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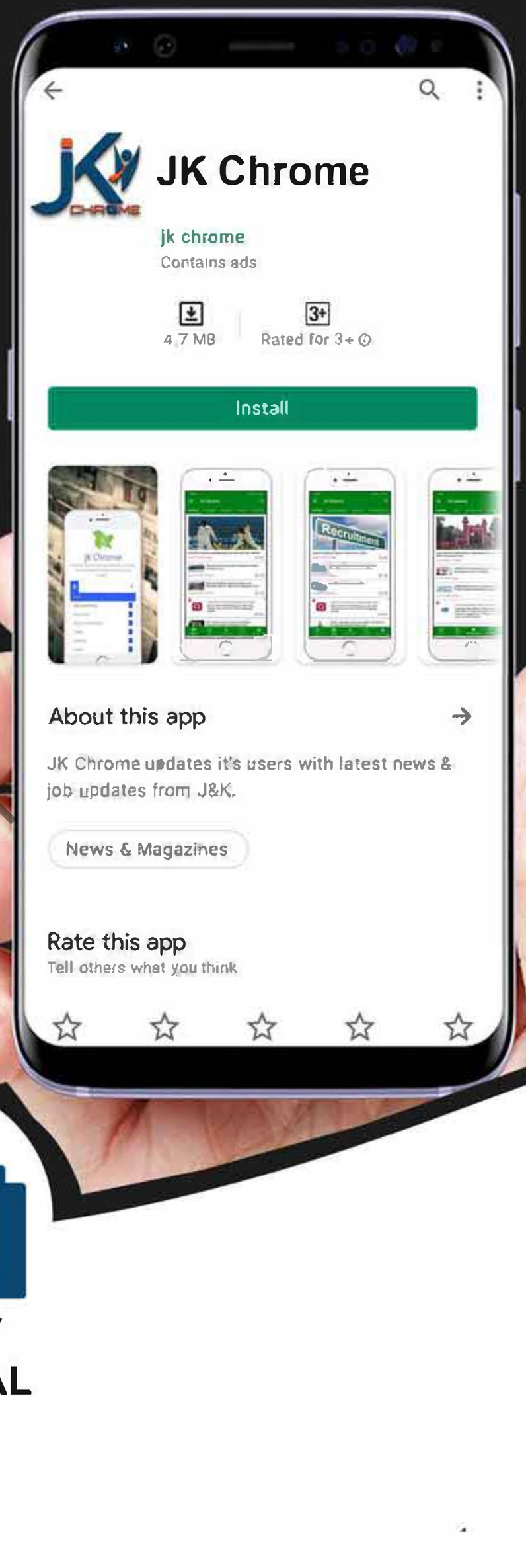

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Chapter 1

India Size and Location

The following topics from this chapter are being highlighted the most in the previous 3 year's examinations and thereby hold significant importance.

An important point is that only factual questions have been asked from this chapter (Very Short Answer Type).

For example, the latitudinal and longitudinal extension of India, neighbouring countries of India etc.

- Location of India
- Size of India
- India and the World
- Neighbours of India.

Location

India lies entirely in the Northern Hemisphere.

India's mainland extends between 8°4'N and 37°6'N latitudes, and 68°7'E and 97°25'E longitudes.

The Tropic of Cancer (23°30'N) divides India into two almost equal parts.

The northernmost point of India which is under Indian administration is near Indira Col, Siachen Glacier.

The southernmost point in India is Indira Point on Nicobar Island.

Size

Covering an area of 3.28 million square kilometres, India's total area is 2.4% of the total geographical area of the world.

India is the world's seventh largest country with a land boundary of about 15,200 km, with total length of the coastline being 7,516.6 km.
India's East-West extent appears to be smaller than the north-south extent.

India and The World

The Indian landmass is centrally located between West and East Asia.

India's protruding Deccan Peninsula helped India to establish close contacts with West Asia, Africa and Europe, South-East and East Asia.

India's contacts with the world via land routes are much more than Its maritime contacts.

India has contributed a lot to the world in forms of ideas, philosophies (Upanishads, Ramayana, Panchtantra) and in mathematics (Indian numerals and decimal system, algebra, trigonometry and calculus).

In exchange, India's architecture was influenced by Greek sculpture and architectural styles from West Asia.

India's Neighbours

India has an important position in South Asia and has 29 States and 7 Union Territories.

India shares its boundaries with Pakistan, Afghanistan, China, Nepal, Bangladesh, Myanmar and Bhutan.

The southern neighbours across the sea consist of the two island countries, namely Maldives and Sri Lanka.

India stands apart from the rest of Asia and is called a sub-continent.

Chapter 2

Physical Features of India

Since the previous 3 years' examinations, the factual questions (Very Short Answer Type) have been asking relevant to various physical divisions of India consisting of the following topics :

- Location
- The Himalayan Mountains
- The Northern Plains
- The Peninsular Plateau
- The Indian Desert
- The Coastal Plains
- The Islands.

Location

India has all major physical features of the Earth, i.e., mountains, plains, deserts, plateaus, and islands.

In India, the soil colour varies from place to place as it is formed from different types of rocks.

India has varied physical features whose formation can be explained on the basis of the 'Theory of Plate Tectonics'.

According to the theory of Plate Tectonics, the seven major and minor plates that form the Earth's crust keep moving, causing stress and thus leading to folding, faulting and volcanic activity.

The physical features of India can be grouped under the following physiographic divisions:

- The Himalayan Mountains or the Northern Mountains
- The Northern Plains or the Indo-Gangetic Plains
- The Peninsular Plateau
- The Great Indian Desert
- The Coastal Plains
- The Islands

The Himalayan Mountains

The Himalayas are young-fold mountains which are the loftiest and one of the most rugged mountain barriers of the world.

The Himalayas are 2400 km long, 400 km to 150 km wide from Kashmir to Arunachal Pradesh respectively.

The Himalayas have three parallel ranges in the longitudinal extent namely :

- Great or Inner Himalayas also called Himadri.
- Middle Himalayas or Himachal.
- Outer Himalayas or Shiwaliks.

The Himalayas can be divided into four sections :

- **Punjab Himalayas** – between Indus and Satluj.
- **Kumaon Himalayas** – between Satluj and Kali.
- **Nepal Himalayas –** between Kali and the Tista.
- **Assam Himalayas (Eastern Himalayas)** – Between Tista and the Dibang (Tsangpo).

The Northern Plains

The Northern Plains spread over an area of 7 lakh sq. km, 240 km long and 240 km to 320 km broad.

The rivers that flow to the plains from the mountains are involved in depositional work.

The difference in relief causes the Northern Plains to have four regions.

- **Bhabar** – Adjacent to the foothills of Shiwaliks, a narrow 8 to 16 km wide belt of pebbles and boulders.
- **Bangar** – Older alluvial plain which rises above the level of the flood plains.
- **Khadar** – Newer and younger alluvial of the flood plains deposited by the rivers flowing down the plain.
- **Tarai** – Lies adjacent to Bhabar region, composed of newer alluvium and is thickly forested.

The Peninsular Plateau

The Peninsular Plateau is the tableland formed due to the breaking and drifting of the Gondwanaland.

The plateau consists of two broad divisions, namely, the Central Highlands and the Deccan Plateau.

The eastward extensions of Peninsular Plateau are locally known as Bundelkhand and Baghelkhand. The Chhota Nagpur Plateau marks the further eastward extension drained by the Damodar river.

The Deccan Plateau, a triangular mass, lies to the south of the river Narmada.

The western and eastern edges of the Deccan Plateau are marked by the Western Ghats and the Eastern Ghats respectively.

The Western Ghats are higher than the Eastern Ghats.

The Malwa Plateau is spread across Rajasthan, Madhya Pradesh and Gujarat and slopes towards the
north.

A distinct feature of the peninsular plateau is the black soil area known as Deccan Trap.

The Indian Desert

The undulating sandy plain covered with sand dunes towards the western margins of the Aravalli Hills is the Indian Desert.

Crescent-shaped dunes called barchans cover large parts of the Indian Desert.

Luni is the only large river that flouts in this region.

The Coastal Plains

The narrow' coastal strips flank the Peninsular Plateau.

On the west, the coastal strips are divided into Konkan (Mumbai-Goa), Kannada Plain and the Malabar Coast from northern to the southern part.

On the east the coastal strip is divided into Northern Circar and the Coromandel Coast from northern to southern part.

The Islands

The Lakshadweep Islands group in the Arabian Sea is close to Kerala.

The Andaman and Nicobar Islands are the two island groups. Andaman Island consists of 204 small islands. India's only active volcano, Barren Island is situated here.

Chapter 3

Drainage

In the previous 3 years' examinations, significant importance has been given to the following topics from this chapter.

- Drainage Patterns
- Various River Basin System
- Pollution of Rivers.

Drainage' is a term signifying the river system of an area.

A drainage basin or river basin is an area w'hich is drained by a single river system.

An upland that separates two drainage systems that are next to each other is called a water divide.

On the basis of origin, there are two river systems of India — The Himalayan rivers and the Peninsular rivers.

Himalayan rivers are rainfed and snowfed, so they have w?ater in them throughout the year, i.e., they are perennial and thus navigable.

Himalayan rivers create meanders, oxbow lakes and other depositional features on their course.

Peninsular rivers are seasonal; mostly depending on rainfall and thus non-navigable.

Most of the rivers of peninsular India originate in the Western Ghats and flow' towards the Bay of Bengal.

The Himalayan Rivers

A river along with its tributaries may be called a river system.

The major Himalayan rivers are the Indus, the Ganga, and the Brahmaputra.

The Indus River System

Rising near Lake Mansarovar in Tibet, the Indus enters India in the Ladakh district of Jammu and Kashmir.

Rivers Satluj, Beas, Ravi, Chenab and Jhelum join Indus near Mithankot, Pakistan and flow southwards to fall into the Arabian Sea, east of Karachi.

With a total length of 2,900 km, the Indus is one of the longest rivers of the world.

The Ganga River System

The headwaters of the Ganga are called 'Bhagirathi'.

Bhagirathi is fed by the Gangotri Glacier and joined by the Alaknanda at Devprayag.

Ganga meets the tributaries from the Himalayas such as Ghaghara, Gandak, Kosi and the Yamuna.

A major river Yamuna, arising from Yamunotri Glader in the Himalayas, joins Ganga at Allahabad.

Other tributaries — Chambal, Betwa and Son — come from Peninsular uplands to join Ganga.

Ganga is joined by the Brahmaputra and flows through Bangladesh to reach the Bay of Bengal.

The delta formed when the Ganga and the Brahmaputra flow into the Bay of Bengal is known as the Sunderban Delta.

The length of the Ganga is over 2,500 km and it develops large meanders.

The Brahmaputra River System

Originating in Tibet, very close to the sources of Indus and Satluj, Brahmaputra enters India in Arunachal Pradesh and flows to Assam, joined by many tributaries.

The tributaries that join the Brahmaputra are Dibang, Lohit, and Kenula.

The Brahmaputra has a braided channel in its entire length in Assam to form many riverine islands.

Unlike other north Indian rivers, the Brahmaputra is marked by huge deposits of silt on its bed, causing the riverbed to rise.

The Peninsular Rivers

The major rivers of the peninsula—Mahanadi, Godavari, Krishna, and Kaveri—flow eastwards to drain into the Bay of Bengal.

The Thai and Narmada are the only rivers which flow west to make estuaries and drain into the Arabian Sea.

The drainage basins of the peninsular rivers are comparatively small in size.

The Godavari Basin

The Godavari begins in Nasik district of Maharashtra. It is the largest peninsular river.

Its large basin covers most parts of Maharashtra, Madhya Pradesh, Orissa and Andhra Pradesh.

The tributaries which join the Godavari include Purna, Wardha, Pranhita, Manjra, Wainganga and Penganga.

Because of its length and the area, it covers, the Godavari is also known as the Dakshin Ganga.

The Godavari drains into the Bay of Bengal.

The Mahanadi Basin

The Mahanadi, a 860 km long river, rises in Chhattisgarh to flow through Orissa to reach the Bay of Bengal.

Principal tributaries of Mahanadi river are Sheonath, Jonk, Hasdeo, Mand, lb, Ong and Tel.

Mahanadi river basin is shared by Maharashtra, Orissa, Jharkhand and Chhattisgarh.

Is is one of the major east flowing peninsular rivers draining into Bay of Bengal.

The Krishna Basin

The 1,400 km long Krishna river rises from a spring in the Mahadev range near Mahabaleshwar and falls into the Bay of Bengal.

The tributaries of Krishna include Bhima, Musi, Ghatprabha, Koyana and Tungabhadra. The Krishna basin is shared by Maharashtra, Karnataka and Andhra Pradesh.

The Narmada Basin

Rising in the Amarkantak Plateau of Maikala Range, Narmada flows to create a gorge in marble rocks of Madhya Pradesh.

Narmada flows towards the west in a rift valley formed due to faulting. •

Narmada river has 41 tributaries. The important ones are: Barna, Ganjal, Chhota Tawa, Hiran, Janatara, Kolar, Orsang, Sher.

The Tapi Basin

Originating in Betul, Madhya Pradesh, the Tapi flows through a basin that covers Madhya Pradesh, Gujarat and Maharashtra.

The main west flowing rivers are Sabarmati, Mahi, Bharatpuzha and Periyar.

The entire Tapi basin can be divided into three sub-basins: upper, middle and lower and into two well- defined physical regions, viz, the hilly regions and the plains or Tapi Basin.

The Kaveri Basin

Originating in the Brahmagiri range of the Western Ghats, the Kaveri reaches the Bay of Bengal at Kaveripatnam, sharing its basin with Karnataka, Tamil Nadu, Kerala and Puducherry or Pondicherry.

The main soil types found in the basin are red and yellow soils.

Lakes

Most lakes are permanent while others contain water only during the rainy season.

Some lakes are the result of the glacial action and ice sheets and some may have been formed by wind, river action and human activities.

A river meandering across a floodplain forms cut-offs that later develop into oxbow lakes.

Glacial lakes are formed when glaciers dig out a basin which is later filled with snowmelt.

Some lakes like Wular Lake in Jammu and Kashmir result from tectonic activity.

Apart from natural lakes, the damming of the rivers for the generation of hydel power has also led to the formation of lakes.

Lakes help to regulate river water flow, prevent flooding, aid to develop hydel power, moderate climate, maintain aquatic ecosystem, enhance natural beauty, develop tourism and provide recreation.

Role of Rivers in the Economy

Rivers are a natural source of water. It forms the main backbone for agriculture.

Settlements on the river banks have developed into cities.

Rivers are used for irrigation, navigation, hydropower generation, all vital for India, and agricultural economy.

River Pollution

Quality of river water is affected by the growing domestic, municipal, iftdustrial and agricultural demand.

A heavy load of untreated sewage and industrial effluents are emptied into the river affecting the river's self-cleansing property.

Concern over rising pollution in our rivers led to the launching of various action plans to clean the rivers like Narmada Bachao Movement.

Chapter 4

Climate

The term climate is the sum total of.the weather conditions (including variations) over a large area for a long period of time (more than thirty years).
The term weather refers to the state of the atmosphere at a place and time with reference to the following elements

- Temperature Humidity
- Air pressure
- Cloudiness or sunshine
- Precipitation (Rainfall or snowfall)
- Wind

The weather conditions fluctuate very often within a day. Based on the generalised fhonthly atmospheric conditions, the year is divided into seasons such as winter, summer and rainy seasons. The world is divided into a number of climatic regions. In Asia, India and other South and South-Eastern countries have monsoon type of climate.

The word monsoon is derived from the Arabic word 'mausim' which literally means season. 'Monsoon' refers to the seasonal reversal in the wind direction during a year.

Regional Climatic Variation In India
Although there is an overall unity in the general climatic pattern in India, there are some perceptible regional variations.

Temperature
The temperature in the winter in North-Western mountainous regions can go down to – 45° C (at Drass in Jammu and Kashmir), while it is 22°C in Thiruvananthapuram in Kerala. Similarly, it can go up to 50°C in summer in some parts of Western Rajasthan and 20°C in Shillong.

In many areas, there is a wide variation between day and night temperatures. In the Thar Desert, the day temperature may rise up to 50°C and drop down to near 15°C the same night. On the other hand, there is hardly any difference in day and night temperatures in the Andaman and Nicobar islands or in Kerala.

Precipitation
There is a wide variation observed in its amount and seasonal distribution. Precipitation in the form of snowfall occurs only in upper parts of Himalayas, the rest of the country receives rainfall.

A typical example, the annual precipitation varies from over 400 cm in Meghalaya to less than 10 cm in Ladakh and Western Rajasthan. Similarly, most parts of the country receive

rainfall from June to September, but the Tamil Nadu coast gets most of its rain during October and November.

Coastal regions experience different weather conditions from the interior regions. For example, temperature and seasonal contrast are relatively mild. The rainfall also decreases from East to West. Such differences help to create a variety in lives of people— the food they eat, the clothes they wear, the kind of houses they used for living and so on.

Climatic Controls

Permanent factors which govern the general nature of the climate of any location on the earth are called factors of Climatic Controls.

The factors of climatic controls are m Latitude The angular distance of a location from the equator in North-South direction is called latitude. Due to the curvature of the earth, latitude changes the amount of solar energy received. As a result, air temperature decreases from the equator towards the poles.

Altitude It refers to the height above mean sea level. With increase of height from the earth surface, the temperature decreases and air becomes less dense. Therefore, hilly regions are cooler in summer.

Pressure and Wind System It depends on the latitude and altitude of a place. Thus, it influences the temperature and rainfall pattern of the area.

Continentality or Distance from the Sea The sea exerts a moderating influence on the climate. As the distance from the sea increases, the weather conditions become more extreme (high temperature and rainfall variation between seasons). .

Ocean Currents Along with onshore winds, the ocean currents (warm or cold) affect the climate of coastal areas. For example, cold onshore currents bring coolness in coastal areas.

Relief Features High mountains stop cold or hot winds from reaching a location..It can also cause rain or snow if the place is on the windward side of the mountains. The leeward side of the mountains are.

Factors Affecting India's Climatic

Latitude

The Tropic of Cancer (23°3 CV N) divides the country into the tropical zone (South of this line) and the sub-tropical zone (North of this line). The line runs from the.Rann of Kuchchh (West) to Mizoram (East). All the remaining area, North of Tropic, lies in sub-tropics. So, India's climate has characteristics of tropical as well as sub-tropical climates.

Altitude

Mountains- in the North of India have an average elevation of about 6000 m, whereas on the coastal areas as well as islands, maximum elevation is about 30 m.

The Indian sub-continent experiences milder winters as compared to Central Asia because of the Himalayas which prevent the cold winds from entering the sub-continent.

Pressure and Winds

The following atmospheric conditions govern the climate and associated weather conditions in India

- Pressure and surface winds
- Upper air circulation
- Western cyclonic disturbances and tropical cyclones

Pressure and Surface Winds

India lies in the region of North-Easterly surface winds. These winds originate during winter from the sub-tropical high-pressure belt of the Northern hemisphere.

These winds blow South, get deflected to the right due to the Coriolis force and move towards the equatorial-low pressure region. These winds originate and blow over land and hence, carry very little moisture. Therefore, they bring no rain or very little rain. The unique feature of Indian pressure and wind conditions is its complete reversal. During winter, high-pressure areas develop over the areas North of Himalayas. This causes cold dry winds blow from the area towards low-pressure area over the oceans to the South.

In summer, due to high temperature, low-pressure area develops over interior Asia and over North-Western India. Air from high-pressure areas blow towards this region resulting in complete reversal of wind direction.

As these winds from high pressure area of Southern Indian ocean crosses the equator and turns right towards low pressure areas of Indian sub-continent. These winds gather large moisture while moving over the warm ocean and bring widespread rainfall over the mainland of India. These winds are known as the South-West Monsoon winds.

Upper Air Circulation and Western Cyclonic Disturbances

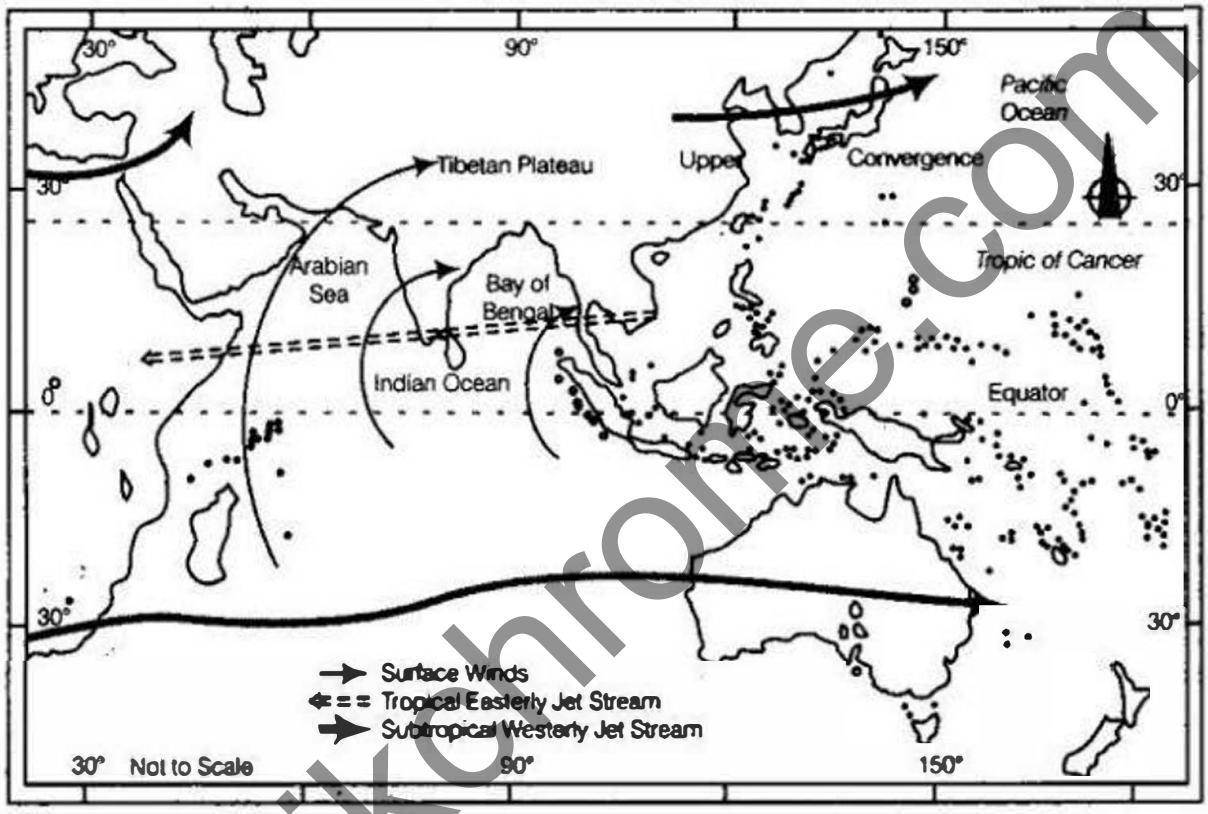
The upper air circulation of the region (Indian subcontinent) is dominated by a westerly flow which is governed by Jet stream. Due to their location over 27°-30° N latitude, these jet streams are known as sub-tropical westerly jet streams. They blow South of the Himalayas, throughout the year except in summer.

Western Cyclonic Disturbances and Tropical Cyclones

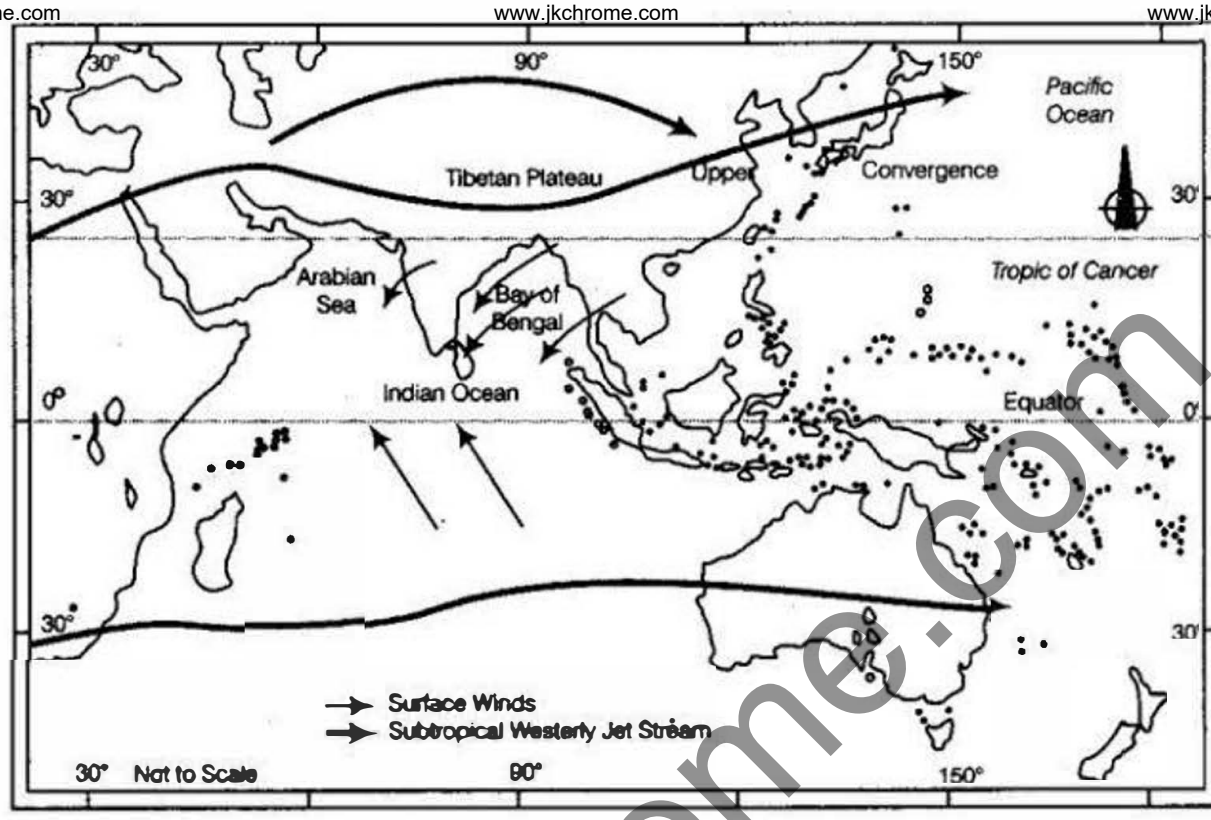
The Western cyclonic disturbances are weather phenomena of the winter months brought in by the westerly flow from the Mediterranean region. They usually influence the weather of the North and North-Western regions of India. Tropical cyclones occur during the monsoon

as well as in October-November and are part of the easterly flow. These disturbances affect th e coastal regions of the country.

The westerly flow brings the Western cyclonic disturbances in the North and North-Western India. In summer, the sub-tropical westerly jet stream moves North of the Himalayas due to apparent shifting of the sun. An easterly jet stream, called sub-tropical easterly jet stream, blows over peninsular India approximately over 14° N during the summer months.



Atmospheric conditions over the Indian Sub-continent in the month of June



Atmospheric conditions over the Indian Sub-continent in the month of January

Coriolis force An apparent force that as a result of the Earth's rotation, deflects moving objects like air currents to the right in the Northern Hemisphere and to the left in the Southern hemisphere. This is known as Ferrel's law. This law states that a wind in any direction tends to deflect towards right (West to East) in the Northern Hemisphere and to the left in the Southern Hemisphere with a force that is directly proportional to the mass of the wind in question, its velocity, the sine of the latitude and the angular velocity of the Earth's rotation.

Jet stream These are a narrow belt of high altitude (above 12,000 m) westerly winds'in the troposphere. Their speed varies from about 110 km/h in summer to about 184 km/h in winter. A number of separate jet streams have been identified. The most constant are the mid-latitude and the subtropical jet stream.

The Indian Monsoon

Monsoon winds strongly influence climate of India. The monsoons are experienced in the tropical area roughly between 20° N and 20° S.

Mechanism of Monsoon

The following facts are important to understand the mechanism of the monsoons

The differential heating and cooling of land and water creates low pressure on the landmass of India while the seas around experience comparatively high pressure-

The Inter-Tropical Convergence Zone (ITCZ) in summer season shifts its position over the Ganga plain. This is the equatorial trough normally positioned about 5°N of the equator. It is also known as the 'monsoon trough' during the monsoon season.

The presence of the high-pressure area, East of Madagascar (approximately 20°S over the Indian Ocean). The intensity and position of this high-pressure area affect the Indian monsoon.

The Tibetan plateau gets intensely heated during summer, which results in strong vertical air currents and the formation of low pressure over the plateau at about 9 km above sea level.

The movement of the westerly jet stream to the North of the Himalayas and the presence of the tropical Easterly jet stream over the Indian peninsula during summer.

Apart from the given facts, it has been noticed that changes in the pressure conditions over the Southern oceans also affect the monsoons. Normally, when the tropical Eastern South Pacific Ocean experiences high pressure, the tropical Eastern Indian Ocean experiences low pressure.

But in past a few years, there is a reversal in the pressure conditions and the Eastern Pacific has lower pressure in comparison to the Eastern Indian Ocean. This periodic change in pressure conditions is known as the Southern Oscillation (SO).

EL Nino Southern Oscillations (ENSO)

The difference in pressure over Tahiti (Pacific Ocean, 18°S/149°W) and Darwin in Northern Australia (Indian Ocean, 12°30'S/131°E) is computed to predict the intensity of the monsoons.

If the pressure differences were negative, it would mean below average and late monsoons.

The EL Nino phenomenon is a feature connected with the Southern Oscillation. In this, a warm ocean current flows past the Peruvian Coast, in place of the cold Peruvian current. It occurs at the interval of 2 to 5 years.

The changes in pressure conditions are connected to the EL Nino. Hence, the phenomenon is referred to as ENSO (EL Nino Southern Oscillations).

The Onset and Withdrawal of the Monsoon

The trade winds are steady but the monsoon winds are pulsating in nature. They are affected by different atmospheric conditions encountered by it, on its way over the warm tropical area. Starting from early June in the Southern part of the Indian peninsula, the monsoon lasts between 100 and 120 days, withdrawing by mid-September.

Rainfall increases suddenly and continues for several days at the time of arrival of monsoon. This phenomenon is called as Burst of monsoon. It is different from pre-monsoon showers. Afterwards, it alternates with wet and dry spells.

Onset of Monsoon

Monsoon generally reaches the Southern tip of the peninsula during the first week of June. After striking the Southern tip, it branches into two parts- the Arabian Sea branch and the Bay of Bengal branch; both branches move rapidly.

The Arabian Sea branch advances North along the Western Ghats, reaching Mumbai by about 10th of June and soon covers the Saurashtra-Kuchchh and central most part of the Deccan Plateau also.

The Bay of Bengal branch reaches Assam in the first week of June and gets deflected towards the West by the mountain ranges, thus giving rainfall to the Ganga plains.

Both the branches again merge over the North-Western part of the Ganga plains. Delhi receives rainfall from Bay of Bengal branch by the end of June (tentative date is 29th June) and by the first-week of July, monsoon covers Western Uttar Pradesh, Punjab, Haryana and Eastern Rajasthan.

Withdrawal of Monsoon

Withdrawal or the retreat of the monsoon is a more gradual process. The process begins by early September in North-Western states. By mid-October, it withdraws completely from the Northern half of the peninsula.

The withdrawal from the Southern half of the peninsula is fairly rapid. By early December, the » monsoon has withdrawn from the rest of the country.

Onset and Withdrawal of Monsoon in the Indian Islands

The islands receive the very first monsoon showers from the last week of April to the first week of May. The withdrawal takes place progressively from North to South (in reverse direction) from the first week of December to the first week of January. By this time, the rest of the country is already under the influence of the winter monsoon.

Important Features of Monsoon

The important features of monsoon are as follows

- The monsoon is also known for its uncertainties.
- There is an alteration of dry and wet spells which vary in intensity, frequency and duration.
- While it causes heavy floods in one part, it may be responsible for drought in other parts.
- Its irregular arrival and retreat (sometimes due to the effect of EL Nino), causing disruption .of farming schedules and causing droughts in certain areas of the country.

The Seasons

The distinct, seasonal pattern is an important characteristic of monsoon type of climate. The weather conditions in India greatly change from one season to another. These changes are particularly noticeable in the interior parts of the country. The coastal areas do not experience much variation in temperature though there is variation in rainfall pattern. There are basically four seasons identified in India. These are

1. The Cold Weather Season (Winter)

The cold weather season begins from mid-November and stays till February in Northern parts of India with December and January as the coldest months. The temperature decreases from South to North.

For instance, the average temperature of Chennai, on the Eastern coast, is between 24°—25°C while in Northern plains, it ranges between 10°—15°C. During this season, days are warm and nights are cold. Frost occurs in the Northern plains and snow falls in the high mountainous regions of Himalayas.

As the North-East trade winds blow during this period, most of the country remains dry as they blow from land towards sea. The only rain occurs in Tamil Nadu and Southern Andhra Pradesh due to these winds picking up moisture from the Bay of Bengal.

Features of Cold Weather Season

The characteristic features of cold weather season are

A feeble (weak) high pressure region develops in the Northern part of the country. Influenced by the relief, the light winds moving outwards from this area blow through the Ganga valley from the West and the North-West.

Clear sky, low temperature and humidity, and feeble, variable winds are the characteristics of the weather during the period.

There is an inflow of cyclonic disturbances from the West and the North-West, which have originated over the Mediterranean Sea and Western Asia. They cause winter rains over the plains and snowfall in the mountains. This winter rainfall though in small amount is locally known as Mahawat. It is useful for cultivation of the Rabi crops.

The peninsular region has moderating effect from sea and hence, it doesn't have well defined cold seasons. Also there is hardly any noticeable change in temperature pattern.

2. The Hot Weather Season(Summer)

The hot weather season starts with the apparent movement of the sun towards the North. It leads to the Northward movement of global heat belt. The hot weather season starts in March and lasts upto the end of May.

Features of Hot Weather Season

The characteristic features of hot weather season are

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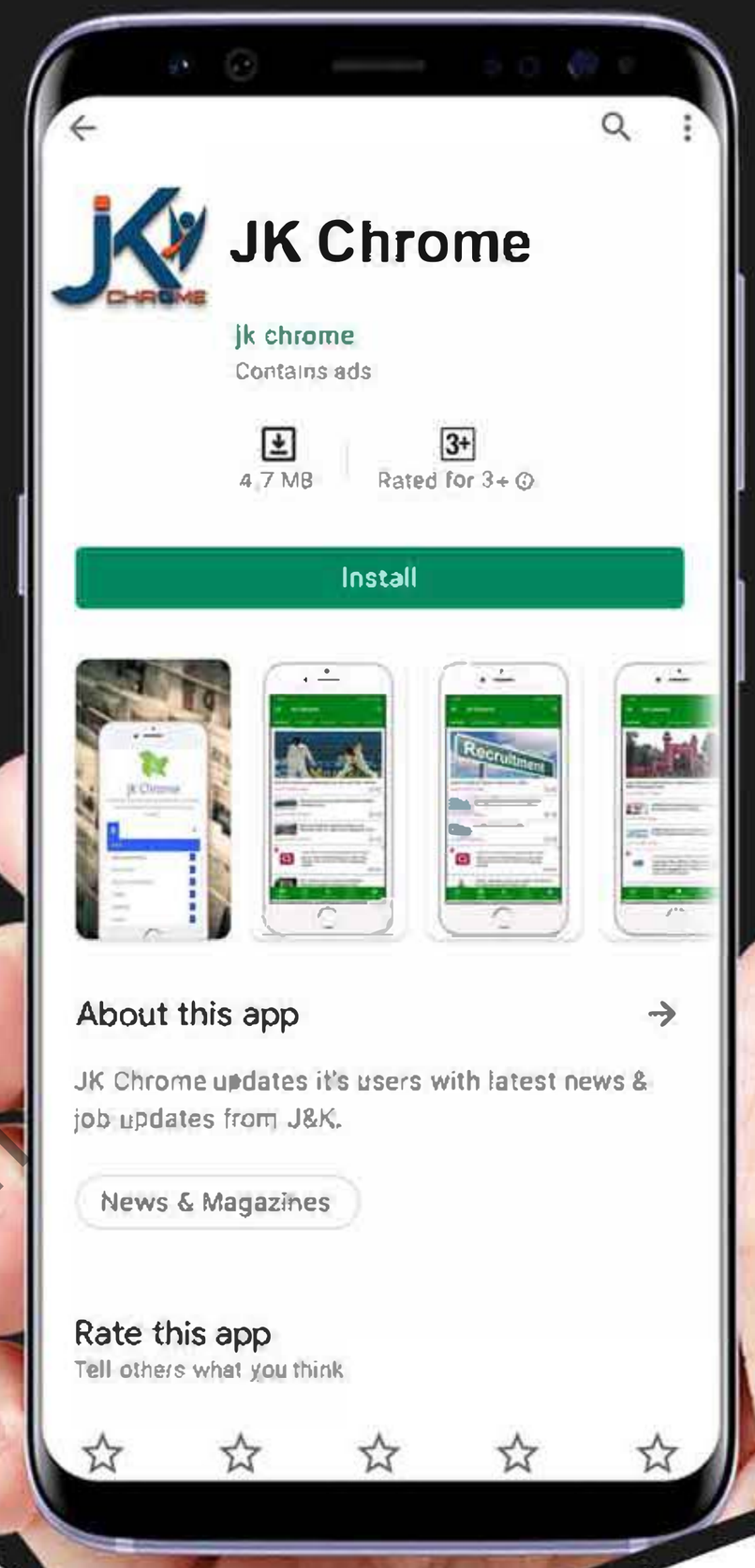

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The temperature of the Northern part of India goes up and the atmospheric pressure comes down.

The summer months experience rising temperature and falling air pressure. Towards the end of May, an elongated low-pressure area develops in the region extending from Thar Desert in North-West to Patna and Chotanagpur plateau in the East and South-East. This results into beginning of air circulation around this trough.

A hot gusty and dry wind, locally known as Loo, blows . during this season over the North and North-Western India and can cause even death if persons are exposed to it for a long time.

Dust storms are very common in North India in the month of May. They bring temporary relief from the heat by lowering the temperature and may also cause light rain and cold breeze.

Localised thunderstorms also occur during summer, which may have high speed winds and even precipitate hail. Such thunderstorms are called Kaal Baisakhi in West Bengal. Near the end of summer, there may be pre-monsoon showers. These are called Mango Showers in Kerala and Karnataka, as they help in the early ripening of the mango fruit.

Temperature Variation During Hot Weather

The influence of the shifting of heat belt can be seen from temperature recordings taken during March to May at different latitudes. In March, the highest temperature is about 38°C, recorded in Deccan Plateau. Temperature in Gujarat and Madhya Pradesh is around 42°C in the month of April. In May, North-Western parts of the country experience temperature around 45°. Due to moderating influence of the oceans, temperature remains lower in peninsular India.

3. Advancing Monsoon (The Rainy Season)

The low-pressure area over the Northern plains intensifies by mid-June and attracts the trade winds. These trade winds originate over the warm tropical ocean in the Southern hemisphere. After crossing equator, these blow in the South-West direction entering peninsula as South-West monsoon. They cover the entire subcontinent except extreme North-West in just over one month.

Maximum rainfall due to these winds occurs in North-Eastern India (mainly Meghalaya and Assam) and the windward side of the Western Ghats (Thiruvananthapuram to Mumbai) as these winds bring abundant moisture to the sub-continent at a velocity of 30 kmph.

Rainfall in the Western Ghats and Deccan Plateau

The monsoon winds cover the country in about a month. A total change in weather is brought up in India by the inflow of the South-West monsoon in India. The windward side of the Western Ghats receives very heavy rainfall, more than 250 cm in the early season. Inspite lying in the rain shadow area, the Deccan Plateau and parts of Madhya Pradesh also receive some amount of rainfall.

Areas of Maximum and Least Rainfall

The maximum rainfall of this season is received by the North-Eastern part of the country. The highest average rainfall in the world falls at Mawsynram in the Southern ranges of the Khasi hills in Meghalaya.

In the Northern plains precipitation decreases from East to West, with Western parts of Rajasthan and Northern parts of Gujarat getting the least rainfall.

Features of Advancing Monsoon

Features of advancing monsoon are as follows

Wet and Dry Spells Monsoon in India does not bring continuous rainfall. It has wet and dry spells i.e. 'breaks' in rainfall. These breaks in monsoon are related to the movement of monsoon trough. The axis of the monsoon trough in the Northern plains keeps moving North to South and back, causing periodic breaks in rainfall. Due to this, it has wet and dry spells. The monsoon rains take place only for a few days at a time. They are interspersed as rainless intervals.

Monsoon Trough The trough and its axis keep on moving Northward or Southward which determines the spatial distribution of rainfall. When the axis of the trough lies over the plains, the region gets good rainfall. With the Northward movement of axis, the Himalayan region gets widespread rain which is the catchment area of various rivers. This causes devastating floods in the plains causing heavy damage to life and property.

Tropical Depression Another phenomenon, which determines amount and Suration of the monsoon, is the frequency and intensity of tropical depression which form at the head of the Bay of Bengal and cross over to mainland. These depressions follow the axis of the 'monsoon trough of low pressure'.

4. Retreating/Post Monsoon Season (The Transition Season)

The sun starts shifting towards the South during October-November. During this time, the low pressure trough over the Northern plains weakens and is replaced gradually by a high-pressure system. This is followed by the South-West monsoon winds.

By the beginning of October, the monsoon withdraws from the Northern plains. The months of October-November form a transition period from hot rainy to dry winter conditions.

Features of Retreating Monsoon

The characteristic features of retreating monsoon are

The period is marked by clear skies and rise in temperature.

The day temperatures are high but nights are cool and pleasant.

Due to the temperature still remaining high and humidity not reducing, the heat is oppressive. This phenomenon is also called October heat.

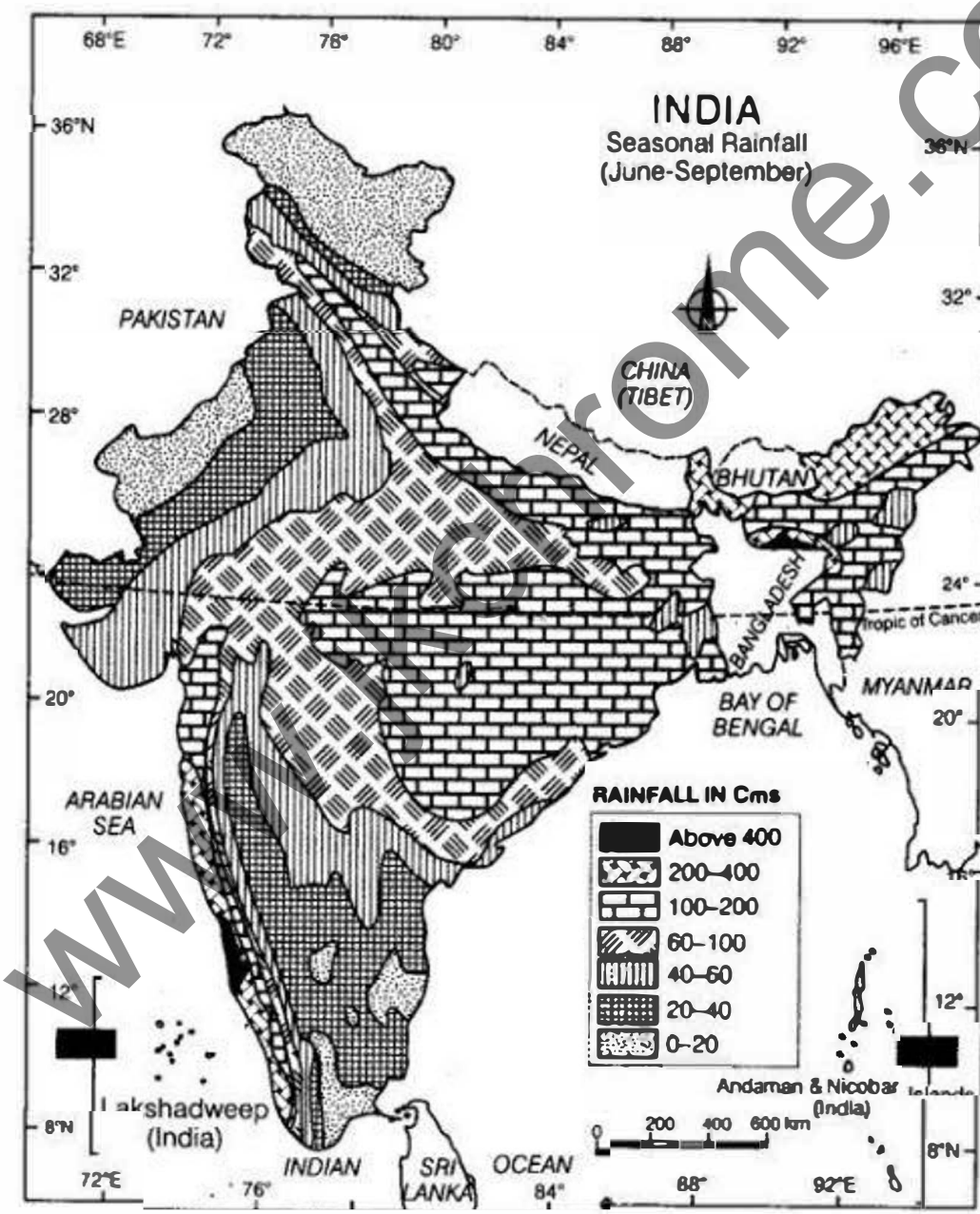
Cyclonic Depression and Tropical Cyclone

By early November, cyclonic depressions originate over the Andaman Sea. It causes tropical

cyclones on the coastline from Bangladesh to Tamil Nadu as low-pressure conditions get transferred to the Bay of Bengal.

These cyclones generally cross the Eastern coast of India causing heavy and widespread rain. Often they cause a lot of destruction. Sometimes, these cyclones arrive at the coasts of Odisha, West Bengal and Bangladesh.

These cyclones frequently strike the populated deltas of the Godavari, Krishna and Kaveri. The Coromandel coast gets its monsoon rainfall mostly during October and November from the cyclones and due to the retreating monsoon picking up moisture over the Bay of Bengal.



Seasonal Rainfall (June-September)

Distribution Of Rainfall

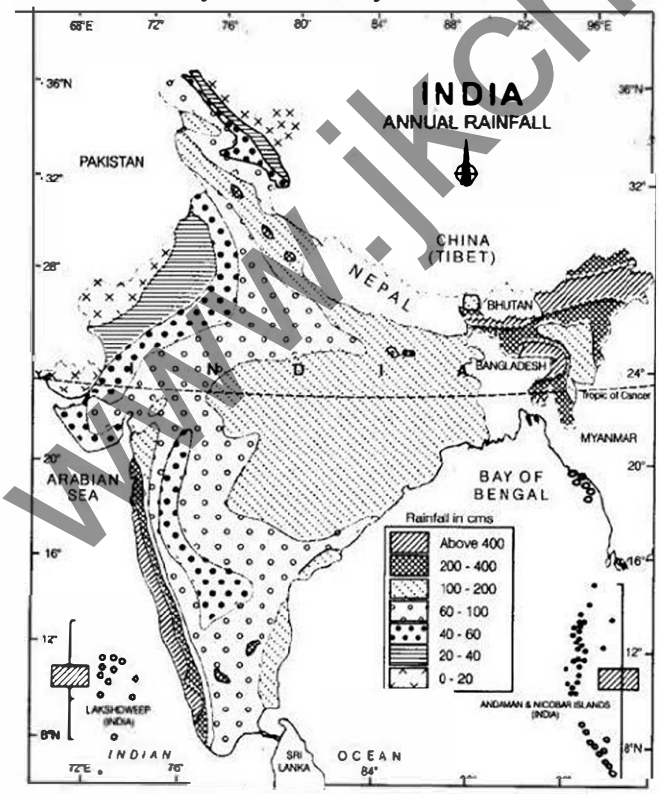
Annually, parts of Western coast and North-Eastern India receive over about 400 cm of rainfall. However, it is less than 60 cm in Western Rajasthan and adjoining parts of Gujarat, Haryana and Punjab. Rainfall is equally low in the interior of the Deccan Plateau and East of the Sahyadris. A third area of low precipitation is around Leh in Jammu and Kashmir.

The rest of the country receives moderate rainfall. Snowfall, is restricted to the Himalayan region. Owing to the nature of monsoons, the annual rainfall is highly variable from year to year. Variability is high in the regions of low rainfall such as parts of Rajasthan, Gujarat and the leeward side of the Western Ghats. Due to this, the areas of high rainfall are liable to be affected by floods whereas, areas of low rainfall are drought-prone.

Monsoon as a Unifying Bond

Northern India has comparatively higher temperatures than other areas of the world at a similar latitude due to the Himalayas protecting it from the cold Central Asian winds. The peninsular plateau has moderate temperatures due to the influence of the sea on three sides. The monsoon provides a great variation despite such moderating influences. However, the monsoon unites the land like no other force, because it provides a rhythmic cycle of seasons. The vegetation, animal life and agricultural activities are all revolving around the effects of the monsoon.

The life of the people, their celebration of festivals and other activities all are geared to the monsoon as India is still primarily an agricultural nation. The monsoon provides the water to set agricultural activities in motion and hence, the arrival of the monsoon is awaited eagerly. The river valleys which carry this water also unite as single river valley unit.



Annual Rainfall

Summary

Climate is the sum total of the weather conditions and variations over a large area for a long period of time, generally more than 30 years.

Weather is the state of the atmosphere over an area at any point of time.

Various elements of weather and climate are temperature, atmospheric pressure, wind, humidity and precipitation.

India along with South and South-East Asia has monsoon type of climate.

The climate of any place is controlled by latitude, altitude, pressure and wind system, distance from the sea, ocean currents and relief features.

High mountain by blocking the rain-bearing winds helps in causing rainfall in windward side of mountain.

The atmospheric conditions which govern the climate and weather condition of India are- pressure and surface winds, upper air circulation, western cyclonic disturbances and tropical cyclone.

Coriolis force which is generated by the rotation of the earth is responsible for deflecting winds towards the right in Northern hemisphere and towards the left in Southern hemisphere.

South-West monsoon winds are South-East trade winds of Southern hemisphere which after crossing equator, become South-Western trade winds (due to rightward deflection by Coriolis force). As they blow over warm ocean, they cause rainfall in Indian sub-continent.

Jet streams are fast blowing winds moving in the upper atmosphere. They are located at about 27°-30° North latitude.

Shallow cyclonic depressions originating over the Mediterranean sea are known as Western disturbances. They cause winter rainfall in-North Western parts of India.

Monsoon is derived from Arabic word 'Mausim'. It refers to the reasonal reversal in wind direction throughout the year.

The Inter Tropical Convergence Zone (ITCZ) is a broad trough of low pressure in equatorial latitude. In ITCZ, there is convergence of North-east and South-East trade wind.

Southern Oscillation (SO) is the reversal of pressure conditions and vice-versa in Southern Pacific ocean and Eastern Indian ocean.

ENSO is the combination of EL Nino and Southern Oscillation. The changes in pressure conditions are connected to EL Nino, hence, the phenomenon is referred to as ENSO.

Monsoons are pubating in nature and are affected by different atmospheric conditions.

The Arabian sea branch of monsoon causes rainfall in Western Ghat, Mumbai, Gujarat and central India.

The Bay of Bengal branch of monsoon causes rainfall in North-East India and Ganga plain.

The sudden and continuous rain associated with violent thunder and lightning is called Burst of monsoon. It occurs around the time of arrival of monsoon.

Arabian sea branch and Bay of Bengal branch are the two branches of South-West monsoon in India.

EL Nino is a warm ocean current that flows past the Peruvian coast in place of cold Peruvian current every 2 to 5 years.

Cold weather, hot weather, advancing monsoon and retreating monsoon are four-main seasons in India.

The cold weather season is associated with clear sky, low temperature, low humidity and feeble, variable wind.

Due to the moderating influence of sea, the peninsular region does not have a well defined cold season.

Loo is hot and dry winds blowing during the day over the North and North-Western India in the summer season.

Kaal Baisakhi is a pre-monsoon shower in West Bengal. This localised thunderstorm of the summer season is associated with violent winds, torrential downpours and is often accompanied by hail.

World's highest rainfall occurs in Mawsynram. It is located in Southern range of Khasi hills in Meghalaya.

Monsoon occurs in dry and wet spells. The rainless intervals interspersing the monsoon rain is called 'Breaks in monsoon.'

The monsoon trough is the intense and elongated low-pressure area, which develops over North-Western India. It extends from the Thar Desert in West to Chota Nagpur plateau in East.

The pre-monsoon shower in coastal Karnataka and Kerala is called Mango shower. It helps in early ripening of Mangoes.

The hot and humid condition which makes the weather oppressive is called October heat. It occurs towards the end of retreating monsoon in the month of October.

With a rhythmic cycle of seasons, in which people celebrate many festivals and do other activities, the monsoon unites the Indian sub-continent and acts as a unifying bond.

Chapter 5

Natural Vegetation and Wild Life

India is one of the twelve mega bio-diversity countries of the world. They are a group of countries that have the majority of the Earth's species and therefore, considered extremely bio-diverse.

Being a vast country, India having 47,000 plant species (out of which 15,000 are flowering plants, i.e. 6 per cent in the world), occupies 10th position worldwide and 4th in Asia. Non-flowering plants such as ferns, algae and fungi also grow here. It also has around 90,000 species of animals (including marine and water fishes) and insects.

Natural Vegetation
Natural or virgin vegetation means the plant community which has grown naturally without any human intervention for a long time. That natural vegetation, which are left undisturbed over a long period of time are called virgin vegetation.

Virgin vegetation are of two types

- Endemic species Those plant species which originated from the country, are termed as endemic species.
- Exotic species Those plant species which originated outside the country are termed as exotic species.

Factors Affecting Diversity
Factors which influence the variety of flora and fauna include Relief (land and soil), Climate (temperature, photoperiod and precipitation) and the Ecosystem. These are as follows

Relief
It includes land and soil.

Land
It affects the natural vegetation both directly and indirectly. The nature of the land i.e. whether it is plain, hilly or a plateau, determines the kind of vegetation which will grow in it. Fertile lands are used for growing crops, vegetables and fruits.

Undulating (Wavy) and rough surfaces generally develop either into grasslands or woodlands (forests). Different types of land accordingly sustain and provide shelter to different kinds of wildlife.

Soil
The soils also vary place to place. Different kinds of soils provide different kinds of vegetation. For example, alluvial or deltaic soil of a river delta near the sea will sustain

mangrove forests while slopes of hills have conical trees. The sandy soils of desert sustain thorny bushes.

Note Animals and birds also inhabit locations based on relief. For example, migratory birds like the Siberian cranes and flamingoes are found to nest in the wetlands of the Rann of Kuchchh, where the desert merges with the sea.

Climate
It includes temperature, photoperiod and precipitation.

Temperature
The temperature along with the humidity in the air and precipitation determine the character of vegetation and its extent.
As the climate gets colder, either by increase in altitude (above 915m) or by going away from the equator, the vegetation will change from tropical to sub-tropical, temperate and then alpine.

For example, on the slopes of the Himalayas and hills of the Peninsula, the fall in temperature affects the type of vegetation and its growth.

Temperature Characteristics of the Vegetation Zones

Vegetation Zones	Mean Annual Average Temp. (in degree C)	Mean Temp. in January (in degree C)	Remarks
Tropical	Above 24°C	Above 18°	No Frost
Sub-tropical	17°C to 24°C	10°C to 18°C	Frost is rare
Temperate	7°C to 17° C	–1°C to (–10) °C	Frost some snow
Alpine	Below 7°C	Below –1°C	Snow

Photoperiod (Sunlight)
The amount and duration of sunlight is known as photoperiod. The difference in latitude, altitude and season brings variation in duration of sunlight in different places. In warmer regions and climates, plant growth is faster due to longer duration of sunlight, especially with availability of adequate moisture. An instance is the fact that the Southern slopes of the Himalayas are covered with thicker vegetation than the Northern slopes.

Precipitation
Advancing South-West monsoon (June to September) and retreating North-East (October-November) monsoons bring almost all the rainfall in India. Areas of heavy rainfall always have denser vegetation than other areas with lesser rainfall. The South-West monsoon rains on the windward side of the Western Ghats, thus cause a heavy growth of tropical evergreen forests there, whereas the leeward side does not have any such forests.

Ecosystem

Various species of plants occur in areas having similar climatic conditions. To a large extent its nature determines the animal life in that area. All the plants and animals in an area are interdependent on each other in their physical environment and form an ecosystem.

Thus, an ecosystem is a biological environment consisting of all the organisms living in a particular area, as well as all the non-living, physical components of the environment with which the organisms interact, such as air, soil, water and sunlight.

Biome

It is a major community of plants and animals having similar life forms existing under similar environmental conditions. A biome is identified on the basis of plant existing there. It is also termed as 'major life zone'.

Human Influence In an Ecosystem

Human beings influence ecosystem in the following manner

- They utilise the vegetation and wildlife.
- The greed of human beings leads to over utilisation of natural resources.
- Human beings cut the trees and kill the animals creating ecological imbalance.
- Due to the activities of human beings, some of the ' plants and animals have reached the verge of extinction.

Importance of Forests

Forests are advantageous for the environment. They influence climate, reduce soil erosion, regulate stream flow, provide raw material for industries and livelihood for many, etc. They control wind force and temperature and cause rainfall. They also provide shelter to various animal species.

Change in Nature of Vegetation in India

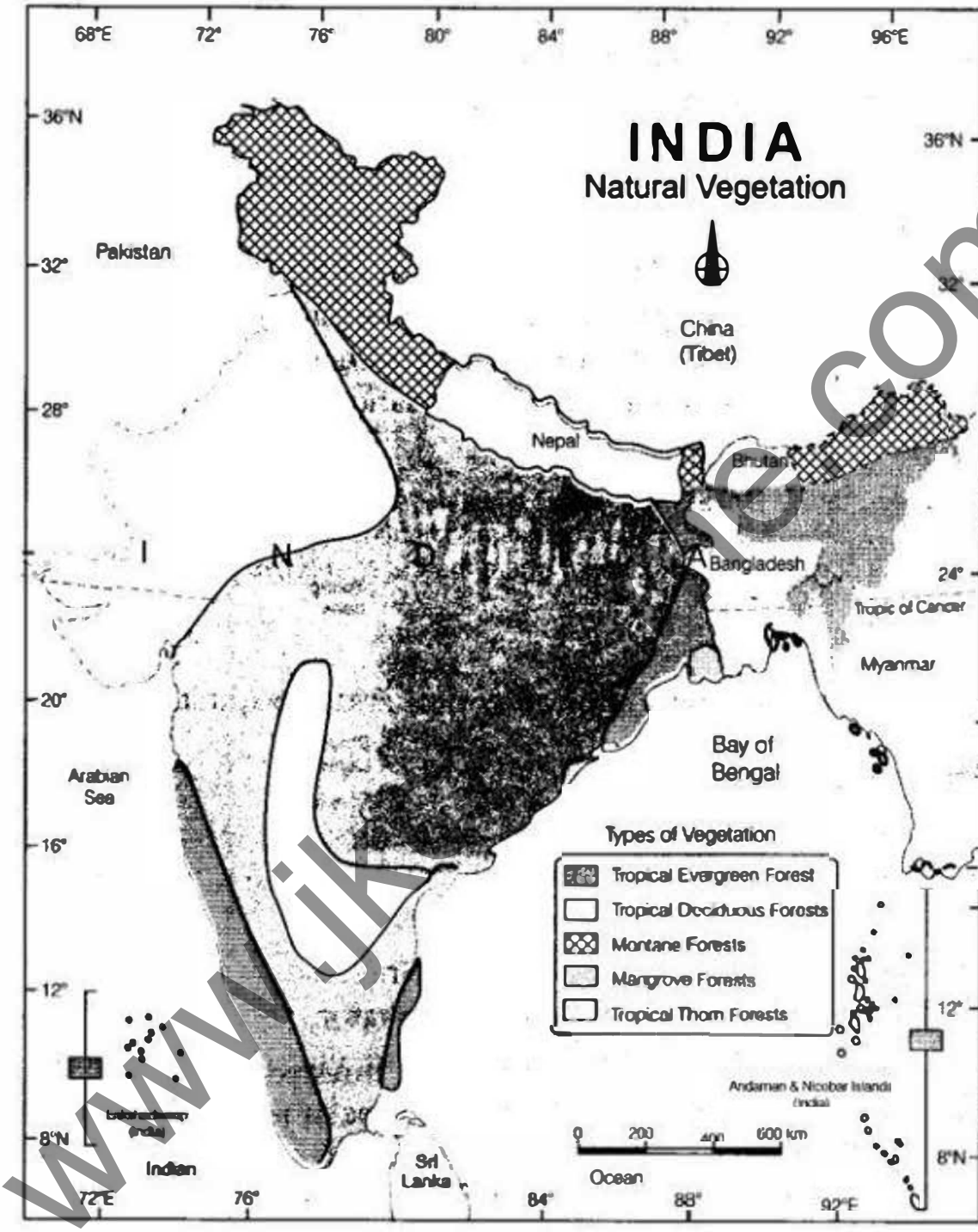
Factors like growing demand for cultivated land, development of industries and mining, urbanisation have changed natural vegetation. The vegetation cover of India in large parts is no more natural in the real sense, except in some inaccessible regions like the Himalayas, the hilly region of Central India and the Marusthali. In most of the places, it is either modified, replaced or degraded by human interference.

Types Of Vegetation

Relief and climatic factors develop different types of vegetation. Based on the major forest types, India has following types of vegetation.

1. Tropical Evergreen Forests
2. Tropical Deciduous Forests
3. Tropical Thorn Forests and Scrubs
4. Montane Forests
5. Mangrove Forests

Note: According to India State of Forest Report (SFR) 2015, the forest cover in India is 21.34% which was 21.05% in the year 2011.



1. Tropical Evergreen Forests

These are also called tropical rainforests. They cover about 12% of the total forested areas of India. They are found in areas where the annual rainfall is over 200 cm.

Regions of Occurrence

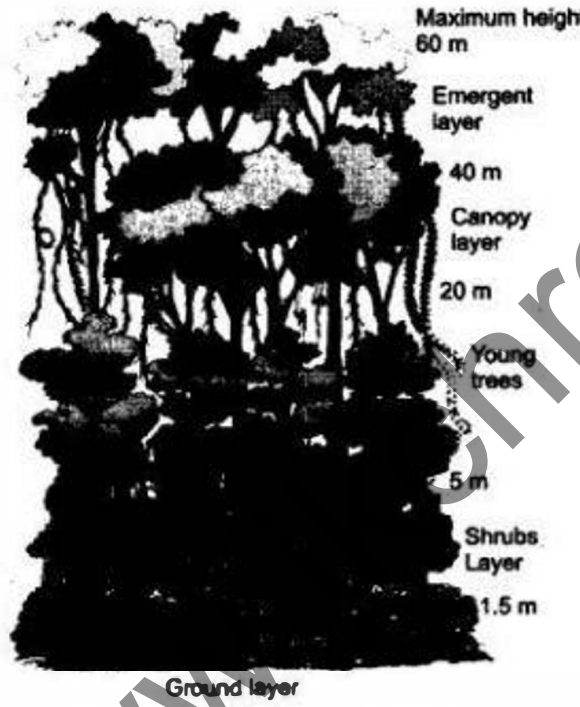
Western slopes of the Western Ghats, both groups of islands (Lakshadweep, Andaman and

Nicobar Islands), upper parts of Assam and some parts of the coasts of Tamil Nadu and Odisha.

Characteristics of Tropical Evergreen Forest

- As these areas are warm and wet almost throughout the year, they have abundant vegetation with tall trees (up to 60 m), creepers and bushes.
- The vegetation occurred in a multilayered structure.
- These appear green throughout the year, as the trees shed their leaves at different times.

Flora and Fauna
Ebony, mahogany, cinchona, rubber and rosewood trees are useful commercial trees found here. Animals found here include rhinoceros, elephants, various species of monkey, lemur, deer, many bird varieties, bats, sloth, scorpions and snails.



Tropical Evergreen Forest

2. Tropical Deciduous Forests
These cover about 64% of the fetal forested areas of the country and are the most abundant variety of forests in India. These are also called monsoon forests and also spread over the region receiving rainfall between 200 to 70 cm. Trees of this forest type shed their leaves for about 6 to 8 weeks in dry summer.

Types of Tropical Deciduous Forest
On the basis of the availability of water, these forests are further divided into moist and dry deciduous.

Moist Deciduous
Forests growing in annual rainfall areas between 100 and 200 cm are classified as moist

deciduous. They cover about 34% of the country's forested area.
They are found mostly in the Eastern part of the country such as North-Eastern states, West Odisha, Jharkhand, Chhattisgarh, foothills of the Himalayas and the leeward side of the Western Ghats. Teak (dominant species), bamboo, sal, shisham, sandalwood, khair, kusum, arjun and mulberry trees are found in these forests.

Dry Deciduous
Forests growing in annual rainfall areas between 70 and '100 cm are classified as dry deciduous. They cover about 30% of the country's forested area. These are found in rainier parts of the Peninsular plateau and the plains of Uttar Pradesh and Bihar.
Teak, sal, peepal and neem trees grow in these areas. Many parts of these areas have been cleared for agricultural activities and for grazing. Besides lions, tigers, elephants, pigs and deer many varieties of birds, lizards, snakes and tortoises are found in these forests.

3. Tropical Thorn Forests and Scrubs
These cover about 5% of the total forested areas of India. These are found in areas where the annual rainfall is less than 70 cm.

Region of Occurrence
These are found in North-Western part of the country including semi-arid areas of Gujarat, Rajasthan, some areas of Uttar Pradesh, Chattisgarh, Haryana and Madhya Pradesh, as well as parts of the Deccan Plateau.

Characteristics of Tropical Thorn Forests and Scrubs
The trees found in tropical thorn forest and scrubs are scattered.

Other such plants which have long roots, succulent stems and small thick leaves are also found here.

All these characteristics have developed to minimise evaporation and conserve moisture. Only scrubs are found in desert areas with the least rainfall.

Flora and Fauna
Trees like acacia palm euphorbia and cactus found in these areas. Fox, wolf, rats and mice, wild ass, horses, tiger, lion, camels and similar animals are found in these areas.

4. Montane Forests
These forests cover about 17% of the total forested areas of India and are found in mountainous areas of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim and Arunachal Pradesh. Natural vegetation changes with corresponding change in temperature with increasing altitude in the mountainous region. These succession of natural vegetation belts is same as in the order from tropical to tundra vegetation.

Altitudinal Distribution of Montane Forests

- Wet Temperate Forest At lower altitude between 1,000-2,000 m, wet temperate forests with evergreen broad leaf trees such as oaks and chestnuts are prominent.
- Temperate Forest At the altitude between 1,500-3,000 m, temperate forests containing coniferous trees like pine, deodar, silver fir, spruce and cedar are found. These forests cover mostly the Southern slopes of the Himalayas, places having high altitude in Southern and North-East India.
- Temperate grasslands These are found at higher elevations. At high altitude above 3,600 m, temprate forest and grasslands give way to the alpine vegetation.
- Alpine vegetation This vegetation through shrubs and scrubs merge into alpine grasslands. These area extensively used by nomadic tribes like Gujjars and Bakarwals for grazing.
- Tundra vegetation Mosses and lichens are part of tundra vegetation are found at higher altitudes.

Flora and Fauna

Kashmir stag, spotted dear, wild sheep, jack rabbit, Tibetan antelope, yak, snow leopard, squirrels, shaggy horn wild ibex, bear and rare red panda, sheep and goats with thick hair are found here. Silver firs, pines, junipers, birches, etc are trees common here.

5. Mangrove Forests

These are found in coastal delta areas influenced by sea tides. Due to this fact, they are also called tidal forests. The roots of the predominate mangroves are submerged under water. Such forests are found in the delta areas of rivers oh the East coast of India (Ganga, Brahmaputra, Mahanadi, Godavari, Krishna and Kaveri) due to mud and silt brought down by the rivers.

Flora and Fauna

- In the Ganga-Brahmaputra delta, sundari trees providing durable timber are prominent. Other trees are palm, coconut, keora and agar.
- Animals found here include the Royal Bengal Tigers, snakes, turtles, gharials and crocodiles.

Wildlife

India is also rich in its fauna (animal life) same as in flora (plant life). It has approximately 90,000 animal species and 2,000 species of birds.

They constitute 13% of the total world's stock. There are 2,546 species of fish, which account for nearly 12% of the world's stock.
It also shares between 5 and 8 % of the world's amphibians, reptiles and mammals. The existence of animals in our country varies place to place.

Distribution of Wildlife in India

The elephants are the most majestic animals among the mammals. They are found in the hot wet forests of Assam, Karnataka and Kerala.

One-horned rhinoceroses are the other animals, which live in swampy and marshy lands of Assam and West Bengal.

Arid areas of the Rann of Kachchh and the Thar desert are the habitat for wild ass and camels, respectively.

India is the only country in the world that has both tigers and lions. The natural habitat of the Indian lion is the Gir forest in Gujarat. Tigers are found in the forests of Madhya Pradesh, the Sunderbans of West Bengal and the Himalayan region.

Leopards too are members of the cat family. They are important among animals of prey.

The Himalayas harbour a hardy range of animals, which survive in extreme cold. Ladakh's freezing high altitudes are a home to yak, the shaggy horned wild ox (weighing around 1 tonne) the Tibetan antelope, the bharal (blue sheep), wild sheep and the kiang (Tibetan wild ass).

The ibex, bear, snow-leopard and very rare red panda are found in certain pockets.

In the rivers, lakes and coastal areas, turtles, crocodiles and gharials are found.

The gharial is the only representative of a variety of crocodile, found in the world today.

Birdlife in India is colourful. Peacocks, pheasants, ducks, parakeets, cranes and pigeons are some of the birds inhabiting the forests and wetlands of the country.

Indian bison, nilgai (blue bull), chousingha (four horned antelope), gazel and different species of deer are some other animals found in India in different places. It also has several species of monkeys.

Note: The Gir Forest is the last remaining habitat of the Asiatic lion.

Wildlife Protection Act was implemented in 1972 in India.

Migratory Birds

Some of the wetlands of India are popular with migratory birds. During winter, birds such as Siberian crane come in large numbers. One such place favourable with birds is the Rann of Kutch. At a place where the desert merges with the sea, flamingo with their brilliant pink plumage, come in thousands to build nest mounds from the salty mud and raise their young ones. It is one among many extraordinary sights in the country.

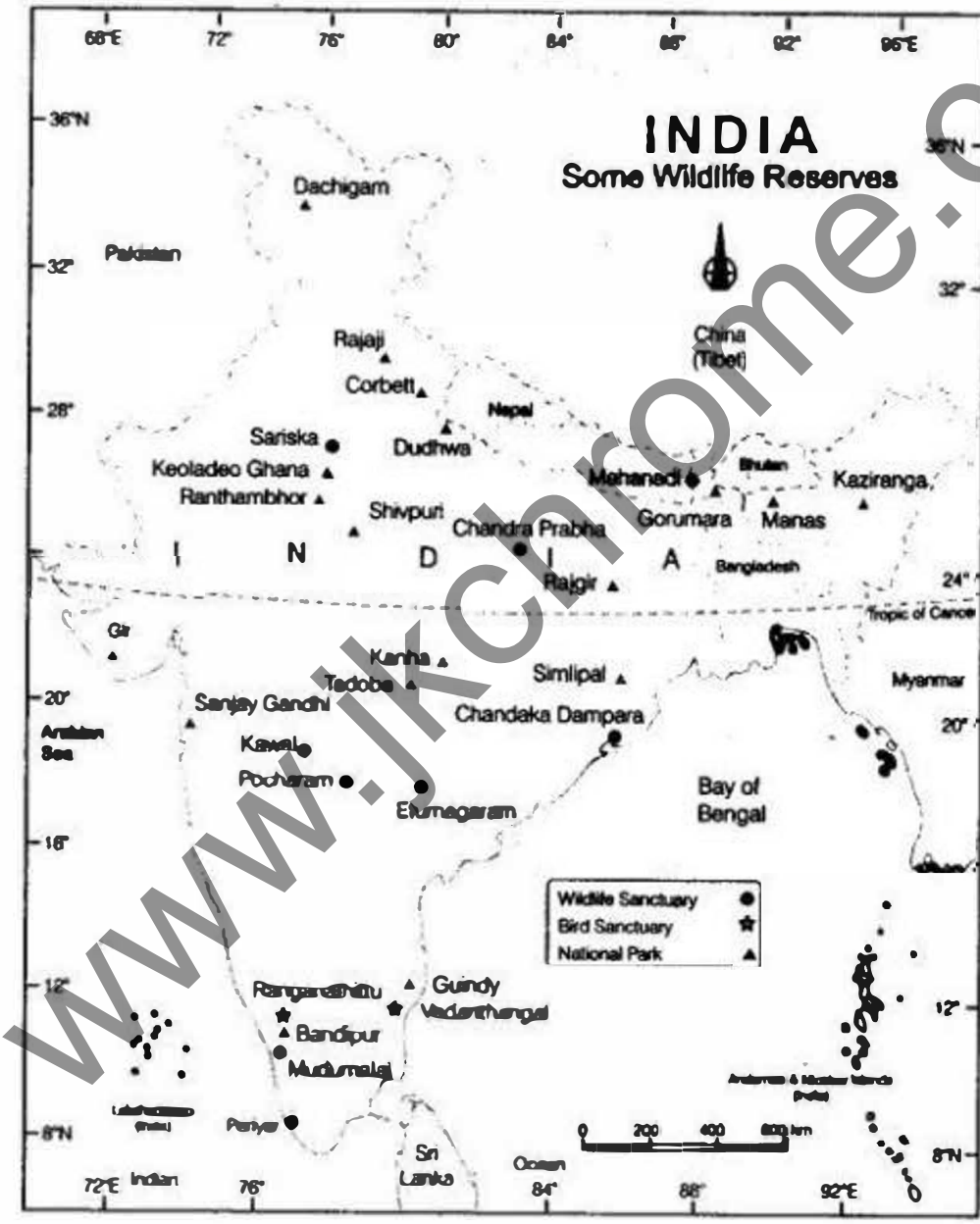
Need Of Environment Conservation

Our crops consist of edible plants from a bio-diverse environment. Many medicinal plants are

also used by us. The animals were selected from large stock provided by nature as milch animal. They also provided us draught power, transportation, meat, eggs.

The fish provide nutritive food. Many insects help in pollination of crops and fruit trees. They also exert biological control on such insects which are harmful. Thus, it can be said that every species has a role to play in the ecosystem. So, its conservation is essential.

Due to excessive exploitation of the plants and animal resources by human beings, the ecosystem has been disturbed. About 1,300 plant species are endangered and 20 species are extinct. Quite a few animal species are also endangered and some have become extinct.



Summary

India is one of the twelve mega biodiverse countries in the world.

The plant community which has grown naturally without human intervention are called natural vegetation.

Natural vegetation which are left undisturbed by human for a long time is termed as virgin vegetation.

The type of virgin vegetation which are purely Indian are called Endemic or Indigenous species.

The virgin vegetation which comes from outside the country are called exotic species.

Various,relief and climatic factors are responsible for distribution of natural vegetation.

Land and soil are the relief factors affecting the type of vegetation.

Temperature, photoperiod and precipitation are the climatic factor affecting vegetation of a region.

Based on temperature, vegetation zones are divided into Tropical, Sub-tropical, Temperate and Alpine type.

Forest are renewable resources and play major role in enhancing quality of Environment.

Most of India's natural vegetation are found in Himalayas, hilly regions of central India and in desert.

Biomes are very large ecosystem on land and have distinct types of vegetation and animal life.

Major vegetation types identified in India are tropical evergreen forests, tropical deciduous forests, tropical thorn forest and scrubs, montane forests and Mangrove forests.

Tropical Evergreen forest is found in region of very high rainfall.

Tropical deciduous forest or monsoon forests are the most widespread forests of India.

The thorn forest and scrubs are found in region with less that 70 cm rainfall.

Montane forests are high altitude alpine vegetation.

Mangroves are tidal vegetation found along the coastal region. Sundari is an important mangrove tree.

The World Conservation Union publishes Red list of critically threatened and endangered plant species.

India has 13% of the world's total bird species and 12% fish stocks.

The Wildlife Protection Act in India was implemented in 1992.

The excessive exploitation of the plants and animal resources by Human beings led them to become endangered and extinct.

Hunting, pollution, the introduction of alien plant and animal species, deforestation are major threats for the ecosystem.

Government of India has taken many steps to protect plant and animals such as – setting up of national parks, biosphere reserves etc, the introduction of different projects to conserve critically endangered species e.g. project tiger, project rhino etc.

We all should be aware of the fact that a natural ecosystem is very important for our survival.

Chapter 6

Population

People ate the nation's most valuable resource. A well-educated, healthy population provides potential power to the nation. The people are important to develop the economy and society, they make resources and use them. The people are themselves a resource with varying qualities.

A census is an official enumeration (numbering) of population done periodically. The first census in India (partial) was done in 1872. While, the first complete census was done in 1881. It is done every 10 years. The recent census was done in 2011. The census of India provides information regaling the population.

The three aspects concerned about population are as follows

- Size and distribution of population It refers to the total number of people in the country and where they are located.
- Population growth and process of population change It refers to how the population has grown and changes in its composition.
- Characteristics of qualifies of life population It refers to age, sex-ratio, literacy levels, occupational structure, health conditions of people.

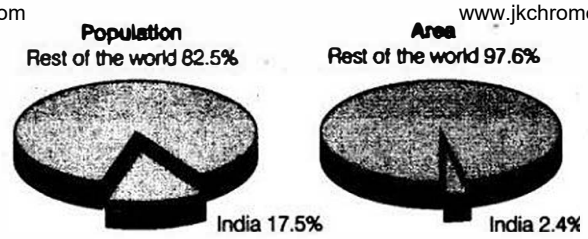
Population Size And Distribution

Hie arrangement or a spread of people of a country in different places, is Catted population distribution.

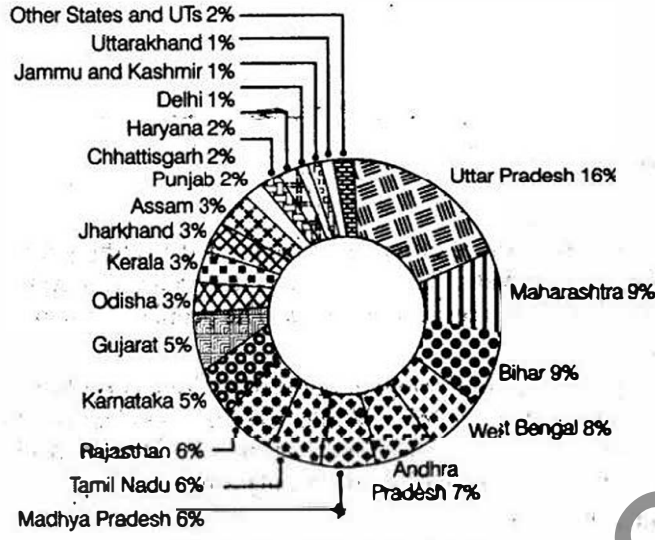
Size of population and its distribution can be studied under two heads- one population size and distribution by numbers and other in population distribution by density.

India's Population Size and Distribution by Numbers

As per 2011 Census, population of India stood at 1,210 million, which is 17.5% of the total world population.. It is unevenly distributed over the various states, with Uttar Pradesh having the highest population (199 million accounts for about 16.49 per cent of the countries population) and Sikkim the lowest population (0.6 million accounts for about 0.05 per cent of the country's population). Among Union Territories, Delhi has the highest (16.75 million) and Lakshadweep the lowest (64,429) population.



India's share of world's area and population



Distribution of Population in India

Almost half of India's population lives in just five states cpmpfisiog Uttar Pradesh, Maharashtra, Bihar, West Bengal and Andhra. Pradesh, while Rajasthan being largest state accounted for only 6% of the total population.

India's Population Distribution by Density

The uneven population distribution can be better judged by the population density in the various states. The number of people living per unit area (sq. km) in an area (state or country) is called population! density of that area.

India is one of the most destiny populated countries in the world. After Bangladesh and Japan, it is the third most densely populated country.

India's population density in 2001 was 324 persons per sq km (this increased to 382 persons per sq km in the 2011 Census), with West Bengal having the highest density of 904 persons per sq km and Arunachal Pradesh the lowest With only 13 persons per sq. km.

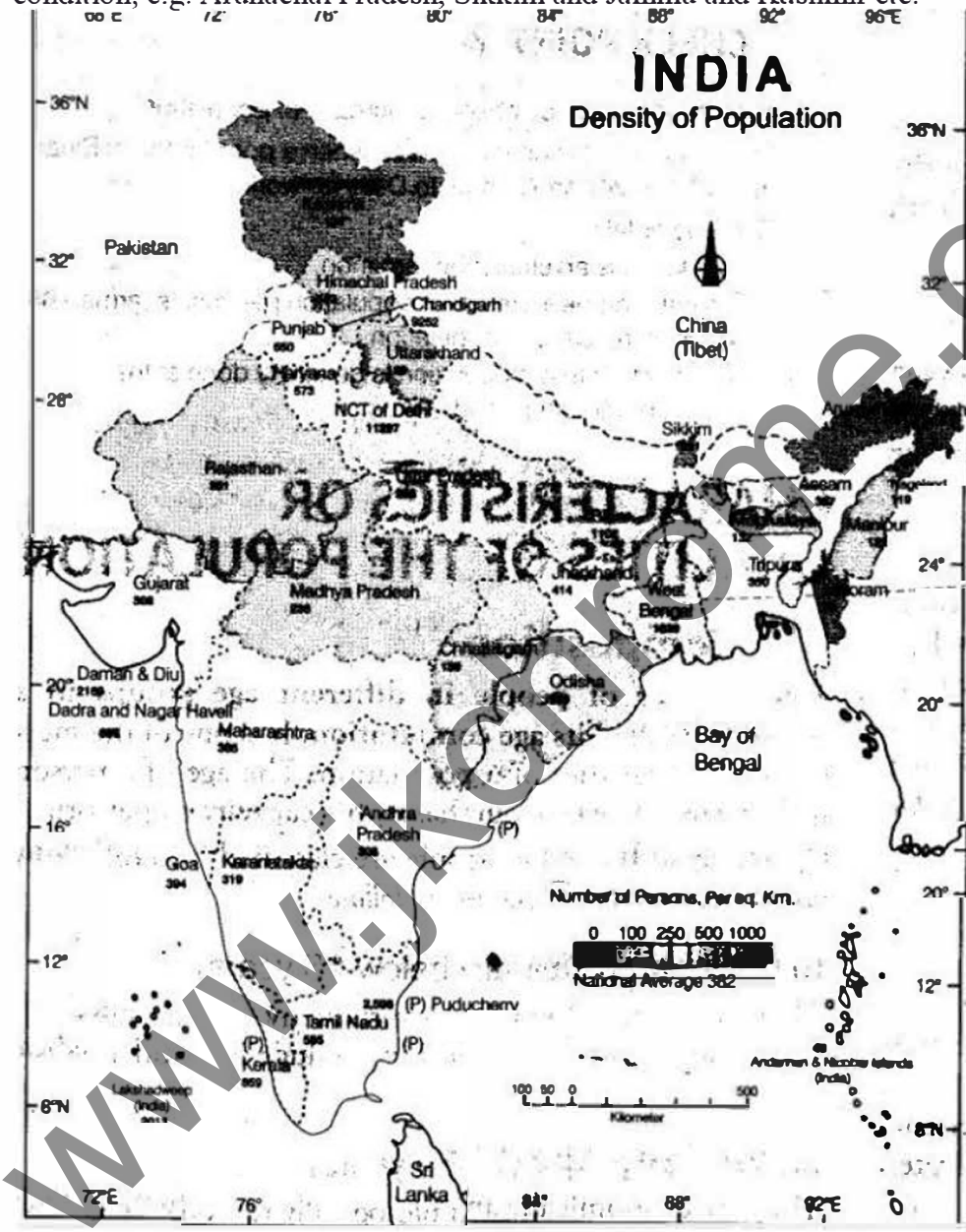
According to 2011 Census, Bihar has the highest population density 1,102 persons per sq km and Arunachal Pradesh having the lowest population density of 17 persons per sq km.

On the basis of population density inhale country is divided in to three regions

High population density states These states are characterised by flat plains with fertile soils and abundant rainfall, e.g. states of Northern Plains and Kerala.

Moderate population density states These states are characterised by hilly and rocky nature of terrain, moderate to low rainfall, shallow and less fertile soil. e.g. Assam and most of the peninsular states.

Low population density states States with – low population density below 250 person per sq. km are characterised by rugged terrain (mountainous and desert) and unfavourable climatic condition, e.g. Arunachal Pradesh, Sikkim and Jammu and Kashmir etc.



[Note: Jelangema became the 29th state of India on the 2nd June 2014 after the reorganisation of the type of Andhra Pradesh.]

Population Growth And Processes Of Population Change

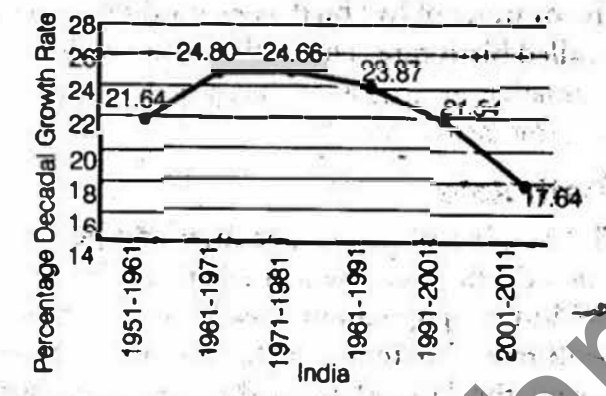
Due to births, deaths and migrations the number, distribution and composition of population change continuously.

Population Growth

The change in the number of people of a country or state during a specific period of time is called growth of population. Usually, it is mostly calculated at the interval of 10 years. The change can be expressed either in terms of absolute numbers or in terms of annual growth rate.

Absolute Increase of Population It means the absolute numbers added each year or in each decade in the population. It is obtained by simply subtracting the earlier population (e.g. that of 1991) from the later population (e.g. that of 2001).

Annual Growth Rate of Population The rate at which the number of individuals in a population increase in 1 year as a fraction of the initial population; is called annual growth rate of population. It is expressed in terms of per cent per annum. For example, a rate of increase of 2% per annum means that there was an increase of 2 persons for every 100 persons in the initial population.

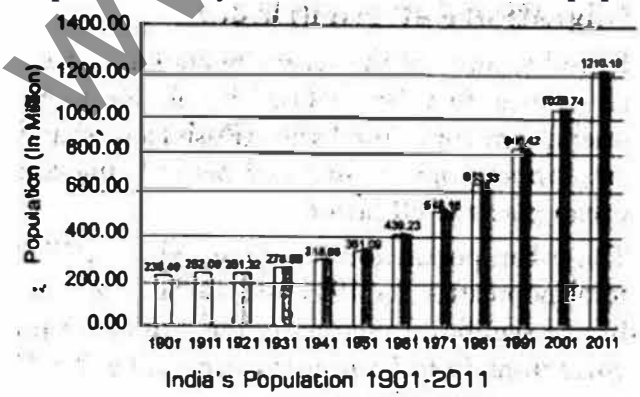


India's Population Growth Rates during 1951-2011

Population Growth Rate Since Independence

India's annual growth rate of population increased steadily till 1981. Since then, the annual rate of population growth started declining. Still the population growth of India in 1990s was 182 million (in terms of number). This addition of people was larger than ever before. Inspite of decreasing annual growth rate (in percent), the largest addition in people(in terms of number) is due to the large population of the country.

A low growth rate results a large absolute increase due to very high population. However, the declining growth rate is a positive indicator for the efforts of birth control but the total additions to the population continue to grow. If this rate of increase continues, then India will surpass China by 2045 to become the most populous country in the world.



India's Population 1901-2011

Processes of Population Change/Growth

Population changes due to the processes of births, deaths and migrations. The natural increase of population or the growth rate is the difference between birth rates and death rates.

Birth Rate

The number of live births per thousand persons in a year is called birth rate. The birth rate is a major component of population growth as in India, it has been always higher than the death rate.

Death Rate

The number of deaths per thousand persons in a year is called death rate. The main cause of the rate of growth of the Indian population has been the rapid decline in death rates. There has been a rapid decline in death rates during the last 50 years due to better healthcare and nutrition, which have made this factor also important for growth of population.

The trend of Population Growth Due to Birth Rate and Death Rate

High birth rates and declining death rates were the phenomena till 1980, which resulted date of birth population growth. After that due to government efforts and increased awareness, the birth fate also started to decline, resulting in gradual decline in the population growth rate.

Migration

It is the movement of people across regions and territories. The movement of people within the country (from one place to another) is called internal migration. It does not change the population size but it changes the population distribution of an area.

The movement of people from one country to other is called international migration. It changes population size of the country as well as population distribution.

Migration Pattern in India

In India, most of the recent migrations have been from rural areas to urban areas. This is due to poverty and unemployment in rural areas (Push factors) and increased employment opportunity and better living, conditions in urban places (Pull factors).
The urban population has increased from 17.29% of the total population in 1951 to 31.8% in 2011. There has been a significant increase in the number of million plus cities from 35 to 53 in just a decade, i.e. 2001 to 2011.

Characteristics Or Qualities Of The Population

Age Composition

The number of people in different age groups in a country is called its age composition. It is one of the most basic characteristics of a population. The age of a person influences his needs, purchases, his capacity to perform. Generally, in India, people are classified into the following three age groups. These are as follow

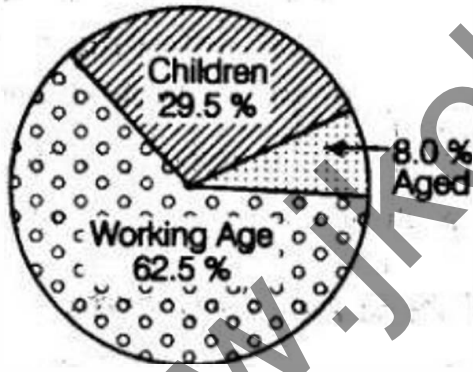
(i) Children (Generally below 15 years)
They are economically unproductive and need to be provided with food, clothing, education and medical care.

(ii) Working Age (15-59 years)
They are economically and biologically reproductive. They comprise the working population. The working age group is an economically productive group. In 2001, this group comprised 58.7% of the population, while children made up 34.4 % and the aged only 6.9%.

(iii) Aged (Above 59 years)
They can be economically productive though they may have retired. They may be working voluntarily but they are not available for employment through recruitment.

Dependent Population
The population of children and aged people together constitute the dependent population. They are termed dependent because they are not producers.

India: Age Composition



Sex Ratio
The sex ratio is the number of females per 1000 males in the population. It is an important social indicator to measure the extent of equality between males and females in a society at a given time. In India, the sex ratio has always been unfavourable to females due to reasons of tradition and unscrupulous actions of people. Certain states which are progressive like Kerala, have a very favourable sex ratio. As per census 2011, the sex ratio of Kerala is 1084 compared to 940 for all of India. Puducherry has 1038 females for every 1000 males, while Delhi has only 866 females p*r thousand males and Haryana has just 877 females per thousand.

India : Sex ratio 1901-2011

Census year	Sex ratio (Females per 1000 males)
1901	972
1911	964
1921	955
1931	950
1941	945
1951	946
1961	941
1971	930
1981	934
1991	927
2001	933
2011	940

Literacy Rate

A person who can read and write any language with understanding by the age of 7 years is considered literate.

The total percentage of the population of an area at a particular time aged seven years or above who can read and write with understanding is called literacy rate.

Although there has been a regular increase in literacy rates in the country, rural literacy lags behind urban literacy significantly and female literacy lags behind male literacy by a huge margin.

According to Census 2011 literacy rate in the country is 74.04%. It has revealed that urban literacy rate was 84.98 %, while that in the rural areas was only 68.91 %. Similarly, female literacy was only 65.46 %, while that for males was 82.14 %.

Occupational Structure

Occupational structure referred to as the distribution'^ population according to various types of occupation. Economically active population percentage is an important index of development. There is a large variety of occupation in the country. The occupations are usually categorised into primary, secondary and tertiary occupations.

Primary occupations are those in which natural resources are extracted from the Earth. These include agriculture, fishery, forestry, mining, quarrying, etc.

Secondary occupations are those in which the extracted natural resources are processed into products for use. These include manufacturing, refining, construction, etc.

Tertiary occupations are those which support the primary and secondary occupations by providing services. This transportation, communications, commerce, administration, legal services, etc.

The pattern of the Working Population

The proportion of people working in different activities vary in developed and developing countries. The developing countries have more of their population working in primary occupations, whereas the developed nations have more of their population working in secondary and tertiary occupations.

In India, half of the population is engaged in agriculture alone. However, due to industrialisation and urbanisation in recent times, there has occurred a significant shift towards secondary and tertiary occupations which earlier stood about 13% and 20%, respectively.

Health

Health is an important component of population composition. It affects its development significantly. Due to the sustained efforts of government, healthcare programmes, life expectancy at birth has improved from 36.7 years in 1951 to 64.7 years in 2011.

The death rate has declined from 25 per 1000 persons in 1951 to 7.2 in 2011. However, healthcare and nutrition are still major issues. Malnutrition in children afflicts a large percentage of the population.

Availability of safe drinking -water and proper sanitation are major problems in rural areas and need urgent action. Only one-third of the rural population has these basic amenities. The level of nutrition and per capital calorie consumption is much below the recommended level. This can be reduced by appropriate policy on population.

Adolescent Population

Adolescents are population aged from 10 to 19 years. They currently comprise about 20% of India's population and are an important future resource for the country.

Their nutritional requirements are more than that of either adults or younger children, but it our country the diet available for them is usually inadequate for their requirements, which leads to deficiency and stunted growth. Many adolescent girls suffer from anaemia and they must be made aware of their requirements through better education and literacy they confront.

National Population Policy

After recognising that the family planning would improve individual health and welfare, the Government of India initiated its first Family Planning Programme in 1952. This, promoted responsible and planned parenthood on a voluntary basis. In the year 2000, the government formulated the National Population Policy (NPP 2000), which had the following major objectives

- Providing a policy framework for imparting free and compulsory school education up to 14 years of age.
- Reducing infant mortality rate to below 30 per 1000 live births.
- Achieving universal immunisation of children against all vaccine-preventable diseases.
- Promoting delayed marriage for girls.
- Making family welfare a people-centred programme.

NPP 2000 and Adolescents

National Population Policy (NPP) 2000 identified adolescents as one of the major sections of the population that need greater attention.

NPP 2000 put greater emphasis on the important needs of adolescents including protection from unwanted pregnancies,' Sexually Transmitted Diseases (STDs) and risks of unprotected sex. It focussed on programmes that aim towards encouraging delayed marriage and childbearing, education of adolescents, providing food supplements and nutritional services, etc.

Summary

Human beings are important resources who not only utilise resources and but also create social and cultural environment.

'Resources', 'calamities' and disasters' becomes meaningful when taken in relation to a human being.

The number, distribution, growth and characteristics of human beings provide basic background for understanding and appreciating various aspects of the environment.

The census is official information about the population of a country done at regular interval (mostly 10 year period).

India has huge population of over a billion, and the population is distributed unevenly throughout the country.

The uneven distribution of population can be known by calculating population density of an area, which is the number of people per unit area.

More than half of India's population resides in five states of Uttar Pradesh, Maharashtra, Bihar, West Bengal and Andhra Pradesh.

India has the third highest population density in the world, which is just after Bangladesh and Japan.

Rugged terrain and unfavourable4climatic condition are reason for sparse population in some regions such as Arunachal Pradesh.

Assam and most of peninsular India has moderate population density.

The high population density in India is found in the Northern Plain and Kerala.

The flat plain area with fertile soils and abundant rainfall are major factors contributing to high population density.

The change in the number of inhabitants of a country at a particular period of time is called growth of population.

Growth of the population is affected by births, deaths, and migration.

The increase in the population calculated by subtracting the earlier population from the later is known as absolute increase in population.

The rate of increase of population per year is measured in terms of per cent per annum and known as the annual growth rate of population.

Although, India's population is steadily increasing from 1951, but since 1981, the rate of growth has started to decline gradually.

The difference between birth rate and death rate gives a natural increase in population.

The number of live birth per thousand persons per year is termed as birth rate.

The number of deaths per thousand of persons per year is termed as death rate.

Migration is the third component of population growth which represent the movement of people from one place to another.

When the movement of people occurs within a country it constitutes internal migration but when the movement is between the country it constitutes external or International migration.

Most migration in India takes place from rural areas to urban areas due to push and pull factors.

Adverse condition, poverty, unemployment in rural areas are push factor of migration.

Greater employment opportunities, better living conditioks in the cities are pull factor of migration.

The age composition of population of nation is grouped into 3 categories : Children (0-14 years) Adult (15-59 years) and aged (60 – above).

Dependency ratio is the ratio of people of dependent age (Below 15 and above 60 years) to people of economically active ages (15-59 years).

The number of females per 1000 males in the population is called sex ratio and is an important social indicator to measure the extent of equality between males and females.

State of Kerala and Union Territory of Puducherry has favourable sex ratio where as Delhi and Haryana has very adverse sex ratio.

A person of 7 years or above who can read and write and understand any one language is termed as literate.

Agriculture, animal husbandry, forestry, fishing mining and quarrying are primary occupation.

The manufacturing industry, building and construction work etc. constitute secondary occupation.

Transport, communication, commerce, administration and other services are tertiary occupations.

Adolescents constitute one-fifth of the total population of India and adequate attention has to be paid on their nutrition requirements.

Comprehensive family Planning Programme in India was started in 1952 and the National Population Policy (NPP) 2000 is a part of it.

NPP aims to impart free and compulsory education up to 14 years, reduce the infant mortality rate, deal with adolescent-specific problems etc.

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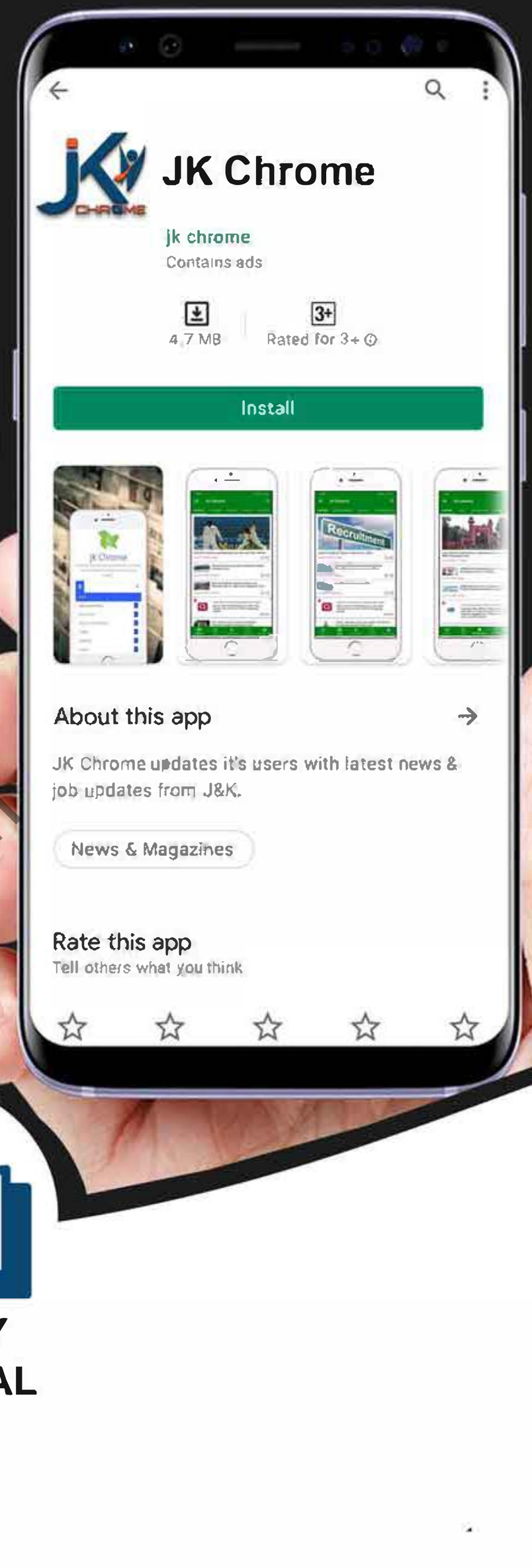

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