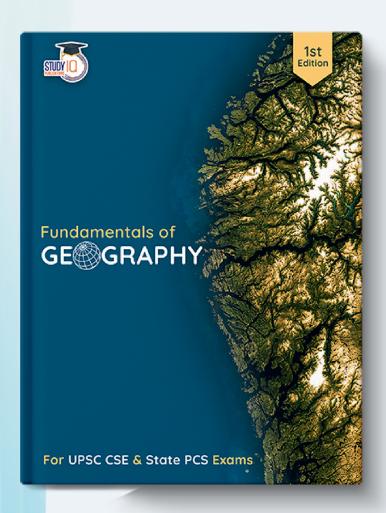
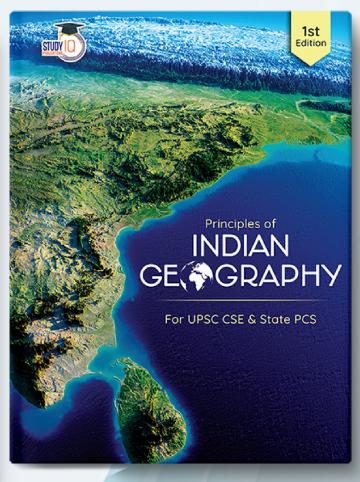
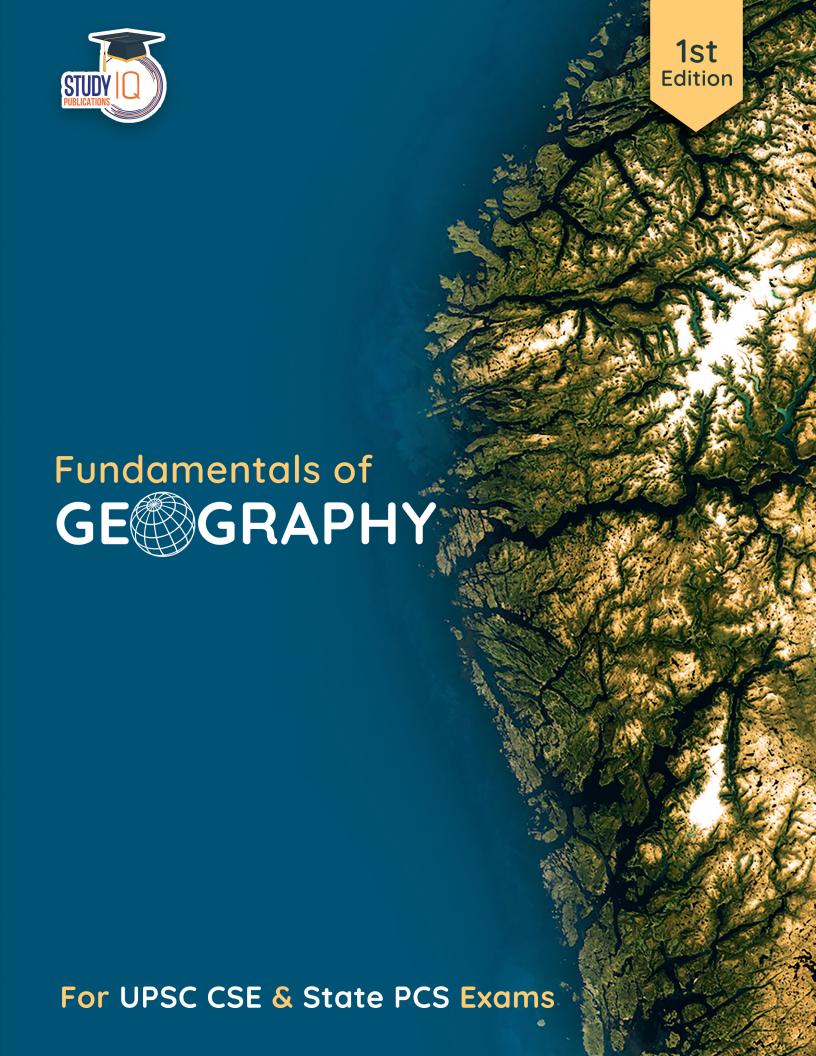


Set of 2 Books

Fundamentals of Geography & Principles of Indian Geography







From the Founder's Desk

Dear Aspirants,

Study IQ Education is progressing towards its mission to democratize quality education for everyone. In this journey, Study IQ Publications is delighted to present you with the first edition of the book 'Fundamentals of Geography', which will undoubtedly be your best companion during your preparation.

This book was created keeping in mind, the concerns and challenges that students face during their Civil services preparation. Students are frequently confused about what to study, how much to study, the depth of knowledge required for any topic, and the type of questions asked by the commission. Above all, the absence of consolidated study material and the information silo from multiple sources hinder our student's preparations.

This book is an honest attempt to tackle these problems and improve students' knowledge base, saving their precious time during their preparation and eliminating many academic misunderstandings that they encounter.

Special Features of This Book

This book aims to make your preparation focused and relevant based on UPSC's current trend and pattern, revision-friendly, and up-to-date.

- The requirements of the UPSC Civil Services Examination are the exclusive focus of this book.
- We have taken great care to ensure that the materials are written in a clear and easy-to-understand, so that students may learn and recall the concepts to their advantage.
- Wherever necessary, we've incorporated relevant examples, maps, and graphics to help students grasp the fundamental concepts and draw the relevant maps in their Mains examination.
- We have incorporated the relevant previous year's questions at the end of each chapter so that the students can test their knowledge while understanding the trend of the question.

With all sincerity and humility, the Study IQ team wishes you the best in your preparation, and we are hopeful that this book will help you in your journey.

Happy Learning!!

Dr. Gaurav Garg Co-Founder, Study IQ Education

Detailed Table of Content

L.	Origi	in of the Universe2	2.	.2	Source	es of Information on Earth's Interior	1
	1.1	Understanding Our Universe2	2.	.3	Obser	vations from the seismic waves	18
	1.2	Origin of the Universe: The Big Bang3	2.	.4	Struct	ure of the Earth	19
	1.3	Understanding Galaxies3	2.	.5	Rocks	and Minerals	21
	1.4	Understanding Stars4	2.	.6	Minera	als	21
		1.4.1 How are stars born, and when do they die?4			2.6.1	Formation of minerals:	2
	1.5	Understanding Constellations4			2.6.2	Mineral Groups	21
	1.6	The Solar System5	2.	.7	Rocks		22
	1.7	The Sun			2.7.1	Types of Rocks	22
		1.7.1 Layers of the Sun5			2.7.2	Sedimentary Rocks	23
	1.8	Sun and Associated Concepts5			2.7.3	Metamorphic Rocks:	2
	1.9	The Planets6			2.7.4	Rock Cycle	24
		1.9.1 Mercury6	3. E	volu	tion of	the Crust and Related Concepts	26
		1.9.2 Venus6	3.	.1	Theory	y of Continental Drift	26
		1.9.3 Earth			3.1.1	What evidence is there to support the the Continental Drift?	
		1.9.4 Mars	3	.2	Seaflo	or Spreading	
		1.9.5 Jupiter		-	3.2.1	What evidence is there to support Sea-floo	or
		1.9.7 Uranus		•	Distr. 7	Spreading? Fectonics	
		1.9.8 Neptune	3.	.3			
		1.9.9 Kuiper Belt and Pluto7			3.3.1	Plates	
	1.10	Other members of Our Solar System		4	3.3.2	Plate Margins and Plate Boundaries uakes	
		1.10.1 Meteors, Meteoroids and Meteorites8	3.	.4			
	1.11	Origin and Evolution of the Solar System 8			3.4.1	How do we measure earthquakes?	
	1.12	Geological History of Earth10		_	3.4.2	What causes an earthquake?	
	1.13	Geographical Grid, Latitude and Longitude11		.5		Distribution of Earthquakes	
		1.13.1 Latitude:11		.6		oution of Earthquakes in India	
		1.13.2 Longitude:11				t of Earthquakes	
		1.13.3 Longitude and Time11	3.	.8		10es	
	1.14	International Date Line:			3.8.1	What causes Volcanic eruptions?	
		1.14.1 Daylight Saving Time:			3.8.2	Where are these volcanoes found?	
	1.15	Different Motions of the Earth12			3.8.3	Products of Volcanic Eruption:	
		1.15.1 Significance of Earth's Rotation			3.8.4	Types of Volcanic Eruption:	
	1.16	Seasons on Earth	3.	.9	Volcan	iic Landforms	
	1.17	Solstices and Equinoxes			3.9.1	Landforms of Central Eruption:	
,		ior of Earth and Earth Materials15			3.9.2	Landforms of Fissure Eruption:	
2.					3.9.3	Intrusive Volcanic Landforms:	
	2.1	Understanding Earth's Interior15			3.9.4	The impact of volcanic Eruptions:	4

4.	Geoi	morphic	Processes	43	5.2.2	Insequent Drainage systems:	54
	4.1	Types	of Geomorphic Processes	43	5.2.3	Drainage Pattern	54
	4.2	Endog	enetic Forces	43 5.3	The ro	ole of Rivers in Landscape Development	55
		4.2.1	Diastrophic Forces and Movements	44	5.3.1	The stages of a river:	55
	4.3	Tecton	ic Landforms: Fold and Faults	44	5.3.2	Rejuvenation of a river:	56
		4.3.1	Folds	44	5.3.3	Landforms formed by River Erosion	56
		4.3.2	Types of Folds	44	5.3.4	River Transportation:	58
		4.3.3	Faults	45	5.3.5	Landforms formed due to river deposition	58
		4.3.4	Types of Faults	46	5.3.6	Different Types of Deltas:	59
	4.4	Exoge	netic Forces	47 5.4	Glacie	ers and Glacial Landforms	59
	4.5	Weath	ering	47	5.4.1	Types of Glaciers:	59
		4.5.1	Weathering is classified into three types	47	5.4.2	Glacial Landforms:	59
		4.5.2	Physical weathering	47	5.4.3	Erosional Landforms:	59
		4.5.3	Freezing, Thawing & Frost shattering	47	5.4.4	Depositional Features:	60
		4.5.4	Expansion resulting from unloading	48 5.5	Action	of the Wind	61
		4.5.5	Thermal expansion and contraction or Inso		5.5.1	Wind Erosion:	61
			weathering		5.5.2	Wind Transportation and Deposition	62
		4.5.6	Salt weathering or crystallisation of salt		5.5.3	Wind Depositional Landforms	62
	4.6	Chemi	cal weathering	48	5.5.4	Works of water in Arid and Semi-arid regions.	63
		4.6.1	Oxidation and Reduction	48 5.6	Action	of Groundwater	64
		4.6.2	Solution		5.6.1	Sources of groundwater	64
		4.6.3	Carbonation		5.6.2	Components of Groundwater	64
		4.6.4	Hydration	49	5.6.3	Wells and Artesian Well	65
	4.7 Biological weathering		49 5.7	Spring	ʒs	65	
	4.8	4.8 Weathering and its significance		49	5.7.1	Types of springs:	65
	4.9	Mass Movements		49 5.8	Karst	Topography	66
		4.9.1	Different Modes of mass movement	49	5.8.1	The distribution of Karst Topography	66
		4.9.2	Slide	49	5.8.2	The Process of Karst Formation	66
		4.9.3	Flow	49	5.8.3	Landform Features	66
		4.9.4	Heave	49	5.8.4	Erosional Features	66
		4.9.5	Types of mass movements	49	5.8.5	Depositional Features	67
		4.9.6	Solifluction	50	Action	of Sea Waves	
		4.9.7	Soil creep	50	5.9.1	Sea Waves and Their Formation	67
		4.9.8	Mudflow and Earthflow	50) Coast	line and Shore	
		4.9.9	Landslide	I		Types of Coastlines	
		4.9.10	Liquefaction	51	5.10.2	•	
		4.9.11	Avalanche	51	5.10.3		
5.	Land	Landform Development53			2.20.0	Landforms	69
	5.1	River a	and the Drainage System	53	5.10.4	Marine Erosional Landforms	69
	5.2	Types	of Drainage Systems:	54	5.10.5	Marine Depositional Features:	70
		5.2.1	Sequent Drainage Systems		5.10.6	Marine Cycle of Erosion:	71

5.	Atm	ospheri	c Composition	73	l		7.6.3	The Frigid Zone	89
	6.1	Evolution of Earth's Atmosphere7			8.	Atmo	ospheric Winds		91
	6.2	Compo	osition of Atmosphere	73		8.1	Nature	of Atmospheric Pressure	91
		6.2.1	Permanent Gases	74			8.1.1	Factors Influencing Atmospheric Pressure .	91
		6.2.2	Variable Gases	74		8.2	The Ve	rtical Distribution of Pressure	92
		6.2.3	Liquids, Particulates, and Aerosols	75		8.3	The Ho	orizontal Distribution of Pressure	93
	6.3	Struct	ure of Atmosphere	76			8.3.1	The temperature of air	93
		6.3.1	Troposphere	76			8.3.2	The rotation of the Earth	93
		6.3.2	Stratosphere	76			8.3.3	Presence of water vapor	93
		6.3.3	Mesosphere	76			8.3.4	Distribution of Pressure Belts across the	
		6.3.4	lonosphere	77				Latitudes	
		6.3.5	Exosphere	77			8.3.5	January Conditions	
7.	Atm	ospheri	c Temperature	79			8.3.6	July Conditions	
	7.1	Heatin	ng of the Atmosphere	79		8.4	The Na	ture of Wind	
		7.1.1	Radiation	79			8.4.1	The direction of Movement and Speed of V	
		7.1.2	Conduction	80			8.4.2	Factors affecting wind speed and movemer	
		7.1.3	Convection	80			8.4.3	Friction	
		7.1.4	Advection	81			8.4.4	Centripetal Force	
	7.2	Insolat	tion	81		8.5		al Circulation of the Atmosphere	
		7.2.1	Factors influencing insolation	81		8.6		of Winds	
		7.2.2	Solar variation:	82		8.7		ary Winds	
		7.2.3	Heat Budget	82			8.7.1	Trade winds	
		7.2.4	Latitudinal Heat Balance	83			8.7.2	The Westerlies	
	7.3	Tempe	erature	83			8.7.3	The Polar Easterlies	
		7.3.1	Latitude of a region	83		8.8	Second	dary winds or Periodic winds	
		7.3.2	Altitude of a region	84			8.8.1	Monsoons	
		7.3.3	Differential heating of land and water	84			8.8.2	Land Breeze and Sea Breeze	
		7.3.4	Distance of a region from the Sea	84			8.8.3	Valley Breeze and Mountain Breeze	
		7.3.5	Effect of Ocean Currents	84		8.9	Local V	Vinds	
		7.3.6	Effect of the Air Mass	84		8.10		Air Circulation	
		7.3.7	Effect of the storms	85				Jet Streams	
		7.3.8	Effect of the local winds:	85		8.11		of jet streams	
		7.3.9	Location of the mountains	85				Polar front jet stream	
		7.3.10	Nature of the region	85				Subtropical jet stream	
	7.4	Tempe	erature Distribution	85				Eastern Tropical Jet Stream	
		7.4.1	Temperature Anomaly	85				Index cycle of jet streams	
	7.5	Tempe	erature Inversion	86		8.12		quence of Jet Stream	
		7.5.1	Types of Inversion	87				ortex	
	7.6	Tempe	erature Ranges	88		20		El-Nino and Southern Oscillation (ENSO)	
		7.6.1	The Temperate Zone	88				El-Nino	
		7.6.2	The Torrid Zone	89					233

			Consequences of El-Nino			10.2.4	Based on above modifications two types of masses arise:	
		8.13.4	La-Nina	103		4005		
		8.13.5	Consequences of La-Nina	104	4.0.0		Role of air-mass in impacting the weather	
	8.14	Indian	Ocean Dipole	104	10.3			
		8.14.1	Positive IOD	104			Stationary Front	
		8.14.2	Negative IOD	104			Warm Front	
9.	Atmo	ospherio	c Water	107			Cold Front	
	9.1		ater Cycle				Occluded Front	
		9.1.1	Humidity			•	es	
		9.1.2	Difference between Absolute Humid		10.5	-	rate Cyclones	
		,,_,_	Relative Humidity			10.5.1	Salient features of Temperate Cyclones:	119
	9.2	Phase	Changes of Water	108		10.5.2	Formation of the temperate cyclone	119
		9.2.1	Evaporation	108		10.5.3	Temperate Cyclone and its Distribution	119
		9.2.2	Condensation	108	10.6	Tropica	al Cyclones	120
	9.3	Forms	of Condensation	109		10.6.1	Salient features of Tropical Cyclones	120
		9.3.1	Dew			10.6.2	Favorable conditions for the formation of Tropical Cyclones	120
		9.3.2	Frost			10.6.3	Structure of Tropical Cyclones	121
		9.3.3	Fog				Formation of a Tropical Cyclone:	
		9.3.4	Impact of Fog	109		10.6.5		
		9.3.5	Mist	109		10.6.6	Recurving Cyclones	
		9.3.6	Haze	110			Types of Tropical Cyclones	
	9.4	Clouds	S	110	10.7		itude Anticyclones	
		9.4.1	Importance of clouds:	110	10.7		Characteristics	
		9.4.2	Types of Clouds	110	10.8		erstorms	
	9.5	Precip	itation	110	10.6		Structure of Thunderstorm	
		9.5.1	Forms of precipitation	111			Thunderstorm and Weather:	
		9.5.2	Necessary conditions for rainfall	111	40.0			
	9.6	Types	of Rainfall	111			0	
		9.6.1	Convectional Rainfall	111		_	ng	
		9.6.2	Orographic Rainfall	111	10.11	Waters	spouts	125
		9.6.3	Frontal Rainfall	144	L. Clima	ate Clas	sifications	127
	9.7	Global	Distribution Of Rainfall		11.1	Classif	ication of climatic regions	128
		9.7.1	Seasonal distribution of precipitation	1113	11.2	Climat	e Types	128
10	A in B	1				11.2.1	Hot, Wet Equatorial Climate	128
10.			d Cyclones			11.2.2	The Tropical Monsoon and Tropical Marine	
	10.1		isses				Climates	
			Source region of Air-Masses:			11.2.3	The Savannah or Sudan Climate	130
	10.2		ication of air-masses			11.2.4	The Hot Desert and Mid-Latitude Desert Climates	121
			Modification of air-masses:			11 2 5	The Warm Temperate Western Margin	101
			Thermodynamic modification:			11.2.3	(Mediterranean) Climate	132
		10.2.3	Mechanical modification:	116		11.2.6	The Temperate Continental (Steppe) Clima	nte:132
							**	

		11.2.7	The Warm Temperate Eastern Margin Climate:			12.2.9	Darwin's Subsidence Theory	148
			134			12.2.10	Coral Bleaching	148
		11.2.8	The Cool Temperate Western Margin (British Type) Climate		12.3	Ocean	Deposits	149
		11.2.9	The Cool Temperate Continental (Siberian)		12.4	Major	oceans and Seas	149
			Climate136			12.4.1	Pacific Ocean	149
		11.2.10	The Cool Temperate Eastern Margin (Laurentian)			12.4.2	Atlantic Ocean	151
		44.0.44	Climate			12.4.3	Indian Ocean	151
	44.0		The Arctic or Polar Climate138		12.5	Salinity	y of Ocean water	153
			en's Scheme of Classification of Climates 139			12.5.1	Distribution of Salinity	153
	11.4		A: Tropical Humid Climates			12.5.2	Horizontal distribution of Ocean Salinity	154
			Tropical Wet Climate (Af)139			12.5.3	Vertical distribution of Ocean Salinity	154
			Tropical Monsoon Climate (Am)139		12.6	The Te	mperature of Ocean Water:	154
			Tropical Wet and Dry Climate (Aw)139			12.6.1	Horizontal distribution of temperature:	155
	11.5		B: Dry Climate			12.6.2	Vertical distribution of temperature:	155
		11.5.1	Subtropical Steppe (BSh) and Subtropical Desert (BWh) Climates140			12.6.3	Influence of ocean water temperature	155
	11.6	Group	C: Warm Temperate Climates 140	13.	Ocea	n Move	ements: Waves, Tides and Currents	157
		11.6.1	Humid Subtropical Climate (Cwa)140		13.1	Waves		157
		11.6.2	Mediterranean Climate (Cs)140			13.1.1	Understanding the wave energy:	157
		11.6.3	Humid Subtropical Climate (Cfa)140			13.1.2	Wave Origin and Movement:	157
		11.6.4	Marine West Coast Climate (Cfb)140			13.1.3	The Wave Propagation	158
	11.7	Group	D: Cold Climate with Dry Winters (Dw) 140			13.1.4	The Wave Break	158
		11.7.1	Group E: Polar Climates140		13.2	Ocean	Tides	158
		11.7.2	Tundra Climate (ET)141			13.2.1	Causes of Tides	158
		11.7.3	Ice Cap Climate (EF)141			13.2.2	Classification based on frequency	159
		11.7.4	Highland Climates (H)141			13.2.3		
12.	The C	Ocean a	nd its Properties144			4004	lum at a second Title	
	12.1	Oceani	c Relief Features144		40.0		Importance of Tides	
		12.1.1	The Continental Shelf144		13.3		ts	
		12.1.2	The Continental Slope145		13.4		of Currents:	
		12.1.3	The Continental Rise146				Based on Depth	
		12.1.4	The Abyssal Plains or Deep Sea Plain146			13.4.2		
	12.2	Minor (Oceanographic Relief Features 146			13.4.3	Factors influencing the Current	
		12.2.1	Trenches146			13.4.4	The Atlantic Ocean's Circulation	
		12.2.2	Submarine Ridges or Mid Oceanic Ridges146			13.4.5	The Indian Ocean Circulation	
		12.2.3	Abyssal Hills146	14.			omes	
		12.2.4	Submarine Canyons146		14.1	-	ties of Soil	
		12.2.5	Bank, Shoal, and Reef146				Soil Profile and Horizons	
		12.2.6	Coral reefs147			14.1.2	Soil Development Processes	171
		12.2.7	Ideal conditions for the development of coral reefs147			14.1.3	conditions	
		12.2.8	Theories on Formation of Coral Reefs148			14.1.4	Factors influencing Soil Formation:	172

	14.2	Major	Soil Types	173	15.13.1 World Distribution of Gold	188
	14.3	Biome	s	174	15.14 Diamond	189
		14.3.1	Factors affecting Biomes	174	15.14.1 World Distribution of Diamond	.189
	14.4	Types	of Biomes	174	15.15 Silver	190
	14.5	Tropica	al Biomes	175	15.15.1 World distribution of Silver	191
		14.5.1	Tropical or Equatorial Evergreen forest	175	15.16 Platinum	191
		14.5.2	Monsoon Deciduous Forests	176	15.16.1 World Distribution of Platinium	.191
		14.5.3	Savanna Biome	176	15.17 Non-metallic Minerals	191
		14.5.4	Desert Biome	176	15.18 Asbestos	191
	14.6	Tempe	rate Biome	176	15.18.1 World Distribution of Asbestos	192
		14.6.1	Mediterranean Biome	176	15.19 Mica	192
		14.6.2	Temperate Grassland Biome	177	15.19.1 World Distribution of Mica	192
		14.6.3	Taiga Biome	177	15.20 Rare Earth Elements (REE)	193
		14.6.4	Tundra Biome	177	15.20.1 List of Rare Earth Elements and their	
15.	World	d's Maj	or Resources	181	Applications	
	15.1	Classif	ication of Resources	181	15.20.2 Trade and Production	
		15.1.1	On the basis of Origin	181	15.20.3 Issues with Mineral resources	
		15.1.2	On the basis of exhaustibility	181	15.20.4 Management of mineral resources	
		15.1.3	On the basis of the nature of ownership	181	15.21 Energy Resources	
		15.1.4	On the basis of the status of Developmen	t182	15.21.1 Different Categories of Energy Resources	
	15.2	Minera	al Resources	182	15.22 Coal	
		15.2.1	Types of minerals	182	15.22.1 Classification of Coal	
		15.2.2	Different Mineral Extraction Techniques	182		
		15.2.3	Important Minerals	183	15.22.3 The benefits and uses of coal	
	15.3	Ferrou	s Metallic Minerals	183	15.22.4 Limitations of Coal Usage	
	15.4	Iron O	re	183	15.23.1 Global Distribution of Petroleum	
	15.5	Manga	nese	184	15.23.2 The benefits and uses of Petroleum	
		15.5.1	World Distribution of Manganese	185		
	15.6	Cobalt		185	15.23.3 Limitations of Petroleum Usage	
		15.6.1	World Distribution of Cobalt	185		
	15.7	Chrom	ium	186	15.24.1 Global Distribution of Natural Gas	
		15.7.1	World Distribution of Chromium	186	15.24.2 Benefits and uses of natural gas	
	15.8	Nickel		186	15.24.3 Elilitations of flatural gas usage	
		15.8.1	World Distribution of Nickel:	186	15.25 Hydroelectricity	
	15.9	Non-fe	errous Metallic Minerals	187		
	15.10	Coppe	r	187	15.25.2 Benefits of Using Hydroelectricity	
		15.10.1	World Distribution of Copper	187	15.25.3 Limitations of Hydroelectricity usage	
	15.11	Alumin	num	188	•	
		15.11.1	World Distribution of Aluminium	188	15.26.1 Global Distribution of Nuclear Energy:	
	15.12	Precio	us Metals and Gems	188	15.26.2 Benefits of Nuclear Energy 15.26.3 Limitations of Nuclear Energy Usage	
	15.13	Gold		188	13.20.3 Lillitations of Nuclear Energy Osage	.202

15.27 Non-Conventional Sources of Energy	203			15.45.1	Reasons for the development of fishing g	
15.28 Solar Energy	203				in temperate region	
15.28.1 Present Status of Solar Energy				15.45.2	Reasons for backwardness in commercia in tropical regions	_
15.29 Wind Energy	203			15.45.3	Major Fishing Regions of the World	213
15.29.1 Present Status of Wind Energy	203		15.46	Abiotic	Resources	214
15.30 Bio-Energy	204			15.46.1	Mineral Resources	214
15.30.1 Present Status of Biofuels	204		15.47	Marine	Energy resources	216
15.31 Geothermal Energy	204				Ocean Thermal Energy Conversion (OTE	
15.32 Wave energy	204	16.	Fcono	mic Ac	tivities	218
15.33 Tidal energy	204				y Sector	
15.34 Forest Resources	205				Agriculture	
15.34.1 Economic Significance of Forests	205				Importance of Agriculture	
15.34.2 Ecological significance	205				Influence of Environment on Agriculture	
15.34.3 Socio-cultural significance	205				Types of Agricultural Practices	
15.35 Major Forest Types	205				Shifting Farming	
15.36 Equatorial Evergreen Forest	205				Sedentary Farming	
15.36.1 Characteristics of Forest	205				Intensive Farming	
15.37 Tropical Deciduous (Monsoon) Forest	206				Extensive Farming	
15.37.1 Characteristics of Forest	206				Subsistence Farming	
15.38 Mediterranean Forest	207				Commercial Farming	
15.38.1 Characteristics of Forest	207				Mixed Farming	
15.39 Temperate Deciduous Forest	207				Market Gardening	
15.39.1 Characteristics of Forests	207				dary Sector	
15.40 Coniferous Forest	208				acturing	
15.40.1 Characteristics of the Forests	209				cation of Manufacturing Industries	
15.41 Deforestation	209				On the Basis of Strength of Labour	
15.41.1 Extent of deforestation	209				On the Basis of Source of Raw Material.	
15.41.2 Global examples	209				On the basis of Ownership	
15.41.3 Causes of deforestation	209				On the Basis of Raw-Material and Finish	
15.41.4 Conservation of forest	210				Goods	
15.41.5 Forest conservation solutions and the term management	-			16.5.5	Miscellaneous Industries	229
15.42 Marine Resources				16.5.6	On the Basis of Capital Investment	229
15.43 Types of Marine Resources				16.5.7	Characteristics of Modern Manufacturin	g229
15.44 Marine biotic resources			16.6	Forest	Based Industries	230
15.44.1 Plankton community			16.7	Paper I	ndustry	231
15.44.2 Zooplankton Community				16.7.1	Factors that influence the paper industry include:	
15.44.3 Nekton community			16.8	Δσrn R	ased Industries	
15.44.4 Benthos Community					tton Textile Industry	
15.44.5 Importance of benthos					I-based Industry	
15.45 Fishing					d Steel Industry	
			10.11	ii on all	a occor maastry	202

16.11.1 Factors determining the location of iron and steel plant23	34
16.12 Petrochemical Industry	35
16.13 Tertiary sector	36
16.13.1 Characteristics of the tertiary sector23	37
16.14 Transportation	37
16.15 Roadways	37
16.15.1 Advantages of Road Transport23	37
16.15.2 Disadvantages of Road Transport23	38
16.16 Railways	38
16.16.1 Advantages of Railway Transport23	38
16.16.2 Disadvantages of Railway Transport23	38

n and	16.17 Waterways
234	16.18 Inland Waterways
235	16.19 Ocean Routes (International waterways) 239
236	16.19.1 Advantages of Waterways239
237	16.19.2 Disadvantages of Waterways239
237	16.20 Airways
237	16.20.1 Advantages of Airways240
237	16.21 Communication System
238	16.21.1 Satellite Communication242
238	101211 00101110 001111101110111011111111
238	
238	

SAMPLE PAGES

Origin of the Universe

Often, we gaze into the night sky, try to count the stars, wish for a shooting star, or simply check out the constellations. In doing so, we just don't look at the sky; we gaze into the universe. The Universe contains all the matter and energy that exists around us. The universe contains millions of galaxies. Each galaxy has millions of stars, and there are stars with several planets revolving around it. Our solar system is also part of the MilkyWay galaxy and consists of eight planets and their moons in orbit around the Sun. Our solar system also contains smaller bodies like an asteroid, meteoroid, and comet. In this chapter, we shall try to understand the origin and evolution of the universe, our solar system, and the basics of geography.

Understanding Our Universe

Why are we here in the universe? Who made the universe? Did the Universe exist forever, or does it have a beginning? Will it live forever, or will it have an end? These questions have always intrigued humans, and we have time and again attempted to answer these questions.

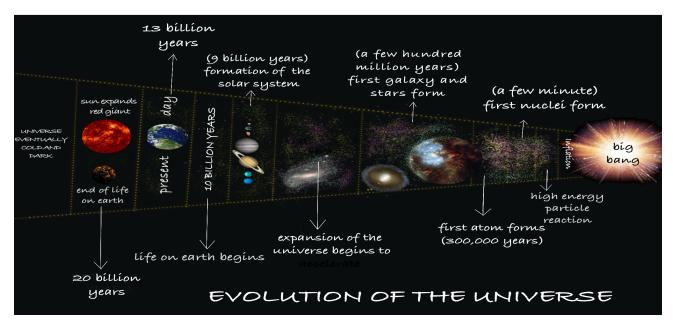
The study of the Universe started back during ancient times. During the Golden Age of Greek civilization, people held two different views on the Universe- the geocentric view and the holocentric view.

Geocentric View: Geocentric means earth-centric. According to this view, the earth was at the center of the universe. The world was considered a spherical, motionless body with a

transparent hollow sphere surrounding it. This hollow sphere was known as the celestial sphere. The stars were located in this sphere, and they moved around the earth daily. Aristotle and Ptolemy supported this view on the Universe.

Heliocentric View: Aristarchus was the first Greek philosopher to put forward a heliocentric, i.e., sun-centered view of the universe. According to this view, the Sun is at the center of the universe, and the Earth revolves around it. However, this view was not popular back then.

Modern astronomy: The academic contributions by Nicolaus Copernicus, Johannes Keppler, Galileo Galilei, and Sir Isaac Newton have been constructive in our understanding of the Universe. They were called the "founders of modern astronomy." Copernicus upheld the heliocentric view of the universe

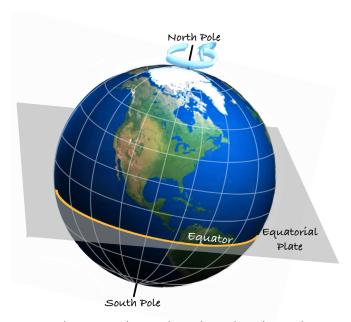


International Date Line:

The world is divided into 24 time zones. But there is a particular place where the day actually starts. The place where the day starts is the International Date Line. It is an imaginary line passing from the North Pole to the South Pole in the middle of the Pacific Ocean. It passes approximately the 180° line of longitude. When we cross the line, we either gain or lose a day depending on our direction of travel. If we travel westward, we gain a day, on the other hand, if we travel east, we lose a day.

Daylight Saving Time:

In some regions (countries in the extreme north and south), clocks are advanced in summer months by one hour. This practice is known as daylight saving time. Near the eaquators the length of day and night are nearly the same. However, as we move closer to the North or South Pole, the days are much longer in the summers. Thus, few countries in higher latitudes decided to come up with the concept of Daylight Saving Time. It was first used in Canada in 1908. The countries advance their clocks by one hhour in summer with the motive to better use the daytime. This process also helps in saving energy as use of artificial lighting is lessened. USA, Canada, European Union Countries, Argentina, Cuba, etc use daylight saving time.



Earths spins around its rotation axis, an imaginary line that passes through the North Pole and the South Pole. An imaginary plane bisecting Earth midway between the two poles defines the equator.

Earth's Axis



Major Latitudes of Earth

Different Motions of the Earth

Has it ever occurred to you how days and nights occur and what a year is? To answer these questions, we need to understand the motions of the earth. The Earth has two motions viz. Rotation and Revolution.

Rotation: Imagine a line passing from the North Pole through Earth's center to the South Pole. This line is called the axis of the earth. The axis is not straight but inclines at angle of 23.5°. This means it makes an angle of 66.5° with its orbital plane (the plane formed by the orbit). The earth spins around this axis. This spinning movement of the earth is called Rotation. The earth takes 23 hours, 56 minutes, and 4 seconds to complete one rotation on its axis. The period of the rotation is called day or earth day. The circle that divides the day from the night is called the circle of illumination.

Significance of Earth's Rotation

If the earth did not rotate, life wouldn't have been possible. Without rotation, the portion of the earth facing the Sun will always face the Sun and experience day. The temperature would have been high on this side. While the side of the earth, facing away from the Sun would always have night. The temperature would be freezing here. It is to be noted that the duration of the day is not equal over all places on th earth. The variation occurs due to the inclined axis of the earth.

The earth's rotation also drives the movement of water in the oceans. It is also responsible for deflection of tides. The rotation of the earth is also responsible for the general circulation in the earth's atmosphere. We will learn about the

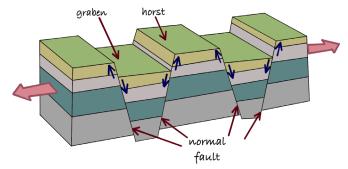
- Hade: It is the angle between the fault plane and the vertical plane.
- Up throw side: It is the block of rock that lies at a relatively greater height than the other.
- Down throw side: It is the block of rock that lies at a relatively lesser height than the other.
- Hanging Wall: It is the block of rock resting above the fault plane.
- **Footwall:** It is the block lying below the fault plane.
- Fault Line: It is the intersection of the fault with the earth's surface.
- Fault Zone: it consists of various small faults. It is formed when the displacement of the rock is not related to a single fracture but is distributed over a large area.

Types of Faults

Normal Fault: Normal faults are formed due to tensional forces that tend to pull the crust apart. In this type of fault, the crust on one side is raised relative to the other. This creates a steep, straight, cliff-like feature called a **fault scarp**.

A trench-like feature with straight, parallel walls is called **Graben or Rift Valley**. They are formed when a block of rock

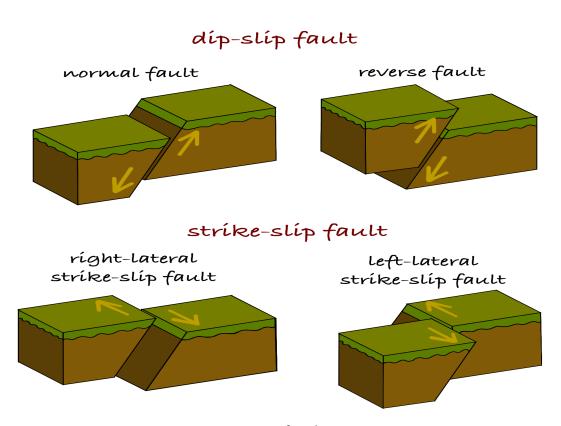
drops down between two normal faults. On the other hand, when a block is elevated between two normal faults, a **horst** is formed. They have a flat top but steep, straight sides. Horsts and Grabens are very common in the East African Rift Valley.



Horst and Graben

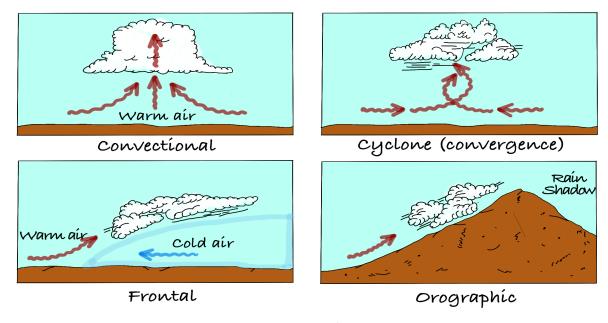
Reverse Fault: These are faults where the fault plane is inclined in such a way that one side rides up over the other. These faults are formed due to compressional forces. They are formed when both the blocks along the fracture are moving towards each other.

Strike-Slip Fault: They are formed when the rock masses slip past one another parallel to the strike. They are also called transcurrent faults. Strike-slip faults are **right-lateral** or **left lateral**. It depends on whether the block on the opposite side

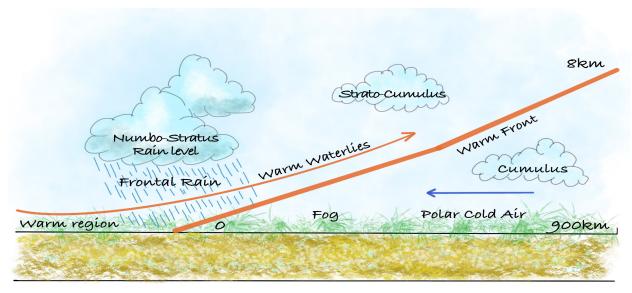


Types of Faults

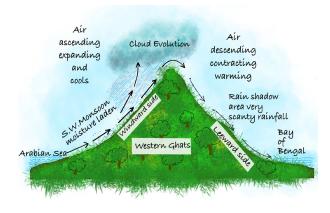
Page 112 Atmospheric Water



Atmospheric lifting



Warm Front Rainfall

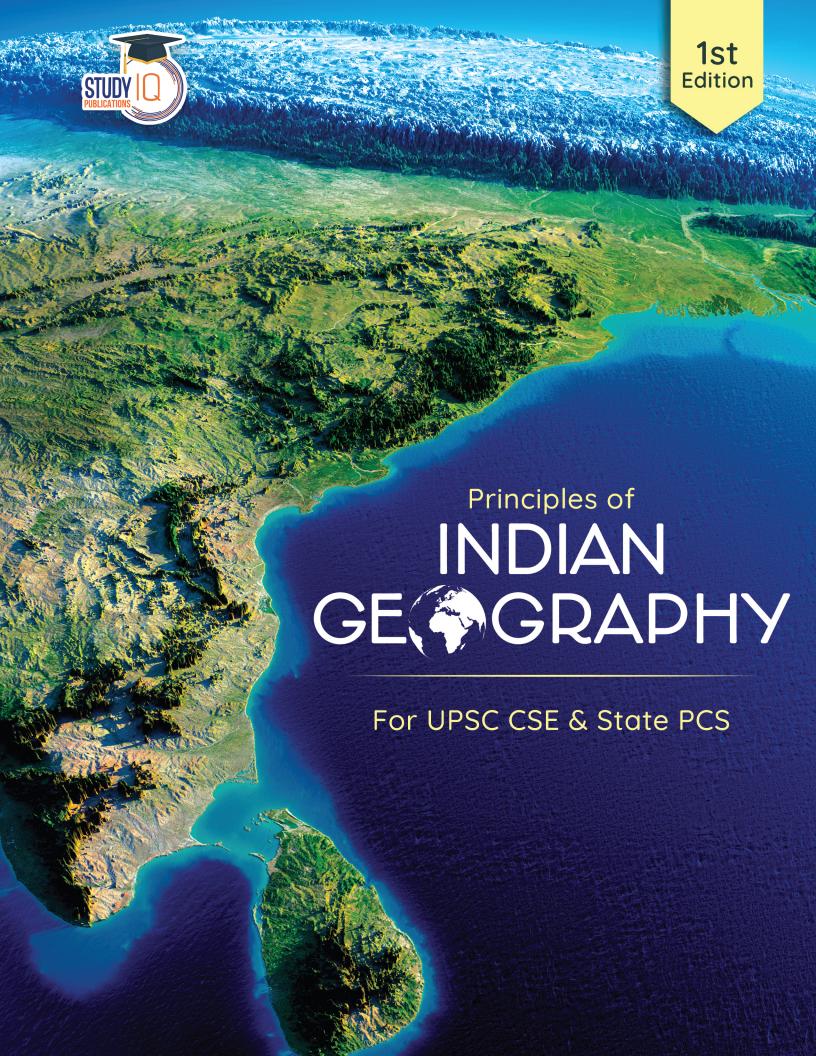


Orographic rainfall

air cross over the mountain range, it descends along the leeward slopes. After descending, they get warm and cause little rain on the leeward side. The region on the leeward side that receives less rain is called the rainshadow area. Orographic rainfall occurs in Cherrapunji on the southern margin of the Khasi Hills in Meghalaya, India.

Frontal Rainfall

When two different air masses meet, they do not mix. Instead, a zone of discontinuity called a **front** is established between them. The warmer air rises over, the cooler air along this



From the Founder's Desk

Dear Aspirants,

We would like to humbly thank you for the great response we had from our first book, 'Fundamentals of Geography'. Within 10 days of launch, we were ranked #2 on the best sellers list for Amazon and Flipkart in the UPSC segment.

Taking inspiration from the overwhelming positive response of our first book, we are taking another leap towards our mission to democratize quality education for everyone. Study IQ Publications is delighted to present you with the first edition our second book 'Principles of Indian Geography'.

This book was created keeping in mind, the concerns and challenges that students face during their Civil services preparation. Students are frequently confused about what to study, how much to study, the depth of knowledge required for any topic, and the type of questions asked by the commission. Above all, the absence of consolidated study material and the information silo from multiple sources hinder our student's preparations. This is more evident for the subject of India geography where the sources are multiple, bulky and with bad presentation, making it difficult for the students to understand and comprehend.

This book is an honest attempt to tackle these problems and improve students' knowledge base, saving their precious time during their preparation and eliminating many academic misunderstandings that they encounter.

Special Features of This Book

This book aims to make your preparation focused and relevant based on UPSC's current trend and pattern, revision-friendly, and up-to-date.

- The requirements of the UPSC Civil Services Examination are the exclusive focus of this book.
- We have taken great care to ensure that the materials are written in a clear and easy-to-understand, so that students may learn and recall the concepts to their advantage.
- Wherever necessary, we've incorporated relevant examples, maps, and graphics to help students grasp the fundamental concepts and draw the relevant maps in their Mains examination.
- We have incorporated the relevant previous year's questions at the end of each chapter so that the students can test their knowledge while understanding the trend of the question.
- We have extensively used tables, so that our students can revise the facts easily during their second revision and not spend time reading the whole chapter again.

With all sincerity and humility, the Study IQ team wishes you the best in your preparation, and we are hopeful that this book will help you in your journey.

Happy Learning!!

Dr. Gaurav Garg Co-Founder, Study IQ Education Mohit Jindal, IIT-Bombay Co-Founder, Study IQ Education, Mentoring UPSC CSE Aspirants for past 7 years

Detailed Table of Contents

1.	Intro	duction to Indian Physical Geography2	2.10	The importance of the Himalayan Region27
	1.1	India-A geographical Unit2	2.11	The Northern Plains28
	1.2	The Frontiers of India3		2.11.1 Evolution of Northern Plains28
		1.2.1 India-China Border (Sino-Indo Border) 4		2.11.2 Features of the Northern Plains 28
		1.2.2 India-Nepal Border5		2.11.3 Physiographic Divisions of Northern Plains of
		1.2.3 India-Bhutan Border5		India29
		1.2.4 India-Pakistan Border6		2.11.4 Comparative Analysis between Bhabar, Tarai, Bhangar and Khadar
		1.2.5 India-Bangladesh Border7		2.11.5 Regional Division of Northern Plains 31
		1.2.6 India-Myanmar Border7		2.11.6 Significance of Northern Plains
		1.2.7 India-Sri-Lanka Border	2 12	The Desert of India
	1.3	India's Political Divisions8	2.12	2.12.1 Features of Deserts of India
	1.4	Bays, Gulfs, and Seas in India8	2 12	The Peninsular Plateau
	1.5	Geological Structure of India10	2.13	2.13.1 Evolution of the Peninsular Plateau of India
	1.6	The Archaean Rock System11		
		1.6.1 Archaean Gneisses and Schists 11		2.13.2 Features of Peninsular Plateau in India 32
		1.6.2 Dharwar System 12		2.13.3 Classification of Peninsular Plateaus 33
	1.7	The Purana Rock System13		2.13.4 Hill Ranges of the Peninsular Plateau 35
		1.7.1 The Cuddapah System 13		2.13.5 Significance of the Peninsular Plateau 37
		1.7.2 The Vindhyan System 13	2.14	The Coastal Plains
	1.8	The Dravidian Rock System14		2.14.1 Western Coastal Plains
	1.9	The Aryan Rock System14		2.14.2 The Eastern Coastal Plains
		1.9.1 The Gondwana System 14		2.14.3 Significance of the Coastal Plain Region 39
		1.9.2 The Jurassic System 15	2.15	The Islands39
		1.9.3 The Deccan Trap 15		2.15.1 Andaman & Nicobar Islands
	1.10	The Tertiary System16		2.15.2 Lakshadweep Islands
	1.11	The Quaternary System (The Pleistocene and	2.16	Mountain Peaks in of Himalayas42
		recent formations)16	2.17	Mountain Peaks of Peninsular India43
2.	Phys	iography of India19	2.18	Major glaciers in India45
	2.1	Physiography of India19	2.19	Major Waterfalls in India47
	2.2	The Himplayes 19		
	2.2	2.2.1 The origin and development of the Himalayas		nage System of India54
		20	3.1	Types of Drainage Systems54
		2.2.2 Division of Himalayas 20	3.2	Classification of Indian Drainage55
		2.2.3 Features of Himalayan Mountains 20	3.3	Himalayan River Systems57
	2.3	The Greater Himalayan Range21		3.3.1 Evolution of Himalayan Rivers 57
		2.3.1 Trans Himalayas21	3.4	The Indus River System59
		2.3.2 The Great Himalayas or the Himadri 22		3.4.1 The Jhelum River System 60
	2.4	The Lesser Himalayas or the Himachal23		3.4.2 The Chenab River System 60
	2.5	The Shiwaliks or the Outer Himalayas23		3.4.3 The Ravi River System
	2.6	The Western Himalayas24		3.4.4 The Beas River System
	2.7	The Central Himalayas25		3.4.5 The Sutlej River System 61
	2.8	The Eastern Himalayas25	3.5	The Ganga River System61
	2.0	The North Eastern Hills or Duryanchal		3.5.1 The Yamuna River System

		3.5.2	The Chambal River System 64	ļ.		Monse	oon	89
		3.5.3	The Sind River System 64	1		4.7.1	El-Nino and Indian Monsoon	89
		3.5.4	The Betwa River System 65	5		4.7.2	La-Nina and Indian Monsoon	90
		3.5.5	The Ken River System 65	5	4.8	Indian	Ocean Dipole	90
		3.5.6	The Son River System 65	5	4.9	Seaso	ns of India	92
		3.5.7	The Damodar River System 65	5		4.9.1	Characteristics of Major Seasons	92
		3.5.8	The Ramaganga River System 66	5	4.10	Distrib	oution of Rainfall in India	
		3.5.9	The Ghaghara River System 66	5	4.11		nes in India	
		3.5.10	The Saryu River System 66	5			tic Regions of India	
		3.5.11	The Gandak River System 66	5	7.12		Koppen's classification of climate	
		3.5.12	The Burhi Gandak River System 66	5		4.12.1	Roppen's classification of climate	50
		3.5.13	The Kosi River System66	5.	Natu	ıral Veg	etation of India	. 100
	3.6	The Br	ahmaputra River System67	7	5.1	Signifi	cance of Natural Vegetation	100
	3.7		ninsular River system67		5.2	Factor	s Influencing Natural Vegetation in India	100
		3.7.1	Evolution of Peninsular Rivers 68		5.3	Spatia	l Distribution of Natural Vegetation in In	ndia
	3.8		owing Rivers68					101
	3.0	3.8.1	The Mahanadi River System 68		5.4	Status	of Forest Cover in India	101
		3.8.2	The Godavari River System		5.5	Classif	fication of Natural Vegetation in India	102
		3.8.3	Krishna River System		5.6	Tropic	al Evergreen Forests	102
		3.8.4	Cauvery River System			5.6.1	Tropical Wet Evergreen Forests or Rain	
	2.0						Forests	102
	3.9		lowing Rivers			5.6.2	Tropical Semi-Evergreen Forests	103
		3.9.1	Narmada River System			5.6.3	Tropical Dry Evergreen Forests	103
		3.9.2	Tapti River System		5.7	Tropic	al Deciduous Vegetation	103
		3.9.3	Luni River System			5.7.1	Tropical Moist Deciduous Forests	103
		3.9.4	The Sabarmati River System 72			5.7.2	Tropical Dry Deciduous Forests	104
		3.9.5	Mahi River System72	2	5.8	Tropic	al Thorn Forests	104
		3.9.6	A comparative analysis between the Himalayan Rivers and the Peninsular Rivers		5.9		opical Forests	
				3		5.9.1	Sub-tropical Broad-leaved Hill Forests	
						5.9.2	Sub-tropical Moist Pine Forests	
4.	India	an Clima	ate 77	7		5.9.3	Sub-tropical Dry Evergreen Forests	
	4.1	Climat	e In India77	7	5 10		erate Vegetation	
	4.2	Salient	features of Indian climate77	7	3.10		Himalayan Dry Temperate Forests	
	4.3	Factors	s determining the climate of India78	3			Himalayan Moist Temperate Forests	
	4.4	Back to	o Basics79)			Montane Wet Temperate Forests	
		4.4.1	Understanding Pressure Belts 79)			Alpine and Sub-Alpine Forests	
		4.4.2	Understanding Jet Streams 80)	г 11			
		4.4.3	Types of Jet Streams 80)			Il and Swamp Forests	
	4.5	The Inc	dian climatic calendar80)			Products and their Utility	
		4.5.1	The Summer Season 81	L			with Forestry in India	
		4.5.2	The onset of Southwest Monsoon 82	2	5.14		Conservation	
		4.5.3	Retreating Monsoon and the North-East			5.14.1	Various measures of forest conservation	. 108
			Monsoon	5	5.15	Types	of Natural Vegetation in India	110
		4.5.4	Winter Season 86	6.	Soils	of Indi	a	. 113
		4.5.5	The factors affecting the intensity of the	J.	6.1		s Influencing Soil Formation in India	
			rainfall	7	6.2		of Soils in India	
		4.5.6	Characteristics of Monsoonal Rainfall 87	7	0.2	6.2.1	Alluvial Soil	
	4.6	Impact	t of Jet Stream on Indian Monsoon88	3				
	4.7	El-Nind	and Southern Oscillation (ENSO) & Indian			6.2.2	Black soil	115

		6.2.3	Red and Yellow Soil	116		7.21	What o	drives migration in India?	143
		6.2.4	Laterite Soil	116		7.22	Impact	of Migration	143
		6.2.5	Forest-Mountain Soils	116		7.23	Govern	nment Initiatives	144
		6.2.6	Arid or Desert Soil	116		7.24	Settler	nents in India	145
		6.2.7	Saline-Alkaline Soil	117		7.25	Classifi	ication of settlements	145
		6.2.8	Peaty Soil	117		7.26	Rural S	Settlements	146
	6.3	Issues	of Soil in India	117			7.26.1	Types of Rural Settlements in India	146
		6.3.1	Soil Erosion	117				Patterns of rural settlements	
		6.3.2	Salinity and Alkalinity	119			7.26.3	Regional distribution of rural settleme	ents 148
		6.3.3	Desertification	120		7.27		Settlements	
		6.3.4	Waterlogging	121				sation in India	
	6.4	Soil Co	onservation Measures	122		7.20		Status of Urbanization in India	
	6.5	Major	Soils in India	123				Causes of Urbanisation	
_				405				Issues with Urbanization in India	
7.			an Geography			7 29		Planning	
	7.1		pulation of India					ment initiatives taken to tackle the	
	7.2		h of Population in India (Tre			7.30		anisation	
		-	n)			7.31	Planni	ng In India	157
	7.3		s of population growth					nt types of Planning	
	7.4	_	nal Variation in Population G			7.33		ng in India- A Background	
	7.5		ution of Population			7.34		ives of Planning in India	
	7.6	The De	ensity of Population				-	ve-Year Plans in India	
		7.6.1	Spatial distribution of popul	ation 128		7.33		First Five-Year Plan	
	7.7	_	mposition, Dependency rati					Second Five Year Plan	
			graphic Dividend					Third Five-Year Plan	
		7.7.1	Age Composition					Fourth Five-Year Plan	
		7.7.2	Dependency ratio and Demo					Fifth Five Year Plan	
	7.0	Cov Do	tio					Sixth Five-Year Plan	
	7.8								
	7.9		:y					Seventh Five Year Plan	
	7.10		ational Structure					Eighth Five Year Plan	
		_	stic Composition					Ninth Five Year Plan	
			ous Composition					Tenth Five Year Plan	
	7.13	Sched	uled Caste and Scheduled Tri	be 134				Eleventh Five Year Plan	
		7.13.1	Scheduled Caste	134				? Twelfth Five Year Plan	
		7.13.2	Scheduled Tribes	134		7.36		Area Planning	
			Major Tribes in India				7.36.1	Command Area Development Program	
	7.14	Popula	ation Problems	138			7 26 2	Drought Prone Area Development	102
	7.15		Population Policies pre-and	•			7.30.2	Programme	164
			endence				7.36.3	Desert Development Programme	
		7.15.1	India's Population Policies po					Hill Area Development Programme	
		7 4 5 2	independence					Tribal Area Development Programme	
	746		National Population Policy, 2					The Small Farmers Development Age	
	7.16		ative measures to control th					(SFDA)	•
	7.17		ion in India			7.37	Sustair	nable Development	167
			is Migration?		•				
	7.18				8.			f India	
	7.19		tant Terms Associated with I			8.1		rces	
	7.20	irend	and Pattern of Migration in I	naia 142		8.2	Classifi	ication of Resources	171

8.3	Water Resources of India	. 172		8.25.2	Nuclear Energy	205
8.4	Surface Water Resources in India	. 173		8.25.3	Solar Energy	207
	8.4.1 Major Lakes in India	174		8.25.4	Wind Energy	209
8.5	Groundwater Resources in India	. 177		8.25.5	Tidal Energy	210
	8.5.1 Status of Groundwater in India	177		8.25.6	Biogas	211
	8.5.2 Groundwater Provinces in India	177		8.25.7	Geothermal Energy	212
8.6	Water Demand and Utilisation in India	. 178 9.	Fcon	omic Ac	ctivities in India	. 216
8.7	Issues with Water Resources in India	_	9.1		ture	
8.8	Implications of Water Scarcity	. 179	9.2	_	esource in India	
8.9	Conservation and Management of Water			9.2.1	Land Use Categories	
	Resources	. 180		9.2.2	Land-use Changes in India	
8.10	Steps taken by the Indian Government	. 181		9.2.3	Common Property Resources (CPRs)	
8.11	Mineral Resources of India	. 181		9.2.4	Agricultural Land Use in India	
8.12	What are Minerals?	. 181	9.3	Signific	cance of Agriculture in India	
8.13	Types of Minerals	. 181	9.4	_	S Affecting Indian Agriculture	
	8.13.1 Difference between metallic minerals an		9.5		of Agriculture Practiced in India	
	non-metallic minerals		9.6		ng Seasons in India	
8.14	Distribution of Minerals in India		3.0	9.6.1	Rabi Crops	
8.15	Major Minerals in India	. 182		9.6.2	Kharif Crops	
8.16	Ferrous Metallic Minerals	. 182		9.6.3	Zaid Crops	
	8.16.1 Iron ore		9.7		Crops in India	
	8.16.2 Manganese	. 184	9.8		rops	
8.17	Non-Ferrous Minerals	. 185	3.0	9.8.1	Rice	
	8.17.1 Bauxite	. 185		9.8.2	Wheat	
	8.17.2 Copper	. 186		9.8.3	Maize	
	8.17.3 Lead	187		9.8.4	Millets	
	8.17.4 Zinc	188		9.8.5	Jowar	
	8.17.5 Gold	188		9.8.6	Baira	
	8.17.6 Silver	189		9.8.7	Ragi	
8.18	Non-metallic Minerals	. 190	9.9		Nagi	
	8.18.1 Mica	. 190			rops	
	8.18.2 Limestone	. 190	9.10			
	8.18.3 Dolomite	. 191			Sugarcane Cotton	
	8.18.4 Other Non-Metallic minerals	. 192			Jute	
8.19	Atomic Minerals	. 193			Tobacco	
8.20	Rare Earth Minerals	. 194			Coconut	
8.21	Issues with Mineral resources	. 195			Oilseeds	
	8.21.1 Management of mineral resources	195	0 11		tion Crops	
8.22	Energy Resources of India	. 195	9.11		Tea	
8.23	Types of Energy	. 195			Coffee	
8.24	Conventional energy Sources	. 196			Rubber	
	8.24.1 Coal	. 196			Arecanut	
	8.24.2 Petroleum	. 199	0.12		ılture	
	8.24.3 Natural Gas	. 201				
	8.24.4 Hydroelectricity	. 202	3.13		ng Pattern	
8.25	Non-Conventional Energy Sources	. 205	0.44		Factors influencing cropping pattern	
	8.25.1 Shale Gas	. 205			ng Intensity	
			7.17	MALOCI	mant / mes	/411

9.16	Irrigati	on242	9.31	Factor	s affecting the Location of Industries	265
9.17	Signific	cance of irrigation243	9.32	Classif	ication of Industries	2 65
9.18	Source	s of irrigation243	9.33	Agro b	ased Industries	2 66
	9.18.1	Tank irrigation 243		9.33.1	Cotton Industry	266
	9.18.2	Well and Tubewell irrigation 244		9.33.2	Jute Industry	26 9
	9.18.3	Canal Irrigation244		9.33.3	Silk Industry	270
	9.18.4	Other Sources of irrigation245		9.33.4	Woolen Industry	272
9.19	Multip	urpose river valley projects246		9.33.5	Sugar Industry	273
	9.19.1	Advantages of Multipurpose Power projects		9.33.6	Tea Industry	276
		246		9.33.7	Coffee Industry	277
9.20	Interlin	nking of rivers248		9.33.8	Vegetable Oil Industry	278
	9.20.1	Advantages of River Interlinking 249		9.33.9	Leather goods Industry	27 9
	9.20.2	Disadvantages of River Interlinking 249		9.33.10	Food Processing Industry	280
9.21	Issues	with Indian Agriculture249	9.34	Heavy	Engineering Industries	281
9.22	Govern	nment Initiatives250		9.34.1	Automobile Industry	281
9.23	Allied	Activities251		9.34.2	Railway Equipment Industry	283
9.24	Livesto	ck resources In India251		9.34.3	Ship Building Industry	284
	9.24.1	Distribution of Breeds Of Cattles 251		9.34.4	Aircraft Manufacturing Industry	285
	9.24.2	Milch Breeds of Cattle252	9.35	Forest	Based Industries	2 86
	9.24.3	Indegeneous Draught Breeds of Cattle 252		9.35.1	Paper Industry	286
	9.24.4	Indegenous Dual Purpose Breeds of cattle 253		9.35.2	Rubber Industry	288
	9.24.5	Exotic Breeds of cattle253	9.36	Minera	al Based industries	28 9
	9.24.6	Indegenous Buffalo Breeds 253		9.36.1	Iron & Steel Industry	289
	9.24.7	Goat Breeds		9.36.2	Copper Industry	293
	9.24.8	Sheep Breeds254		9.36.3	Aluminium Industry	293
	9.24.9	Problems for Indian Dairy Industry 254		9.36.4	Lead Smelting Industry	294
9.25	Poultry	/255		9.36.5	Zinc Smelting Industry	295
	9.25.1	Areas of Production255		9.36.6	Cement Industry	295
	9.25.2	Important breeds of chickens and their distribution in India	9.37		cal based Industry Heavy inorganic chemical industry	
	9.25.3	Various Govt. Schemes and programmes			Heavy organic chemical industry	
		related to Livestocks in India 256			Fertilizer Industry	
9.26	Apicult	ture256			Pharmaceutical Industry	
	9.26.1	Production of Honey in India 256			Glass Industry	
9.27	Sericul	ture257			Ceramic Industry	
9.28	Fishing	257	9.38		e Industries	
	9.28.1	Comparison of inland and marine fishing. 258	9.39	_	onics Industry	
	9.28.2	Status of Fisheries in India258	9.40		Manufacturing	
	9.28.3	Importance of the fishing industry 258			· ·	
	9.28.4	Marine fisheries in India259	9.41	-	Industrial Regions in India	
	9.28.5	Inland fisheries 259	9.42		Sector of India	
	9.28.6	Challenges faced by Indian Fishing Industry	0.40		The Service Sector in India	
			9.43		n Sector	
		Government initiatives 261			Significance of Tourism in India	
9.29	Agricul	tural Revolution In india263			Medical Tourism	
9.30	Manuf	acturing Sector of India264		9.43.3		
	9.30.1	Significance of manufacturing sector in India			Challenges in the Tourism Sector of Indi	
				9.43.5	Fast-tracking Tourism in India	311

	9.44	IT and BPM312		
		9.44.1	Status and Potential	312
		9.44.2	Distribution	312
		9.44.3	Government initiatives	312
	9.45	Challer	nges Faced by Service Sector in India	313
10.	Trans	port an	nd Communication	317
	10.1	Transp	ort	317
	10.2	Land T	ransportation	317
		10.2.1	Road Transport	317
		10.2.2	Pipeline Transportation	322
		10.2.3	Railways transportation	322

10.3	Water	Transportation324
10.4	Airway	rs Transportation328
10.5	Comm	unications in India329
10.6	Differe	nt Types of Communication System 329
	10.6.1	Postal Services329
	10.6.2	Telecommunication
	10.6.3	The 5G Revolution 330
	10.6.4	Mass-Communication331
	10.6.5	Print media332
	10.6.6	Satellite Communication

SAMPLE PAGES

Introduction to Indian Physical Geography

India's Geography encompasses one of the world's most diverse land layouts. India is the country that occupies most of the Indian subcontinent in Southern Asia. These diverse features make India one of the best topographic regions. In this chapter we are going to discuss the physical features of the Indian Subcontinent which includes its geographical extent, the different frontiers and the shared boundaries of our nation. We will also discuss the surrounding oceans, political divisions and the geological structure which comprises this huge sub continent.

India-A geographical Unit

The land of the ancient civilizations, **India** is a vast country with cultural and physical diversity, lying entirely in the Northern Hemisphere in the Continent of Asia. The word India has its origin in Greek Mythology which referred to the land of "**Indoi**" or people dwelling near the river **Indus**. India has been regarded by many names like- **Aryavarta** (The land of the Aryan race), **Bharat**, and **Hindustan** (the Land beyond the river Sindhu).

India forms part of South Asia; it is the seventh-largest country in the world in size. India has a vast geographical extent, extending from the snowy ranges of the Himalayas

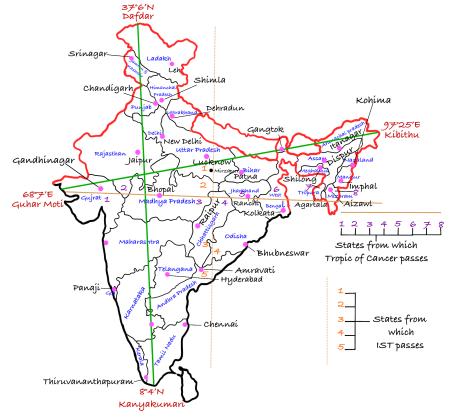
ranges in the north to the shores of the Indian Ocean in the south and the Arabian Sea in the south-west to the Bay of Bengal in the south-east. It also encompasses a diverse landmass that varies from permanently ice-covered lofty Himalayas to Great Indo-Gangetic Plains. It spans from vegetation devoid Thar deserts in the west to vegetation abundant hilly north-east. The land mass is as old as the oldest land of Gondwana in the Indian peninsula and relatively new like the coastal plains in both eastern and western India.

To the southeast and southwest of the mainland lie the islands of **Andaman and Nicobar Island** in the Bay of Bengal and **Lakshadweep Islands** in the Arabian Sea respectively.

The mainland extends between latitudes 8°4′N and 37°6′N and longitudes 68°7′E and 97°25′E. Both latitudinal and longitudinal extent is about thirty degrees. India extends

from Indira Ridge in Kashmir to Kanyakumari in Tamil Nadu with 3214 kilometers. The west-east extent of India spans from Rann of Kutch in Gujarat in the west to Kibuthu (the easternmost town) in Arunachal Pradesh in the east with a distance of 2933 kilometers. The Indian landmass has an area of 3.28 million square kilometers, which is around 2.4 percent of the total geographical area of the world.

With 30° longitudinal differences between Saurashtra in the west and Arunachal Pradesh in the east, the local time difference is **120 minutes or 2 hours**. Thus, Arunachal sees the sun rising 2 hours earlier than Saurashtra in the west. The standard meridian in India



India's Geographical Extent

Drainage System of India Page 61

The Sutlej River System

River Name	Sutlej		
Origin	Mansarovar-Rakas Lake near Darma Pass in Tibet		
Length	1450 Km (1050 Km in India)		
Discharge	Joins Chenab and together they form Panjnad and discharge into the Indus.		
Major Cities	Kapurthala district of Punjab		
Right Bank Tributaries	Spiti, Beas, Chenab		
Left Bank Tributaries	Baspa		
Major Dams	Bhakra-Nangal Dam		

The Sutlej is the longest of the five rivers (Jhelum, Chenab, Ravi, Beas, and Sutlej) that flow through the Punjab region in northern India and Pakistan. The river originates from Mansarovar-Rakas Lake near Darma Pass in Tibet. The river is known as Langchen Khamban in Tibet. The river flows almost parallel to the Indus River for 400 kilometers before entering India through Shipkila Pass. The main tributary of the Sutlej River is the Spiti River. The Spiti River joins Sutlej at Namgia. It feeds the Bhakra Nangal canal system. After entering the plains at Rupar, the river turns westward and joins Beas at Harike. From Ferozpur, it forms the boundary between India and Pakistan for 120 Kilometres.

The Ganga River System

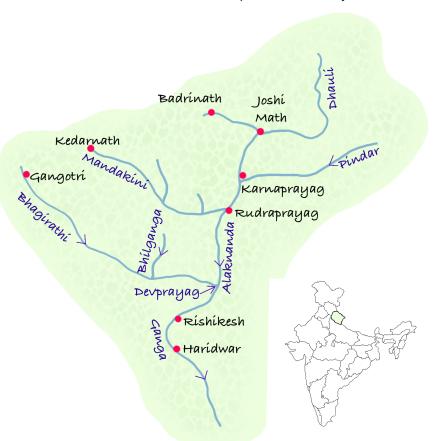
The Ganga River is a lifeline to millions of people and India's longest river. It has a historical and mythological significance. Many imperial capitals like Pataliputra, Kannauj, and Munger have flourished

on the banks of the river Ganga. Apart from cultural and geographical significance, it has an environmental significance. The deteriorating condition of the Ganga River system has raised concerns in India.

The Ganga rises as **Bhagirathi** from the **Gangotri glacier at Gaumukh** at 7,010 meters above the mean sea level. **Alaknanda**, another head-stream of river Ganga,

originates from the **Satopanth glacier near Badrinath.** Alakananda River flows to meet the Dhauliganga River at **Vishnuprayag**, the Pindar River at **Karnaprayag**, the Mandakini or Kali Ganga at **Rudraprayag** and finally the Bhagirathi at **Devprayag**. At Devprayag, the river gets its name "**Ganga**."

After flowing 280 kilometers from its source southwest, Ganga touches the Gangetic Plains at Haridwar. Haridwar is considered one of the major holy pilgrimages for Hindus. From this point, the Ganga River starts flowing south-east direction through the plains of northern India. The river takes a curved path while passing through the city of Kanpur before being joined by the River Yamuna from the southwest direction at Allahabad. The river passes some major towns like



The Ganga and its Tributaries in the Area of Origin

Varanasi, Buxar, Patna, and Bhagalpur. The Ganga River is joined by numerous rivers such as **Kosi, Son, Gandak, and Ghaghra** before changing its course in the south direction

At Pakur, the river begins to branch its distributaries. The first distributary, the **Bhagirathi-Hoogly**, forms the **Hooghly River**. Near the border of Bangladesh, the

Natural Vegetation of India Page 105

Flora: Chir Pine, Oaks, and Olives are important trees.

Fauna: Asian elephant, clouded leopard, gaur, golden langur, etc are found.

Do You know?

Oak trees are of huge economic value as they are used to make furniture and flooring, railroad ties, and mine timbers. They are also used to make barrels in which many wines and spirits are aged.

Sub-tropical Dry Evergreen Forests

Distribution: Sub-tropical Dry Evergreen Forests are found in the western Himalayas up to about 1000 metres above sea level and Shiwalik and Bhabar.

Climatic conditions: The annual rainfall in this area ranges between 50 and 100 cm. Summers are hot enough, and winters are bitterly cold.

Characteristic:

- Low scrub forest with stunted evergreen trees and shrubs are found.
- Considerable regions are covered by dwarf creeping palm Nonnorpops.

Flora: The most common species are olive, Acacia Modesta, and pistacia.

Fauna: Snow Leopard, Himalayan Wild Yak, Musk Deer, etc are found here.

Temperate Vegetation

Himalayan Dry Temperate Forests

Distribution: It is found in the inner dry ranges of the western Himalayas. Ladakh, Lahul, Chamba, Kinnaur, Garhwal, and Sikkim are examples of such areas.

Climatic condition: Precipitation here is low, below 100 cm, and is mostly in the form of snow.

Characteristics:

- The forests are mainly coniferous with xerophytic shrubs.
- Epiphytes and climbers are rare.

Flora: Deodar, Chilgoza, oak, maple, ash, Parrotia, and olive, are important species.

Fauna: The snow leopard and the black-necked crane are found here.

Himalayan Moist Temperate Forests

Distribution: These occur in the western Himalayas between 1,500m and 3,000m. These are found in Kashmir, Himachal Pradesh, Uttaranchal, Darjeeling, and Sikkim.

Characteristics:

- Mainly coniferous species are found.
- These go upto 30 to 50 m high.
- Mosses and ferns thrive on trees.
- They have a shrubby undergrowth.

Flora: Oak, cedar, spruce, maple, walnut, deodar, and chestnut are found. These forests provide high-quality wood for construction. They are also used for making railway sleepers.

Fauna: Barking Deer, Red pandas, Snow Leopard, etc are found here.

Montane Wet Temperate Forests

Distribution: Evergreen wet temperate forests can be found between 1800m and 2700m altitude in the eastern Himalayas. This type of forest can be found in Tamil Nadu and Kerala's higher hills, primarily above 1500m in elevation.

Climatic conditions: The average annual rainfall ranges from 150-to 300cm. The average temperature is 11° to 14° Celcius.

Characteristics:

- The trees are shorter. The trees rarely reach heights of more than 6 meters.
- The undergrowth is dense, with abundant epiphytes, mosses, and ferns that cover the branches.
- These are closed evergreen forests. The leaves are densely packed and rounded.
- Woody climbers are common.

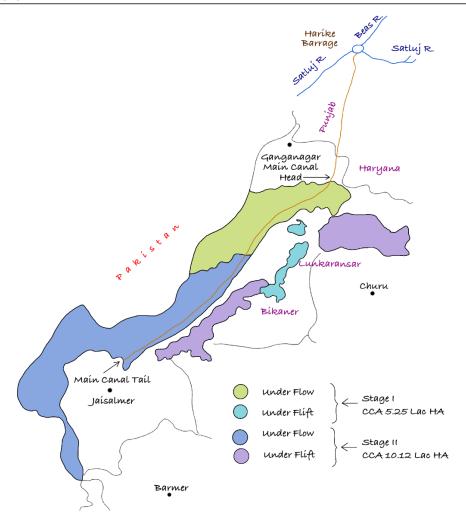
Flora: Oak, Plum, Birch, Deodar, Indian chestnut, magnolia, blue pine, hemlock, chilaune, etc are found.

Fauna: The Nilgiri tahr is found only in the Nilgiri Hills and the southern portions of the Western and Eastern Ghats in the Indian states of Tamil Nadu and Kerala.

Alpine and Sub-Alpine Forests

Distribution: It occurs above the tree line, between elevations of 3,200 and 3,600 meters, and goes up to about 4,200 meters in the western Himalayas and 4,500 meters in the eastern Himalayas.

Indian Human Geography Page 163



Indira Gandhi Canal Command Area

Case Study-Indira Gandhi Canal Project

Indira Gandhi Canal, which was earlier known as the Rajasthan Canal is one of the largest canal systems in the country. It originates at Harike barrage in Punjab and runs parallel to the Pakistan border in the Thar Desert of Rajasthan. The construction work of the canal was carried out in two stages. The First stage command areas include Ganganagar, Hanumangarh, and the northern part of the Bikaner districts. Whereas, second stage command areas include Bikaner, Jaisalmer, Barmer, Jodhpur, Nagaur, and Churu districts covering culturable command areas.

The canal irrigation in these areas has transformed its ecology, environment, and society. It also brought a change in the agricultural economy of the region. Moreover, the presence of soil moisture and various afforestation and pasture development programs under CAD helped in reducing wind erosion and siltation of the canal system.

Objectives of Command area Development:

- Reduce water pilferages and efficient utilization of water for irrigation.
- Leveling of land to achieve a uniform spread of irrigation water in the field.
- Construction of roads.
- Develop participatory management of irrigation.
- Reclamation of waterlogged areas that have been rendered useless.
- Promoting a rotational system of water distribution.
 This is done to ensure an equitable share of irrigation water between the large, small, and marginal farmers.
- Diversification of agriculture.