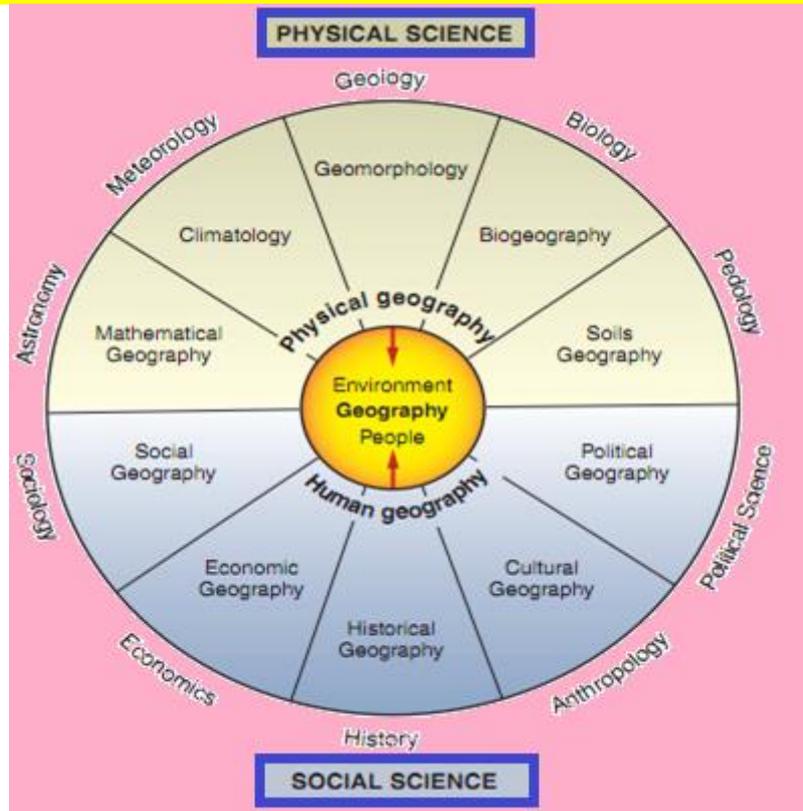


# UNIT 2 – UPSC - Salient features of world's physical geography

**(GS Paper- 1 Indian Heritage and Culture, History and Geography of the World and Society)**

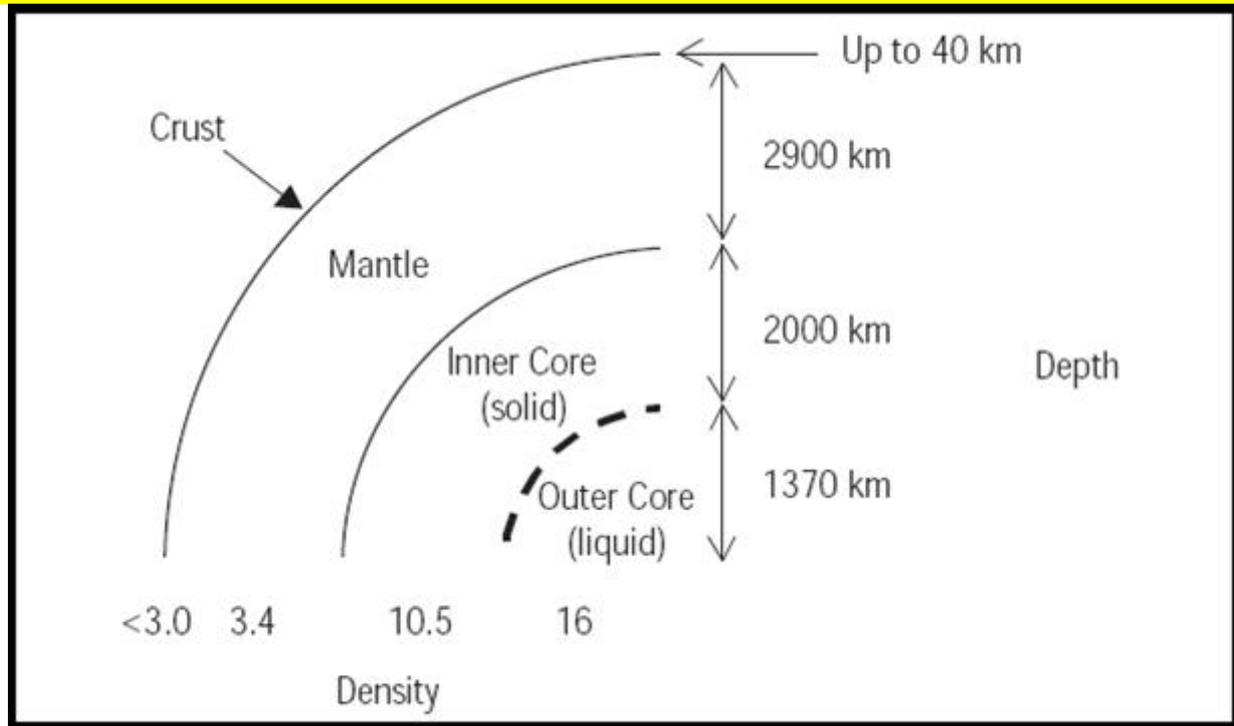
Earth is splendid terrestrial haven. It is imperative to know physical geography through its display of environmental diversity. In scientific studies, it is established that Geography is a word that originated from two Greek roots. Geo-denotes to "Earth," and graphy stands for "picture or writing." Geography is the study of earth as the home of present day human being (Sagmit, 1998). The main objective of geography is the assessment, and explanation of Earth, its variability from place to place, the way places and features transform over time, and the processes responsible for these variations and changes. Geography is termed as the spatial science because it incorporates recognizing, analysing, and explaining the variations, similarities, or differences in phenomena situated on the surface of Earth. Geography is unique among the sciences by virtue of its characterization and central purpose. It describes the values and attitudes towards environment and sharpen intellectual and practice skill.





Earth's structure is divided into three zones that include crust, Mantle and core. Crust is the solid outer layer of the Earth, and its depth is usually never more than 1 per cent of the Earth's radius, or averaging 40–50 km, but this varies significantly around the sphere. These are two different types: oceanic and continental. Mantle is the region within the Earth's interior that range from 25 to 70 km below the surface, to a depth of ~2,900 km. It is composed mainly of silicate rocks, rich in iron and magnesium. At the base of the mantle, temperatures may reach up to 5,000°C. These high temperatures may help to generate convection currents which drive plate tectonics. Core is the very centre of the Earth and is composed of iron and nickel. It consists of an outer core (semi-molten) and inner core (solid). The temperature at the very centre of the Earth (~6,300 km below surface) may reach 5,500°C.

## Structure of earth

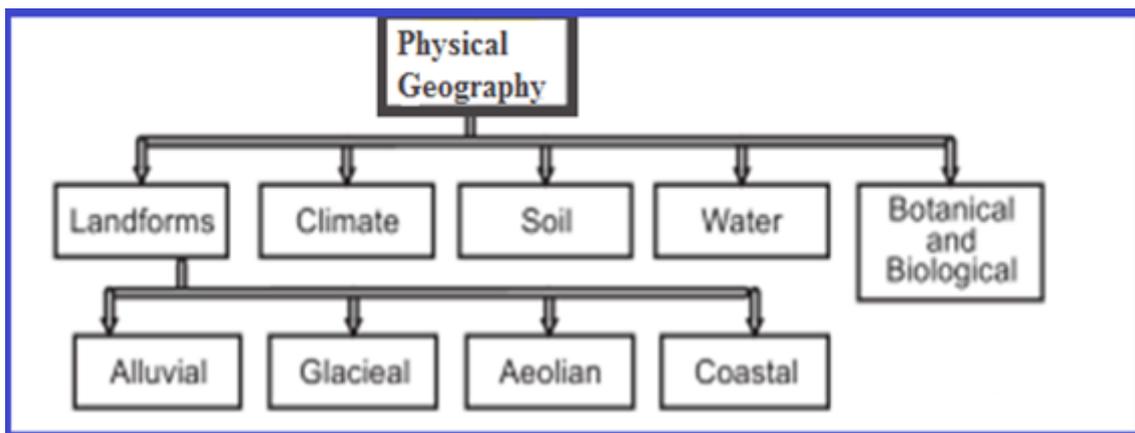


Geography is inherently encompassing discipline. It brings together facts from other sciences such as physical biological and social. Physical geography is related to the physical science. Physical geography includes the processes and attributes that constitute Earth which incorporate human activities where they interface with the atmosphere. Different branches of Physical geography are climatology, Meteorology, Geomorphology and pedageography (Sagmit, 1998).

Scientific studies have revealed that physical geographers are more interested in comprehending all aspects of Earth and can be considered generalists because they are qualified to scrutinize a natural environment in its entirety, and how it functions as a unit. In physical geography, researchers study about lithosphere, atmosphere, hydrosphere, and biosphere. Due to interaction of these elements, numerous changes occur on earth surface. Most physical geographers concentrate on advanced study in one or two specialties. For instance, meteorologists and climatologists believe how the interaction of atmospheric components influences weather and climate. Meteorologists focus their studies learning the atmospheric processes that affect daily weather, and they use current data to predict weather conditions. Climatologists are interested in the averages and extremes of long-term weather data, regional classification of climates, monitoring and understanding climatic change and climatic hazard, and the long term impact of atmospheric conditions on human actions and the surroundings.

The study of the nature, development, and modification of landforms is a field of geomorphology, a major sub field of physical geography. Geomorphologists are excited to know and elucidate variation in landforms, the processes that produce physical landscapes, and the nature and geometry of Earth's surface features. The factors involved in landform development are as varied as the environments on Earth, and include gravity, running water, stresses in the Earth's crust, flowing ice in glaciers, volcanic activity, and the erosion or deposition of Earth's surface materials. Biogeographers scrutinize natural and human-modified environments and the ecological processes that influence their characteristics and distributions, including vegetation change over time. They also research and explain the ranges and patterns of vegetation and animal species,

seeking to find out the environmental factors that limit or facilitate their distributions. Several soil scientists are geographers, who are concerned in mapping and analysing soil types, determining the aptness of soils for certain uses, such as agriculture, and working to conserve soil as a natural resource. Geographers are broadly concerned to study water bodies and their processes, movements, impact, quality, and other features. They may serve as hydrologists, oceanographers, or glaciologists. Many geographers involved with water studies also function as water resource managers, who work to ensure that lakes, watersheds, springs, and groundwater sources are suitable to meet human or environmental needs, provide an adequate water supply, and are as free of pollution as possible. Hydrology is merging science. It helps to understand the processes in which water plays an important role in nature through oceans, rivers and glaciers in sustaining life forms of earth surface.



## Main perspective of physical geography

Geographic knowledge and studies often start with locational information. The location of a feature usually uses one of two methods: such as absolute location, which is articulated by a coordinate system (or address), or relative location, which recognizes where a feature exists in relation to something else, usually a fairly well-known location.

Physical geographers are more concerned in exploring the environmental features and processes that merge to make a place unique, and they are also involved in the shared characteristics between places. Another feature of the characteristics of places is analysing the environmental benefits and challenges that exist in a place. When there is a need to know how features are arranged in space, geographers are generally engrossed in two spatial factors. Spatial distribution means the extent of the area or areas where a feature exists. Spatial pattern denotes to the arrangement of features in space that are regular or random, clustered together or broadly spaced.

It is well established that Earth's features and landscapes are constantly changing in a spatial context. Weather maps demonstrate where and how weather elements change from day to day, over the seasons, and from year to year. Storms, earthquakes, landslides, and stream processes change the scenery. Coastlines may change position because of storm waves, tsunamis, or changes in sea level. Areas that were once forested have been clear-cut, changing the nature of the environment there.

The main interest of Geographers is to comprehend the physical and human characteristics of places, seeking to identify and explain characteristics that two or more locations may have in

common as well as why places vary in their geographic attributes. Geographers collect, systematize, and analyse different types of geographic data and information, yet a unifying factor among them is a focus on explaining spatial locations, distributions, and relationships. They use array of skills, techniques, and tools to respond geographic questions. Geographers also study processes that influenced Earth's landscapes in the past, how they continue to affect them today, how a landscape may change in the future, and the significance or impact of these change.

When appraising the geography of world, it is recognized that there are seven continents on Earth which include Africa, Antarctica, Asia, Australia, Europe, North America, and South America. Each has its own unique intermingle of physical features such as mountains, deserts, plains, valleys, forests, and bodies of water. In all over world, Latitude, landforms, and nearness to bodies of water greatly affect climate. Landforms, soil, and climate significantly influence the plants and animals that can be found in each place.

North America is ranked as third largest continent in area in the world. It is situated in the Western Hemisphere, it extends from near the North Pole southwards almost to the equator. It covers the territory between the Atlantic and Pacific Oceans from east to west. Central America, North America is surrounded by the Atlantic, Pacific, and Arctic Oceans. South of Mexico, the land narrows into Central America. Central America links North America to South America. Although Central America contains far less than 1% of the Earth's surface, it has 7% of the world's biodiversity that include various plants and animals. West Indies is in Northeast of Central America composed of a huge number of islands in the Caribbean Sea. Physical Features of this region of the world include mountains, water bodies, and rain forests. Major mountain ranges found in North America include the Rocky Mountains to the west and the Appalachian Mountains to the east. The Rocky Mountains expand northward into Canada and southward into Mexico. Main feature of Bodies of Water is the St. Lawrence River which separates parts of the United States from eastern Canada. The Mississippi River flows in much of the United States.



The Great Lakes include Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario form the biggest system of fresh water on Earth. The Rio Grande detaches the United States from Mexico. The Panama Canal, located in Central America, connects the Atlantic and the Pacific Oceans. Areas of Plains include west of the Mississippi River, a region known as the Great Plains, containing some of the world's most productive farmland, Rainforests. Much of Central America and the islands of the West Indies have warm, humid climates and rainforests.

Another important region of world is South America which is sited in the Western Hemisphere south of Central America. South America is considered as the fourth major continent in area. It extends over 7,000 miles in length, it lies between the Atlantic and Pacific Oceans. Physical Features of this region include Mountains, Grasslands and Plains and others. The Andes Mountains are among the uppermost in the world. They lengthen over 4,500 miles in the western part of South America. The Andes were once the foundation of the Inca Empire. Grass lands and Plains are also important part of this region. Mountains and poor soils are unproductive in South America. One exception is the pampas of Argentina and Uruguay. The pampas give large areas of productive soil to grow crops and grazing cattle. Another physical feature of South America is Rainforests. Rainforests are situated on the east coast of Central America and the northern part of South America. Climatic conditions in this area are warm and humid. The vegetation closely reflects the climatic conditions in this continent. There are numerous vegetation as the major types of climate. The six Amazon Rainforests are the world's biggest tropical rainforest in Brazil. Thousands of different varieties of trees are found here. Tropical grasslands are found in Venezuela, Guianas and South Brazil. Tropical grasslands are called Savannas. The prevailing vegetation consists of coarse grass varying heights. There is Mediterranean vegetation. The summer droughts and winter rains in central Chile produce a drought resisting vegetation having thick leaves and long roots.

Physical features of South America (Source: J.K. Bhatnagar' 2006 )

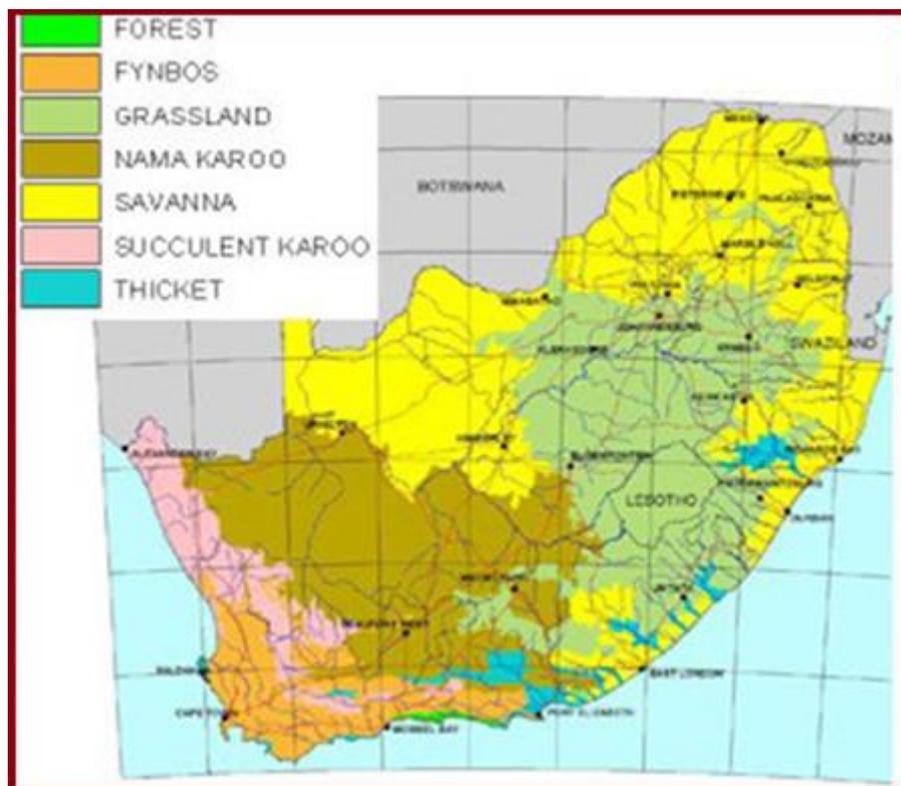


Every year, there is deforestation to provide land for ranches and farms. Bodies of Water in South America include The Amazon River which is the second longest river in the world. Furthermore, South America has the Orinoco River and the Rio de la Plata. Main population of South America lives on or near these river systems. Climate of South America is warm because it lies near the equator. Nevertheless, this region is surrounded by its mountains and ocean winds, majority of places in South America have comfy temperatures. Some of the greatest concentrations of people can be found in higher elevations where temperatures are cooler. The basic temperament of the South American landscape is driven by tectonic forcing, which has given the continent its site and general structural design and provided it with its major relief features and mineral resources. While tectonism is a mostly slow process on human timescales, it involves pulses that are frequent reminders of underlying forces. Earthquakes along the active Pacific Rim are a primary expression of these forces, and great earthquakes (Magnitude [M] > 8) happen somewhere along the continent's western margin every few years.

Africa is important and the second largest continent in area. It is three times bigger in the size of United States. To the north, Africa is separated from Europe by the Mediterranean Sea. To the east, it stretches out the Red Sea and Indian Ocean. On the west, Africa is encircled by the Atlantic Ocean. Physical Features of Africa include Deserts, water bodies and mountains. When describing physical geography, The Sahara Desert, which covers most of North Africa, is the world's major desert. It separates Africans north and south because of dry, sandy area and it is difficult to cross. Since ancient time, the Sahara isolated sub-Saharan Africa (Africa south of the Sahara) from the other part of the world. Beyond south, Africa's land also covers the Kalahari Desert. Savannas; Africa's region covers savanna land where tall, uncultivated grasses grow with some trees.

Savannas are the paramount areas in Africa to cultivate crops and raising livestock. Most populace of Africa live in the savanna area or along the coasts. It is the most tropical of all continents. Climate and vegetation range from equatorial rainforests, tropical deserts and savanna grassland to Mediterranean. The Sahara Desert, the largest of its kind anywhere in the world, is over 10.4 million km<sup>2</sup>. North to south is approx. 1800 kms and east-west is 5600km. Tropical Rainforests in Central and West Africa are hot and humid which get 60 to 100 inches of rainfall a year. This climate creates thick forest and jungle an area in which travelling is very difficult. Rainforests are the home to more plant and animal species than anywhere else on the globe. Africa has many mountains and Valleys. The Atlas Mountains are found on the northwest edge of Africa. The Great Rift Valley runs through the highlands of Ethiopia and Kenya, to the east. Bodies of Water; Africa has numerous major rivers such as the Nile, Congo, Zambezi, and Niger. The Nile, the world's longest river, flows 4,150 miles from Central Africa through Egypt into the Mediterranean. The banks of the Nile River give some of Africa's richest farmland. Important lakes in Africa are Lake Victoria, Lake Tanganyika, and Lake Nyasa. Climate of Africa is warm, with hot summers and mild winters. The amount of rainfall varies greatly. Deserts receive too little water for farming, while some other areas get excessive rainwater. Although Africa comprises of one landmass, it has a numerous islands, which are structurally not different from the main land. Major Islands are Madagascar, Zanzibar and Pemba; the Comoros; Mauritius; Reunion, Seychelles (all in the Indian Ocean); Cape Verde, Fernando Po, Principe, Sao Tome and Annobon.

## Climate and topography of South Africa



**Europe** is ranked as the second smallest continent in land area of the world. Europe and Asia actually both share the same land mass. This land mass is so big that geographers have divided it into two continents. Great Britain, Ireland and Iceland are island nations in the Atlantic Ocean that are considered part of Europe. According to Geographers, this area is known as Europe a

"peninsula of peninsulas". Salient physical features of this region include mountains, Bodies of Water. There are several mountain ranges in Europe. They include the Alps, Pyrenees, Apennines, and Balkans. These mountains shield borders between areas. Europe has many major bodies of water. In the north are the Baltic and North Seas. In the south, there are the Mediterranean Sea and the Black Sea. Europe also has many major rivers, including the Danube, Rhine, Loire, Rhone, Elbe, Vistula, and Volga. Wind has great impact the climate of Europe. The climate and vegetation in this continent vary from the cold, barren, tundra and sub-arctic starches of Iceland, Norway, Sweden, Finland, to the warm shrub covered Mediterranean coasts of Italy, Spain and Greece.



**Asia** is known as biggest continent in area wise in world. Presently, it is domicile to two-thirds of the world's inhabitants. Because of its huge size and the multiplicity of its cultures, geographers consider the region of Asia as being composed of numerous distinct regions. The Middle East lies at the junction of three continents, connecting Africa, Asia and Europe. It has most important waterways of the world, the Suez Canal, which cut downs the travelling distance between Europe and Asia. Physical geography of Asia includes desserts, mountains and water bodies. In the region of the Middle East, major area is covered by desert. Most of the Arabian Peninsula is occupied by 900,000 square miles of the Arabian Desert. The other major desert in the Middle East is the Syrian Desert. There are several important rivers in the Middle East such as Jordan, Tigris, and Euphrates Rivers. In this region, it is found that there is mild climate and fertile soil along these rivers made them centres of some of the world's most primitive culture. Other main bodies of water adjoining the Middle East include the Mediterranean Sea, Black Sea, Red Sea, and the Persian

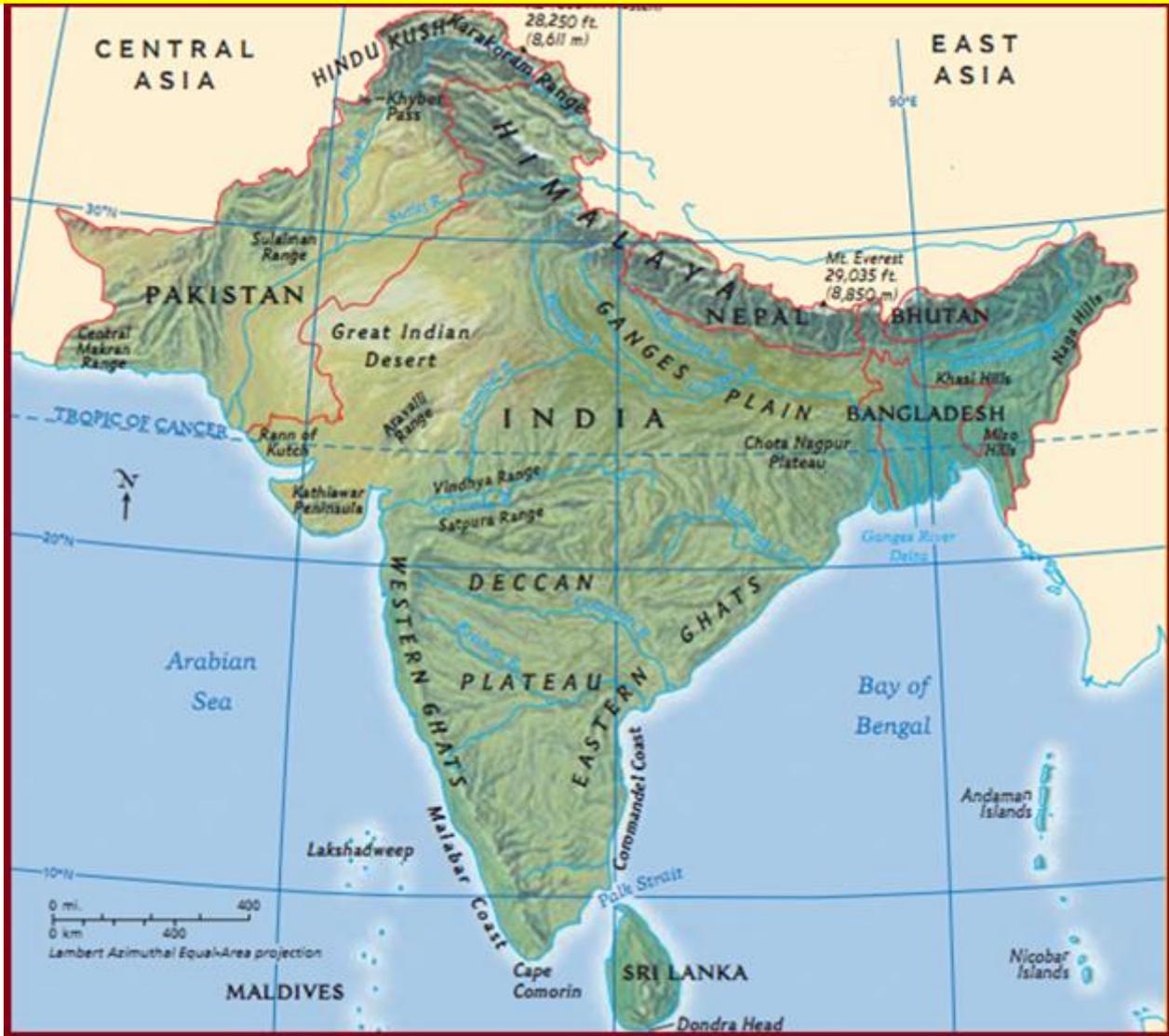
Gulf. In regard to climate and resource, most of the Middle East is located near the equator. The area has warm winters and hot, dry summers but there is scarcity of adequate water supplies. The Middle East has about half of the world's famous oil reserves.

Northern Asia is covered by Russia, which extends from Eastern Europe to the Pacific. Russia is the world's biggest country in area. Although the majority of its inhabitants are located in Europe, most of Russia's land area is in Asia. Central Asia composed of a huge passageway to south of Russia, made up of mountains, deserts and steppes (treeless grasslands). The steppes supply good grazing land. Siberia, in north-eastern Russia, is a cold area with forests. Northernmost Russia is tundra, where the land is ice-covered most of the time in the year. Afghanistan, a dry mountainous country in Central Asia, separates Iran and Russia from Pakistan. Its physical geography include mountains and Bodies of Water. The Arctic Ocean, north of Russia, is frozen for most of the time. Major rivers in Asian Russia are the Ob and Lena. The Ural Mountains separate European and Asian Russia, while the Pamir Mountains separate Russia from China. In major part of Russia, there is long, cold winters and short mild summers.

East Asia consists of three important countries namely China, Korea, and Japan. China is the third largest country in the world area wise. Korea is a neck of land extending from the north-eastern coast of China. Japan consists of four main islands and a number of smaller islands, separated from the Asian mainland by the Sea of Japan. Physical geographical features in these three areas include Bodies of Water, Mountains. Important rivers are the Hwang Ho (Yellow River) and the Yangtze in China. These river valleys were the origin of early civilizations. China's southern and western borders are ringed by the Himalayan, Kunlun, and Tianjin Mountains. To the west is the mountainous plateau of Tibet. In Japan and Korea, most of the area is covered by mountains. About 85% of Japan is covered by mountains and hills. Mount Fuji, an extinct volcano, is the highest and most famous mountain in Japan. The Gobi Desert is situated to the north of China in Mongolia. Since earlier times, mountains, deserts, and surrounding seas served to separate East Asia from the rest of the world.

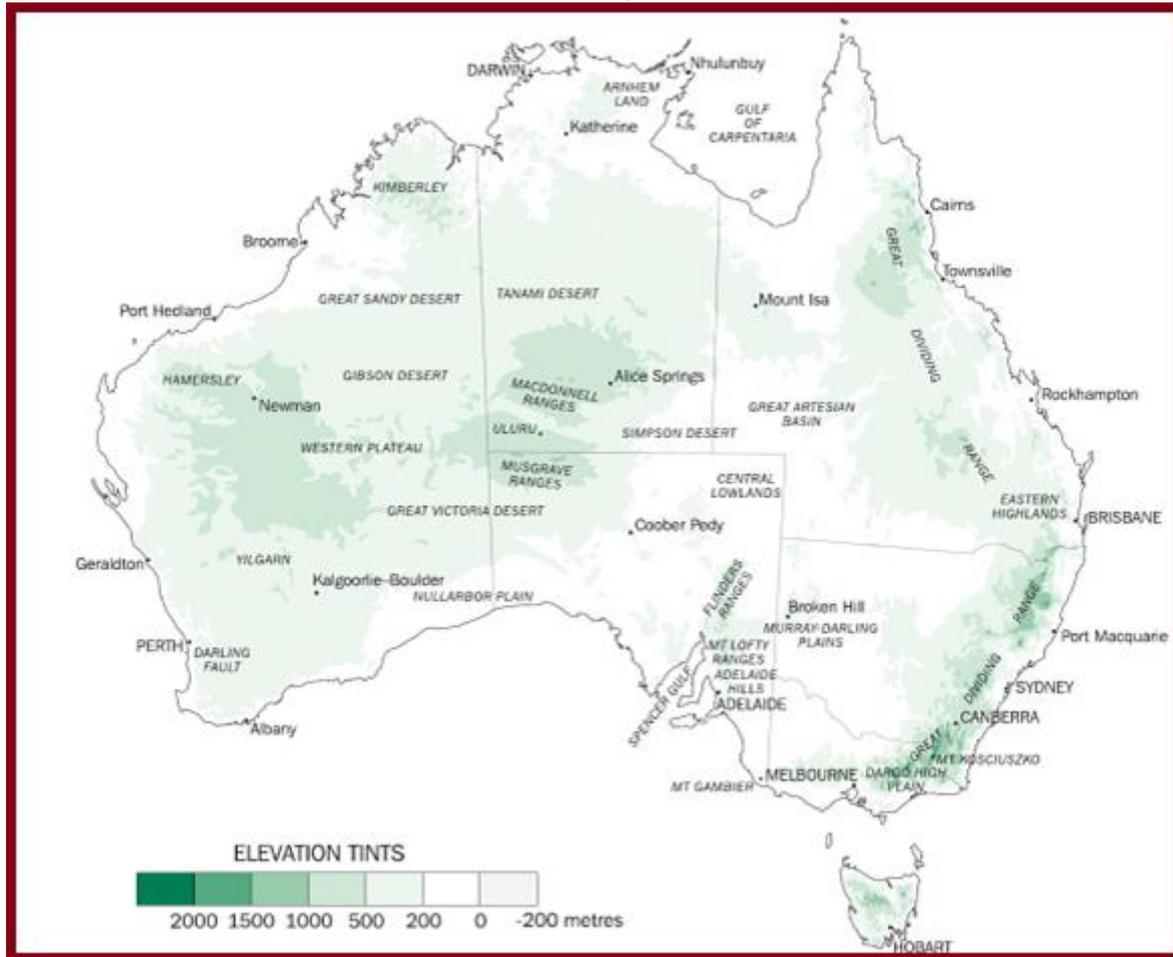
Majority of South Asia is a subcontinent. It has various natural resources. The Indian 'subcontinent, approximately the size of the United States, appears a large triangle extending out of Asia into the Indian Ocean. Southeast Asia consists of a peninsula (land surrounded by water on three sides) and a series of islands on the southeast corner of the Asian mainland. These are enclosed by the Pacific and Indian Oceans, which is the shortest water route between these two oceans. As with other continents, South Asia has numerous mountains, bodies of water. The Himalayas, located at the north of India, are the topmost mountains in the world. They separate the Indian subcontinent from the rest of Asia. Mountains also cut off Southeast Asia from the rest of the continent. The main rivers of the Indian subcontinent are the Indus and Ganges. The Mekong, Salween, and Irrawaddy Rivers are main rivers in Southeast Asia. Both South and Southeast Asia have warm winters and hot summers. The most important climatic aspect is the monsoons. These vicious winds blow over the region and bring heavy rains in the summer. Monsoon rains give water for crops and support life, but also cause flooding, landslides, property damage, and even death.

## **Physical feature of south Asia**



**Australia**, bordered by the Indian and Pacific Oceans, is cut off from Asia by the Arafura and Timor Seas. It is the smallest continent of the world. It is also the lowest, the flattest and the driest. The highest point on the Australian mainland is Mount Kosciuszko, New South Wales, at 2228 metres above sea level. The lowest point is the dry bed of Lake Eyre, South Australia, which is 15 metres below sea level. The mainland and Tasmania are enclosed by thousands of small islands and many larger ones. The mainland continents are divided into western plateau, eastern highlands and central lowlands. The areas have no boundaries. Much of the western plateau is relatively flat. There are many rugged areas near the coastal boundaries of the plateau including the Kimberley region and Hamersley ranges in Western Australia. The central lowland \*stretches from the Gulf of Carpentaria through the great artesian basin to the Murray darling plains. Most of these areas are flat and low lying. The eastern highlands extending along most of the length of the east coast are characterized over much of their length by steep escarpment on the coastal side, a series of high plateaus and then most gentle sloping towards the inlands (Year Book Australia 1982).

**Elevation of Australia continent (Source: Australian surveying and land information group, 1996).**



Nearly 40 per cent of the total coastline length comprises island coastlines. As an island nation, coastlines play a vital role in defining national, state and territory boundaries. Almost 20 per cent of Australia's land mass is desert. As well as having a low average annual rainfall, rainfall across Australia is also variable. The rainfall pattern is concentric around the extensive arid core of the continent, with rainfall intensity high in the tropics and some coastal areas. Climatic zones range from tropical rainforests, deserts and cool temperature forests to snow covered mountains. Within this climate, plants and animals have evolved on a geographically remote continent, through a time of a slowly drying climate, combined with continuing high variability. The central regions of Australia are mostly deserts. The world's biggest coral reef, the Great Barrier Reef, is located in Australia. Many unique animals are found in this continent.

**Mean temperatures and rainfall (Source: Australian bureau of meteorology).**

Period (b)	Temperature deviation °C	Rainfall mm
<b>10- YEAR PERIODS --ANNUAL AVERAGE</b>		
1900	.. 9	n.a.
1910	.. 19	-0.33
1920	.. 29	-0.40

1930	..	39	-0.28	418
1940	..	49	-0.41	436
1950	..	59	-0.27	468
1960	..	69	-0.22	431
1970	..	79	-0.12	527
1980	..	89	0.23	463
1990	..	99	0.39	485

**YEARS**

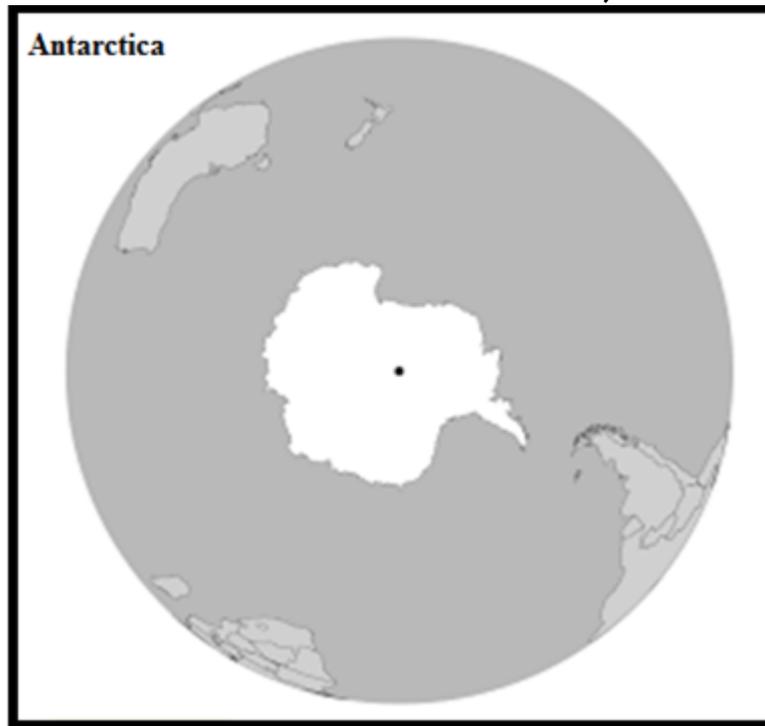
1990		0.50	418
1991		0.68	469
1992		0.15	452
1993		0.30	499
1994		0.25	341
1995		0.18	523
1996		0.60	470
1997		0.23	527
1998		0.84	565
1999		0.21	584
2000		-0.21	727
2001		-0.10	559
2002		0.63	341
2003		0.62	487
2004		0.45	512
2015		1.06	406

Droughts can occur in all parts of Australia and they are most economically damaging in south eastern Australia, an area encompassing about 75% of Australian populace and much of its agriculture. Thunderstorms are more frequent over northern Australia. During most years, snow covers much of the Australian Alps over 1500 metres for varying periods from late autumn to early spring. In terms of water vapour content, Australia is dry continent (Year Book Australia 1982).

**Antarctica** is the world's southernmost continent and wraps the South Pole. It is encircled by the Southern, Atlantic, Pacific, and Indian Oceans. Since 2000, most geographers call this the Southern Ocean. Antarctica is the coldest, driest, and windiest continent, and has the highest

average elevation of all the continents. About 98% of this continent is enclosed by ice, averaging one mile in thickness. Only plants and animals adjust to the severe cold and survive in this region.

**Physical feature of Antarctica represented that it is surrounded by water ( Source: Evan-Moor Educational Publishers).**



In Antarctica, The landmass is made up of 98% ice sheet with the remaining 2%, barren rock. The standard height of Antarctica is between 2000 and 4000 m with resident mountain ranges up to 5000 m in elevation. Roughly half of the coastal areas are ice free. Ice shelves form along the coast and in the areas where seawater comes in contact with the ice shelf, these chunks of ice break free in the form of icebergs. Temperatures in Antarctica remain around the freezing mark around the coastal areas in the summer, which occurs from December to February. In the winter, temperatures range from  $-10^{\circ}\text{C}$  to  $-30^{\circ}\text{C}$  in the coastal regions. The higher plateaus have a much colder weather. Because of their higher elevation and the distance from the ocean, summer temperatures range anywhere from  $-20^{\circ}\text{C}$  to  $-60^{\circ}\text{C}$ , in the winter.

To summarize, Physical geography is imperative for understanding various things about countries and regions of the world. It is the branch of science that deals with processes and patterns in the natural environment such as hydrosphere, biosphere, atmosphere and geosphere. Physical geography is a scientific discipline that addresses the distribution of natural features and processes within a spatial, or geographical, reference frame.