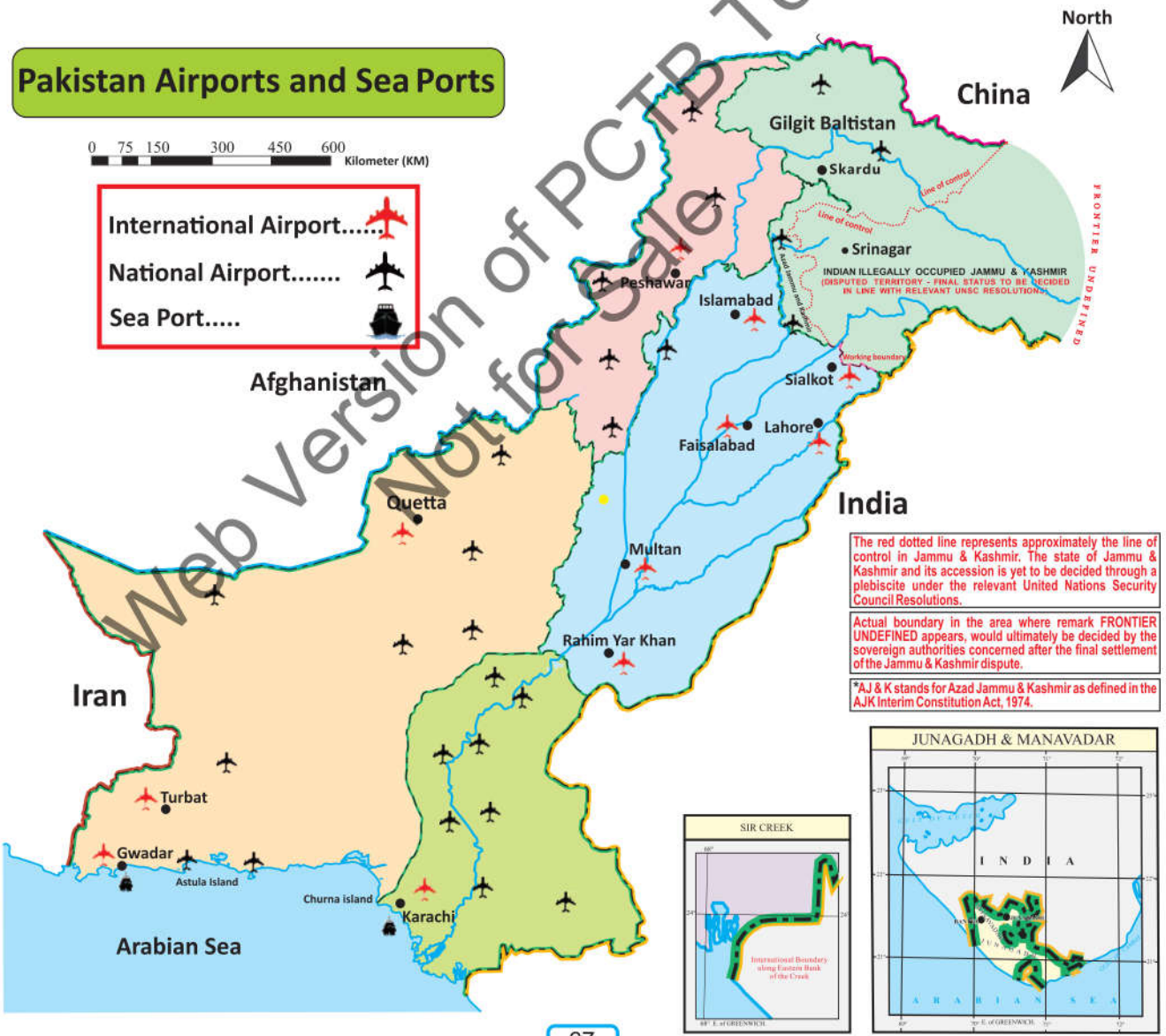
Pakistan Airports and Sea Ports



Do you know?

Pakistan's busiest airport is Jinnah International Airport, Karachi.

(iv) Water Transport

Today bulky goods, which do not perish on the journey, are carried by water transport. Sea-Ports and Shipping Service Pakistan has three major sea ports Karachi, Gawader and Port Qasim. Karachi Port has established an annual cargo handling record of over 2.6 million tons of cargo. In order to facilitate further expansion and improvement in the port and harbour facilities, a comprehensive development programme has been formulated. Waterways are important for handling bulky goods.

Water Transport

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Seaports handle the most international trade. Pakistan has three main seaports: Keamari, Port Qasim and Gwadar.

(a) Keamari Seaport, Karachi

Keamari Seaport, Karachi is located to the west of the Indus Delta on the Arabian Sea.

Table : Cargo & Container Handling at Karachi Port						(000 tonnes)
Fiscal Year	Imports	Exports	Total	%Change		
				Imports	Exports	Total
2019-20	27,206	14,634	41,840	-17	4	-11
2020-21	36,469	15,810	52,279	34	8	25
(July-March)						
2019-20	21,076	11,527	32,603	-16	11	-8
2020-21	27,546	11,878	39,424	31	3	21
2021-22	27,008	12,705	39,713	-2	7	1
Source: Karachi Port Trust						

(b) Port Qasim

Port Qasim is 20 km south-east of Karachi at Gharo Creek. It is Pakistan's second-busiest seaport and handles around 30% of its cargo.

(c) Gwadar Port

Gwadar is located on the Makran Coast in Balochistan, and is the world's deepest seaport. Gwadar port will serve the national economy in the following ways:

- The economic interests of the largest province in the country, Balochistan, demand that it has a seaport of its own to encourage its economic development. The port will facilitate exports of its large fruit crop.
- If the ports of Keamari and Bin Qasim are affected by a prolonged strike or a natural calamity, Gwadar can become a substitute port.
- Gwadar can serve as an entreport for Central Asia, if Afghanistan allows Central Asian goods to pass through its territory. This can also generate revenue for Afghanistan and Pakistan.

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Gwadar Port

Activity Corner!

Inquire and analyze data based on major exports and imports through CPEC, silk route, Chaman, Torkham, Port Qasim, Karachi Port, and Gwadar Port.

Major Imports and Export Through Sea ports

Major ports of Pakistan include Karachi, Port Qasim and Gwadar. Their importance is stated below:

(i) Karachi Port

It is the most important and oldest port of Pakistan. Initially its scope was very limited, which increased with the passage of time. Special terminals were erected at this port to load and unload the import and exports like iron ore, coal, steel, edible oil, rice, wheat, cement and fertilizers. Latest gigantic containers cranes are available at this port. The Government intends to expand it further.

Karachi port

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(ii) Port Qasim

It is the second largest port in Pakistan, built near the Pakistan Steel Mills, to meet the needs of the steel mills with greater ease. Special terminals were erected at this port to load and unload the import and exports like iron ore, coal, steel, cement, fertilizer and LNG etc. These special arrangements at Port Qasim were made to meet the needs of Pakistan's steel industry.

(iii) Gwadar Port

Gwadar port is a deep sea port in the Arabian Sea in the city of Gwadar, Balochistan. This important port was inaugurated on March, 2007. This port is very convenient maritime trade route for the countries in the East and Central Asian States. Trade (import and exports) of wheat, rice, coal, fertilizers and certain other commodities has been started from this port. It is hoped that the completion of projects under the China-Pakistan Economic Corridor (CPEC) in the near future will make the port of Gwadar a global hub, which will improve Pakistan's economic situation.

China-Pakistan Economic Corridor (CPEC)

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Do you know?

The Gwadar Port area, was bought by Pakistan from Oman in 1958 in 300,000 dollars.

Some of the Strengths and Weaknesses of the Transport Infrastructure in Pakistan

Transport infrastructure refers to the framework that supports our transport system. This includes roads, railways, ports and airports. Because of the intensive use of infrastructures, the transport sector is an important component of our country's economy.

Following are the same strengths of transport infrastructure in Pakistan:

- With the development of transport, rural and urban areas come into contact. Surplus agricultural goods are transported to the cities and manufactured goods moved to the villages.

- An efficient transport system also leads to a specialization in production, which enhance production and reduces cost per unit.
- Transport also helps to mobilize the workforce, particularly from rural to urban areas. This reduces extra pressure on land and unemployment in the villages.
- Well-developed transport opens up investment opportunities in less developed areas. For example, inaccessible areas (e.g. Balochistan Plateau, western Mountains) could be developed economically.

Economic	Political	Social
Mobility of labour	Maintence of law and order	Increased social welfare
Increase in trade	Promotes defence	Culture interaction
Balanced economic growth	Political awarness	Spread of education and health
Link between rural and urban areas		Easy interaction
More income for the state		
Price stability		

Following are weakness of Transport infrastructure in Pakistan:

- Traffic congestion and parking problems are weaknesses of transport infrastructure in Pakistan.
- Public transport inadequacy.
- Loss of public space.
- High infrastructure maintenance costs.
- Environmental impacts and energy consumption.
- Accidents and safety.
- Broken roads.

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Activity Corner!

Explore the ways how transportation effects our lives.

Key Points

- There are three main types of transpor : land, water and air transport.
- In most countries, road transport in the form of cars and buses, are most important for carrying passengers.
- For international trade, ocean going ships are the major forms of transport.
- Compared with ships, trains and road vehicles, aircraft can travel practically anywhere and over any type of land.
- In modern times, a safe and efficient transport system is the basis for a nation's progress.
- A dense railway network in Punjab and Sindh, especially along rivers, since tracks are easier to build on flat land.
- The ocean has always been a source of food for man. Until now only about 1% of mankind's food comes from the sea and much of it is fish.
- Gwadar port is a deep sea port in the Arabian Sea in the city of Gwadar, Balochistan.

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Exercise

1. Tick (✓) the correct answer.

I. Main type of transport system are:

a) Two b) Three
c) Four d) Five

ii. Transport has large load capacity:

a) Air Transport b) Water Transport
c) Rail Transport d) All of these

iii. Highly economical mode of transportation:

a) Road Transport b) Air Transport
c) Water Transport d) Rail Transport

iv. Transport used in urgent need:

a) Rail Transport b) Air Transport
c) Water Transport d) Road Tranport

v. Pakistan has around kms roads:

a) 26,000 km b) 270,000 km
c) 280,000 km d) 290,000 km

2. Write short answer to the following questions:

i. What is the significance of transport system?
ii. Write the name of major mode of transportation.

iii. Which road has the highest traffic density?
iv. Write the names of seaports of Pakistan.
v. What is the role of transportation in International trade?

3. Write detail answer to the following questions:

i. Discuss the modern transportation and their characteristics?
ii. Write a note on the importance of transport system in economic development.
iii. Explain the transport system in Pakistan.
iv. Explain the role of water transport in national and international trade.

Learning Activities:

- Investigate the differences in transport in rural and urban areas.
- Evaluate the importance of transportation for exports and imports.
- Inquire the role of CPEC, silk route, Chaman, Torkham, Port Qasim, Karachi Port, and Gwadar Port in development of economic growth in Pakistan.
- Analyze the transportation infrastructure in Pakistan.

Critical Thinking Questions:

- Suggest some ways to improve our transport system in Pakistan.
- How we can enhance the quality of our rail transport in terms of freight?
- Why transport is important in development of the country?

Project For Students:

- Make a chart of imports and exports traded through Gwadar port.

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Chapter 6

SOCIAL AND ECONOMIC DEVELOPMENT

Students' Learning Outcomes:

- Investigate the key economic indicators of development and their importance.
- Enlist a few human indicators that are important for the development of the country.
- Explain the role of inflation and unemployment in the development of a country.
- Evaluate the impacts of technology in the development of a country.
- Evaluate the current position of Pakistan at EDI and HDI indicators.
- Explore the importance of health care in the development of the country.
- Identify the role of Organization for Economic Co-operation and Development (OECD) to support development in developing countries.

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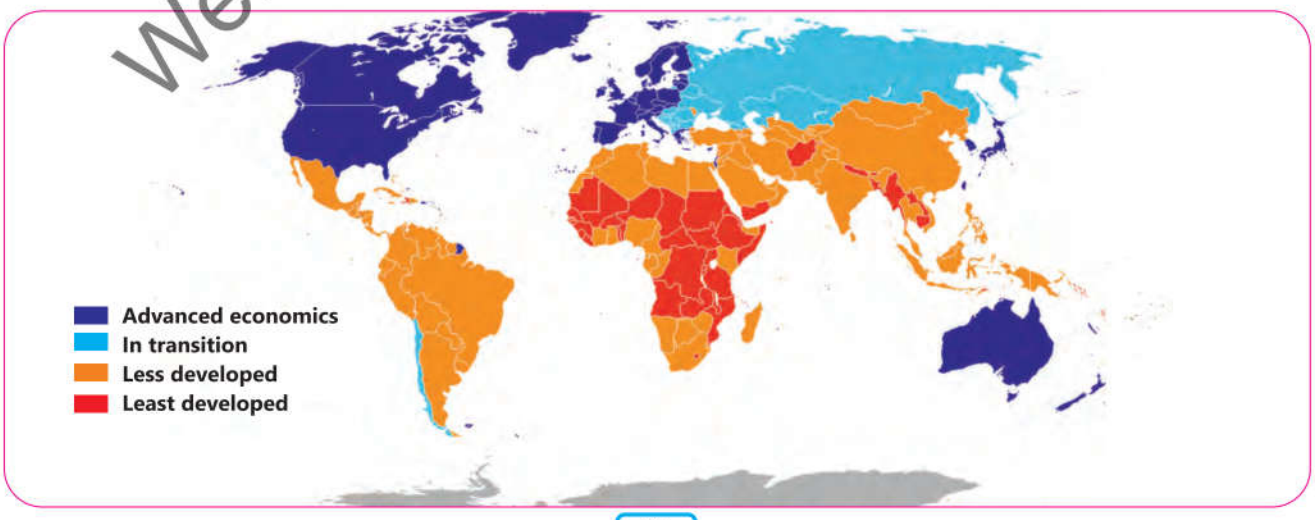
The terms "economic development," and "economic growth," "economic progress" have been used more or less now-a-days. "Economic development" means a change in national income over time. "Economic growth" may be conceived of in terms of a rise in per capita income. One may distinguish between the concepts of "growth" and "development" by saying that "Economic growth means more output" while "Economic Development" means more output and changes in the technical and institutional structure by which it is produced.

Economic Indicators of Development and Their Importance

Most of the economists differentiate rich and poor nations by one or more of three measures which are also called development indicators:

(i) Per capita GNP,
(ii) Per capita energy consumption,
(iii) Percentage of labour force in primary activities



(i) Per Capita GNP

This measure seems the best indicator of economic well-being. Per capita data is obtained by dividing total national income to the nation's population. Per capita data are thus average values. In many poor nations, average values do not apply to large segments of the population, because wealth is concentrated in the hands of a few. In many poor nations, for example, Ethiopia have per capita GNP values so low that it is inconceivable that the vast majority could physically survive, but they do.

(ii) Per Capita Energy Consumption

Just as per capita GNP is a measure of productivity in terms of value, per capita inanimate energy use is a measure of production in terms of power expended. There is a close relationship between energy consumption and degree of economic activity. Low per capita energy consumption is associated with subsistence and other forms of non mechanized agricultural economies, high per capita energy use with industrialized societies.

(iii) Labour Force in Primary Activities

In general, nations with a large part of their labour force in primary activities are less able to produce income. On the other side a nation that has strong secondary and tertiary components in its labour force usually has a greater per capita GNP and consumes more energy. Of all the primary activities, agriculture is the most important.

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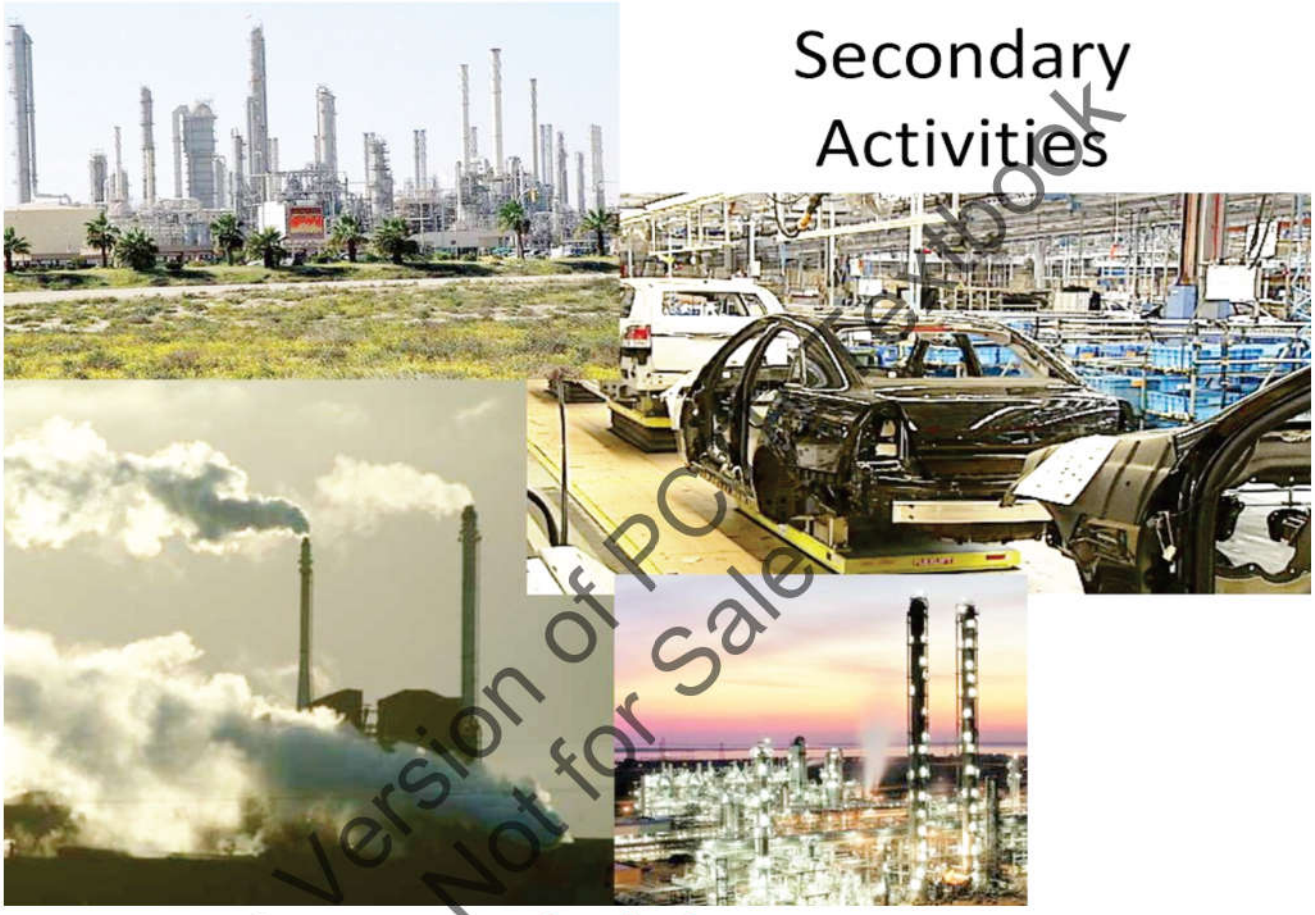
Primary Activities

(iv) Other Measures

Although GNP, energy, and agricultural labour force are most often used to determine rich and poor nations, following measures are sometimes used:

(a) Life expectancy
(b) Food supply
(c) Low rate of population growth



Secondary Sectors

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Do you know?

Equity, Diversity and Inclusiveness (EDI) refer primarily to matters of gender, race, ethnicity, disability, religion and age, but also more generally to ensuring respectful working relations.

Human Development Index (Indicators) (HDI)

Human development index is a summary of measure of average achievements in key dimensions of human development. It is a process of enlarging human opportunities and improving their lives, which can be measured with the following indicators:

I. Healthy Life (Life Expectancy)

A healthy life is measured by life expectancy (The age that a person is expected to live) at birth.

ii. Education

Education is measured by the mean of years of schooling for adults, aged 25 years and more expected years of schooling for children of school-entering age.

iii. Standard of Living

Standard of living states the quantity and quality of material goods and services available to a given population.

iv. Higher Per capita Income

Per capita income means the average per person income of a country's population and higher income indicates higher human development.

v. Sizeable GDP Growth Rate

Gross domestic product (GDP) is the total market value of all the finished goods and services produced within a country.

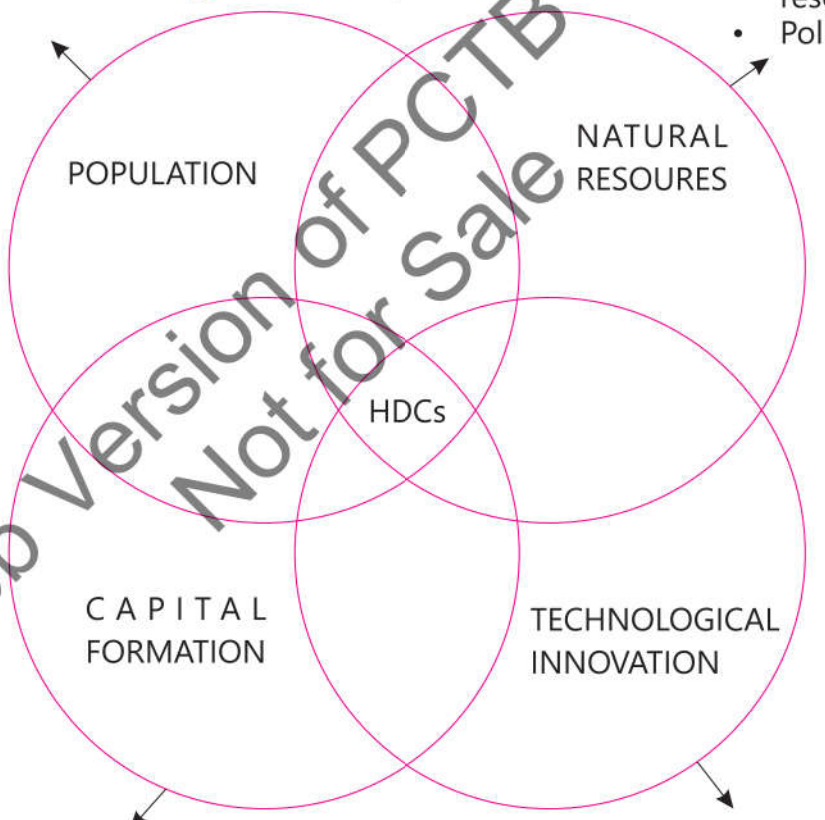
LDCs

- Rapid natural population growth
- Poor educational levels and skills
- Poor health standards

(LDCs)
Less Developed Countries
(HDCs)
High Developed Countries

LDCs

- Poor mineral and agricultural resources
- Cultural constraints on improved resource uses
- Political disturbance



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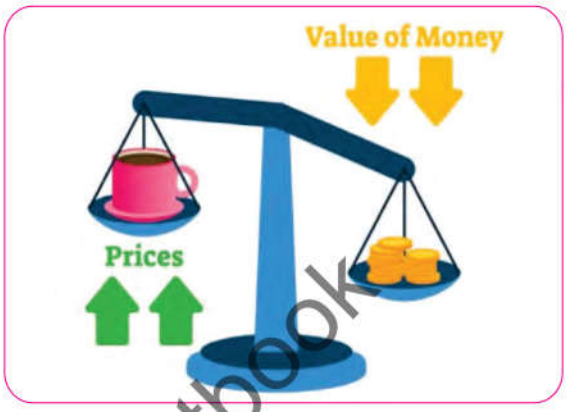
LDCs

- Poverty and low levels of savings
- Use of savings in unproductive things
- Nationalistic barriers to foreign capital investment

LDCs

- Traditions that discourage innovations
- Low borrowing rates from outside
- Low levels of local innovation

Role of Inflation and Unemployment in the Development



Inflation is a rise in prices, which can be translated as the decline of purchasing power over time. Inflation can be both beneficial and damaging to the economy. If inflation becomes too high, the economy can suffer, but if inflation is controlled and at reasonable levels, the economy may prosper. Inflation can sometimes cause unemployment when the uncertainty of inflation leads to low investment and low economic growth in the long term. Customer purchase fewer goods during high unemployment which sometimes reduces inflation. With controlled inflation, employment increases. Consumers have more money to buy goods and services, and the economy grows. In developing countries like Pakistan, inflation has highly negative impacts on development of the country.

When a person searches job/work but is unable to find it, this situation is called unemployment. Unemployment is considered to be a key measure of the economy. So, in common, unemployment has a negative impacts on development of the country.

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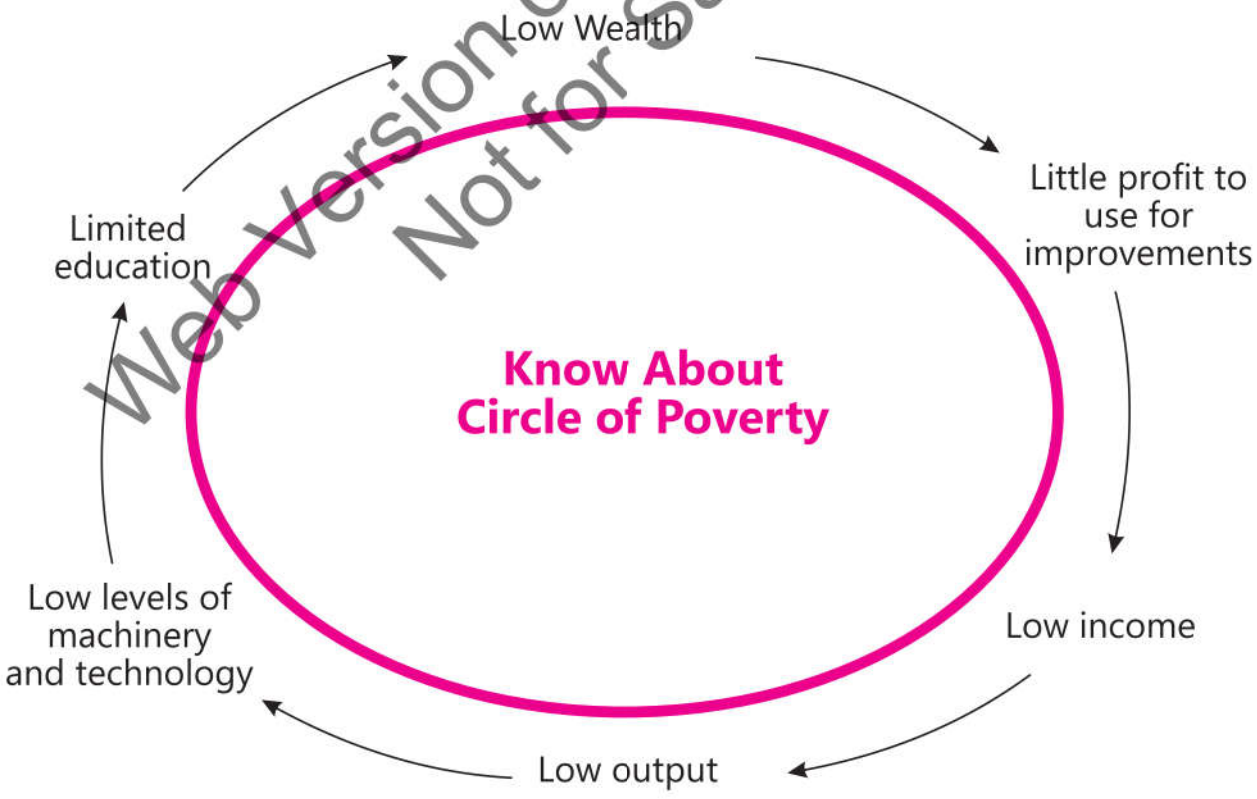

Impacts of Science in Technological Development

"Technology" has been defined as "the science or systematic knowledge of the industrial arts". It is as old as man himself and broadly embraces all the methods used by humans to achieve their objectives, particularly in the field of production. Modern technology is the result of systematic application of scientific laws as well as research findings of the technologists to the processes of production. The major roots of modern technology are the following:

(i) The re-organization of labour.
(ii) The use of machines in manufacturing process.
(iii) The exploitation of man-made material.
(iv) The application of new sources of energy.

Modern Technology

Underdevelopment may be regarded synonymous with technological backwardness. Much of our agriculture is carried on with primitive techniques used thousands of years ago. The new technology has already arrived. In agriculture, improved seeds, chemical fertilisers, plant-protection measures are increasingly being used. Even mechanization is getting popular. In large-scale, industry techniques are nearly as advanced as in any developed country. The transport system is increasingly being mechanized-railway, roads, shipping and air

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communications, all are reflecting modern techniques. There is a vast field of technical knowledge available to underdeveloped-countries like Pakistan. The most basic economic characteristic of the rich world is the widespread use of technology.

The fruits of the agricultural and industrial revolutions are widely applied and new techniques are quickly diffused and adopted.

Current Position of Pakistan at EDI and HDI Indicators

It is calculated through income, education liberty and on gender basis and more improvement in the indicators of life. In Human Development Index (HDI), Pakistan ranks 161 out of 192 countries during 2021-22 periods. HDI data and ranking can be different to some changes in data.

Do you know?

Adequate quantity is considered at least 2400 available calories per person daily. Adequate protein supply is attained if at least 60 grams of protein are available per person daily.

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INTERESTING READING

The recent accomplishments of science and technology (which is the practical application of science) are astounding. They include the release of energy from the nucleus of the atom "the biggest break-through since man mastered fire 60,000 years ago"; breaking the gravitational forces of the Earth and pushing out into space (man has landed on the Moon for the first time and his machine on the Mars); extension of the knowledge of our galaxy and reaching farther and farther to the boundaries of the universe, making radio instruments capable of picking signals of events which took place many millions of miles away, many millions of years before life existed on the Earth. In the medical field, the wonder drugs have saved from premature death during the last forty years more lives than have been lost in all the wars of history. The eye,heart and kidneys and other parts of the body are being transplanted from the dead into the living. Man is on the verge of finding the secrets of life, and of the process of aging which is now being considered as a disease capable of being cured. The computer is another recent wonder which helps in almost all fields of life. It can calculate in split seconds what would require a lifetime to reckon with pen and pencil and can store unbelievable amount of information which can be used when needed. These are only a few examples. The list would be endless.

Activity Corner!

Gather and interpret data related to inflation and unemployment rates in Pakistan. Investigate its possible causes.

Role of Health Care in the Development of the Country

There is a significant relation between the health of a population and the development of a country. A good health care system plays an indirect role in the development of a country in many ways. It improves productivity and increases the quality of life. It also prepares people for the future. Improved health conditions can promote development. Healthier children grow up to have heathier minds with higher earning capacities.

As we observe that life expectancy rate is high in developed countries, similarly, infant mortality rate is low in the developed world because people have access to better medical facilities. On the other side, People living in developing countries have low life expectancy and high infant mortality rates due to fewer healthcare facilities. They do not have even access to clean drinking water. Better health care system is a key indicator of a country's progress, a nation with a healthy population is more likely to experience constant growth. Good health care system is also essential for the stability of entire regions, as pandemics can have severe social and economic impacts. Good healthcare is important in reducing poverty and helping communities to be prosper. The COVID-19 pandemic highlighted how poor and inadequate healthcare system harms the economy, gender equality, nutrition, environment and education. So, a good healthcare system is key to development of a country.

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Health Care System

Role of Organization for Economic Co-operation and Development (OECD)

Introduction

The Organization for Economic Co-operation and Development is an Inter-Governmental Economic Organization with 38 member countries, founded in 1961 to stimulate economic progress and world trade.

Objectives

The Organization for Economic Co-operation and Development (OECD) produces independent analysis and statistics to promote policies to improve economic and social wellbeing across the globe.

The OECD publishes reports on the economy and analysis the impacts of policy issues and makes recommendations for economic improvement around the world. The OECD provides a platform to share experiences of Government and give solutions to their confront problems.

Key Points

- Economic Development means a change in national income over time.
- Per capita data are obtained by dividing total national income to the nation's population.
- The life expectancy measure would seem to be the ultimate indicator of development.
- The natural rate of unemployment is the level of unemployment consistent with sustainable economic growth.
- "Technology" has been defined as "the science or systematic knowledge of the industrial arts".
- The eye, heart and kidneys and other parts of the body are being transplanted from the dead into the living.
- Diseases like malaria, Dengue, Corona, hepatitis, tuberculosis, typhoid, dysentry, and others, still take a heavy toll of life.
- The Organisation for Economic Co-operation and Development (OECD) produces independent analysis and statistics to promote policies to improve economic and social wellbeing across the globe.

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Exercise

1. Tick (✓) the correct answer:

i. HDI ranking of Pakistan in 2021-22 was:

a) 144 b) 161
c) 151 d) 166

ii. One of the best Indicator of Economic well being is:

a) per capita GNP b) per capita Energy consumption
c) labour force d) life expectancy

iii. Member countries of Organization for Economic Co-operation and Development are:

a) 38 b) 37
c) 36 d) 40

iv. The OECD was founded in:

a) 1971 b) 1979
c) 1961 d) 1959

v. Due to inflation purchasing power of the people:

a) Increases b) Decreases
c) No change d) None of these

2. Write short answer to the following questions:

i. Define economic development.
ii. Enlist the development indicators.
iii. What are the main Human Development Indicators?
iv. Enlist major roots of modern technology.
v. What is the role of OECD?

3. Write detail answer to the following questions:

i. Discuss the economic indicators of development and their importance.
ii. Write the human indicators for the development of the country.
iii. What is the role of science in Technological Development?
iv. Discuss the role of inflation in the development of a country.
v. Explore the importance of Health Care in development.

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Learning Activities:

1. Initiate discussions that pose multiple questions about the various aspects of development and to what extent it serves humanity.
2. Apply knowledge about EDI and HDI to Pakistan's context.
3. Inquire about the inefficacy/need for improvement of health care system in Pakistan.

Critical Thinking Questions:

- How we can improve human development index (HDI) in Pakistan?
- Why do we care about health in Development?
- What we can do to stop unemployment and inflation in our country?

Project For Students:

- Make a chart of differences found in rich and poor countries of the world (Gap of have and have not).

Rich Countries	Poor Countries

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GLOSSARY

Biodiversity: Shorthand for biological diversity; the variety of the earth's life forms and the ecological roles they play.
Desertification: The process of desert expansion into neighbouring steppelands as a result of human degradation of fragile semiarid environments.
Greenhouse Effect: The widely used analogy describing the blanket-like effect of the atmosphere in the heating of the earth's surface.
Habitat: The environment a species normally occupies within its geographical range.
Hydrologic cycle: The complex system of exchange involving water in its various forms as it continually circulates among the atmosphere, lithosphere, hydrosphere, and biosphere.
Pollution (air): Air is said to be polluted when its composition departs significantly from its natural composition of such gases as nitrogen and oxygen.
Smog: the poor-quality surface-level air lying beneath a temperature inversion layer in the lower atmosphere; the word is derived from the contraction of "smoke" and "fog".
Bay: Recess in the shore or an inlet of a sea between two capes or headlands; not as large as a gulf but larger than a cove.
Circulation: General term describing a water current flow within a large area; usually a closed circular pattern such as the North Atlantic.
Current: Horizontal movement of water.
Environment: Sum total of all the external conditions that affect an organism, community, material, or energy.
Glacier: Moving mass of ice originating from the compacting of snow by pressure.
Island: Body of land surrounded by water; relatively smaller than a continent.
Ocean: The vast body of salt water occupying the depressions of the earth's surface.
Acid Rain: Rain and snow with a pH of less than 5.6.
Deforestation: conversion of forest land to other uses (cutting of trees).
Greenhouse Gas: any gas which absorbs infrared radiation in the atmosphere.
Ecosystem: community with interacting organisms of different species.
Plankton: Floating organic life chiefly microscopic found in depth of sea lakes oceans.
Urbanization: Growth of cities and towns.
Fossil Fuel: energy sources in the form of buried organic matter e.g, natural gas, petroleum, coal.
HDI: Human development Index is a process of enlarging human opportunities and improving their lives, which can be measured with various Indicators.

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