FLP - II

Sec.A Question 1 (A) Show 5 symbols in the map (5*2=10)

1 Black Sea 2 Dead Valley 3 Kalahari Desert 4 Gobi Desert 5 Chilka Lake 6 Baltic Sea

(b) Short Questions Choose any 5 questions. Each question carries a mark weightage of 2 .

1 Mount Albert , 2 Skead Category , 3 Brickfields 2019 4 Appalachian Mountains , 5 Rivers draining into the Pacific Ocean , 6 Rivers draining into the Atlantic Ocean , 7 Rivers draining into the Arctic Ocean 8 Hydroelectric power stations of the United States , 9 Coal fields of the United States , 10 New England Industrial Region ,

Sec.- B Choose any 4 questions, choosing 1 question from each unit. Each question carries 15 marks.

Unit(1)

1 Major climatic regions of the world detailed and illustrated Describe with or world's leading clayey Discuss in detail about

2 Discuss in detail about the major vegetation of the world or region What is meant by genetics? Explain the regions in detail.

Unit (2)

3. Soils of Asia Classify and explain them in detail . Explain the natural vegetation regions of Asia.

4 1 Describe in detail about the Trans Siberian Railway in the world or Asia Describe the suitable geographical conditions and distribution pattern of rice in

Unit(3)

5 Give a detailed explanation about the drainage system of Europe. Europe demographic of structure Of Description that live

6 Describe in detail the industrial regions of the United Kingdom . Describe in detail and with illustrations the iron and steel industry of Europe.

Unit(4)

7 combined States of America Divide India into industrial regions and describe each region with the help of a map . Describe the suitable geographical conditions and distribution pattern of maize in North America.

8 Describe the drainage system of North America. Canada To Divide it into industrial regions and describe each region with the help of a map.

4.5 THE WORLD'S FORESTS

An assessment of the impact of various physico-cultural factors on the distribution of natural vegetation signifies the fact that, the cultural factors determine the magnitude of forest while, even today, the physical factors are of overwhelming importance in differentiating the regional pattern of global forest types. For an immediate evaluation of the relationship between forest types and climate, the following table may be considered.

Distribution of World's Forests

(In million km^2)

Region	Conifers	Non-Conifers	Total
Europe	0·8	0·6	1·4
CIS	5·8	1·6	7·4
North America	4·6	1·9	6·6
Latin America	0·3	8·6	8·9
Africa	0	8·0	5·3
Asia	1·2	4·1	5·3
Oceania	0·1	0·8	0·9
Total	12·8	25·6	38·5

The above table shows three major divisions of global forests—

(a) Tropical Hardwood Forests :

(i) West Equatorial forests.

(ii) Monsoonal forests or Tropical deciduous forests.

(b) Mid-latitude or Temperate Deciduous Forests of Hardwood Trees :

(i) Mediterranean forests and scrubs.

(ii) Temperate broad-leaved mixed forests.

(c) Higher Mid-latitude Softwood Forests :

(i) Coniferous or Taiga forests.

A bird's eye-view of the forest cover reveals unusual concentration of forest resources in the high latitudes, below the frozen polar region. Bulk of the forest is located within the old CIS, closely followed by Europe, North America. In a sharp contrast with northern hemisphere, its southern counterpart is very sparsely vegetated. As evident from the table, coniferous mostly occur in the areas having relatively cool climatic conditions, as is seen in the temperate latitudes.

The table showing the relative composition of forests indicates that the ratio of hardwood non-coniferous and softwood coniferous is not necessarily the same everywhere. The continents, which are more temperate in their latitudinal extensions, have more areas under coniferous vegetation than the continents having greater tropical extensions. Commercially, temperate softwoods are more important than the tropical hardwoods.

A. **Tropical rainforests or Wet Equatorial evergreen forests or Selva :** The equatorial regions constitute the most laxuriant growth of all vegetation types. The forests are confined to those places where the temperature is high and rainfall is heavy with a very brief period of dry season. The tropical rainforests are well distributed in the following areas :

(a) The Amazonian Basin Region of South America, where they range northwards in the Caribbean and Gulf of Mexico regions to nearly the tropic of Cancer, southwards parts of Brazil and westwards to the Pacific Ocean coast of California and Equador.

(b) About the Equador in Central and Western Africa extending southwards past the tropic of Capricon in eastern Africa.

(c) In Western India, particularly in Kerala and Sri Lanka.

(d) In the Malayan Region, where they range north to the Himalayas, north east to Indo-China and Philippines and south and east through much of Indonesia and New Guinea to Fiji and adjacent archipelagoes of the Western Pacific, with an intermittent extension in Eastern Australia well past the tropic of Capricon.

Tropical rain forest possesses some peculiar characteristic of its own which distinguishes them from the other major forest types of the world. The tropical rainforest has the following characteristics :

(a) The area under forest is generally flat or rolling at an altitude of about 1,000 metres or even higher.

(b) It rains almost in every afternoon and night practically throughout the year with a very short dry season.

(c) The temperature is relatively high and uniform, the annual means being normally around 25°–26°C.

(d) The relative humidity also tends to be substantially high as compared to the other regions, being usually above 80 per cent.

(e) The vegetation is very luxuriant and no single species dominate the forest landscape. In fact, it contains several diverse association of plants having different strata.

The foliage of a rainforest is generally of leathery texture, very glossy and evergreen. The forest trees form the main structural component of tropical rainforest and are sometimes referred to as the 'roof' or 'canopy', which is made up of three more or less separate strata, characterized by different types of trees. In general, however, three different stratas can be distinguished, consisting of trees whose crowns vary in height about a mean, and commonly there are three such strata in tropical rainforest. The roof of the forest has generally an irregular profile, the trees of the— (i) highest stratum, being most widely aparted and hardly forms a continuous layer. The term canopy is generally applied to it; (ii) the second stratum, or sometimes even the third, is commonly the highest layer of tree crowns forming a continuous mass.

Despite the fact that the forest floor remains free from vegetative growth, woody climbers, epiphytes stranglers, saprophytes and parasites are usually very common and abundant. These, virtually, make the forests impenetrable; coupled with this the heterogenous stands disfavour commercial exploitation of timber to a great extent. In fact economic exploitation of forest is only confined in the river bank areas, where the means of transporting the logs are readily available through the rivers. Usually, rafts are floated to down the rivers to the nearest towns and ports.

It is important to note that the Equatorial rainforests contain valuable trees like mahogany, ebony, palm, iron wood, rubber etc. But the cutting has to be highly selective and only a few species pay revenue. This explains the fact why the densest forest region accounts for only 10 per cent of the global timber output. It is rather surprising to note that the important output of forest products from Equatorial rain forests do not comprise of timbers but nuts, resins, ceilea, balata, latex, palm oil etc. This is perhaps the only forest region in the world which remains apparently unaffected, especially in the Amazon Basin.

B. Tropical deciduous or Monsoonal forests : The semi-evergreen or Monsoon forest exhibits itself in areas of marked dry season, i.e. in the humid tropics. Tropical rainforest is replaced by tropical dry deciduous forest where annual droughts are quite distinct in its occurrence. In the humid tropics, conditions tend to be so critical that even slightest variation in the climate or soil condition may cause marked variation in the plant formulation.

The so called tropical deciduous or Monsoonal forests are usually found in the areas of true monsoonal climate, such as in India, Mayanmar, Indo-China and southwards to Northern Australia, Thailand, Laos, Cambodia, parts of Vietnam, South China, Philippines Islands. Outside the traditional realm, Monsoon forests are also found along the margins of tropical rainforest in Africa, Madagascar, Indonesia, Central South America, the Guinea Coast and in Eastern Brazil.

According to Eyre, the spatial distribution of monsoon forests can be grouped into three distinct zones :

(1) The American formation.

(2) The African formation.

(3) The Indo-Malayasian formation.

(1) **The American formation**—The American type of Monsoon forest covers a large area, over West Indies and South America, southern rim of the Amazon Basin and a second belt that run almost parallel to the south-eastern coast of Brazil.

In these areas the annual rainfall ranges between 75–125 cm. In the relatively drier months of the year rainfall amount to only 30 cm. Trinidad actually represents the typical American semi-evergeen forest. Two storeys of trees can be observed here, the lower one at a height of about 6–12 mts. forming almost a canopy above which stands a layer of scattered emergent trees attaining a height of about 18–24 mts. Lianas profusely exhibit itself here, but epiphytes are extremely rare.

Effects of seasonal drought is reflected —

(a) in the composition of forest species, where 20–30 per cent of the upper storey is deciduous and under extreme dry condition all the trees may shed their leaves,

(b) in the increase in the mesophyllous species. The American deciduous forest has short structure of the trees displayed in two layers and vigorous growth of underbushes.

(2) **The African formation**—In Africa, tropical deciduous forest has developed over Nigeria and other parts of West Africa where it has been described as dry evergreen forest.

The African grade of tropical deciduous forest possesses some typical characteristics of its own, namely :

(a) There are three distinct layers of trees in addition to the layers of herbs.

(b) The upper layer is completely deciduous and lower layers are evergreen.

(c) The prolonged duration of dry condition is manifested in the dieing down of many herbs and extreme rarity of epiphytes. Today, most of the African Monsoonal forest has greatly been modified by shifting cultivation.

(3) **The Indo-Malayasian formation**—Indo-Malayasian formation is the most extensive of all the three types extended over a wide tracts, in North-Eastern India, Mayanmar, Thailand, Malayasia, Indonesia and extends up to Northern Australia.

Teak forest is most abundantly found over these areas. Evergreen, including 'moist teak' forest, and deciduous, including 'dry teak' forests, are very common. Much of the extensive Monsoonal forest tracts have been cleared off in the last few decades following the rapid expansion of the agricultural tracts. Mayanmar still has some areas under virgin Monsoonal forest.

C. **The Mediterranean forests and shrubs :** In warm temperate regions, having a rather hot and dry summer alternating with a relatively cooler moist season, the dominant trees and shrubs tend to be evergreen and to have small and hard thickish leathery leaves. This is the typical climo-floral complex of the Mediterranean type of climate, which attains its most extensive development along the margins of the Mediterranean Sea, from Southern Portugal to Palestine—a east-west expansion of over 2,500 kms. Other regions of

Mediterranean climate are located in Chile, South Africa, Southern Australia and South Central tracts of California.

The totality of the climatic conditions is reflected in the native plant cover of an area. The basic features of the Mediterranean climate, that most profoundly affected the forest vegetation, are as follows :

(i) Rainfalls abundantly in the winter half of the year, especially on bare slope lands and in the parts of the sub-tropical belt farthest from the equator.

(ii) Summer months are characteristically dry and, therefore, remain rainless.

(iii) Winters are mild and the summers warm to hot. The most obvious effect of these climatic conditions is to produce a carpet of brilliant green in winter and of subdued brown to yellow in summer. Many trees and shrubs are evergreen which are able to grow at least during part of the winter season and the spring. During the summer months, however, they are exposed to the burning sun and, therefore, have developed protective devices against extreme loss of moisture. As a result, most evergreens have hard leathery leaves, often thickly set with fine hairs to further restrict evaporation.

Much of the original forest vegetation of the Mediterranean lands was cleared long ago for agricultural purposes or has been reduced to bush by goat and by man's centuries' quest for firewood and lumber. Still, Mediterranean forests survive in many parts of the world covering as many as five continents. The areas that predominant in the distinct coverage of Mediterranean forests include :

(a) **The Mediterranean Basin Region and the Southern Black Sea Region :** These regions have thin sclerophyllous woodland vegetation. The dominant species include ever-green oaks, such as the cork oak, and various pines, such as Aleppo pine and Stone pine. However, the entire area has been so greatly disturbed by grazing that only sparsely scattered, low and gnarled trees remain. The stunted scrub vegetation predominantly thrives on the pale lime-stone terrain, known as 'garique' and a denser and a taller one on siliceous soils, known as 'maquis'. East of the Mediterranean, this type thins out with decreasing rainfall, although some resemblance of it is still to be seen on the gentler slopes of the mountains of northern Iraq.

(b) **The Cape Region of South Africa :** This region had once thick coverage of trees but has now become almost bare, due to the wanton process of human destruction for the expansion of agricultural lands. The maquis type of forest, which once dominated the Cape region, has also transferred into only mere bushes.

(c) **The California Region :** The sclerophyllous wood land and scrubby chaparral communities of Western California and some adjacent regions constitute one of the most distinctive climo-floral complex. Here, the dominant trees are often sparse and include conifers and several species of evergreen oaks, which in very dry conditions are reduced to mere shrubs. The main mass of vegetation is commonly thick and often tall scrub of very diverse families predominate.

(d) **Central Chile :** Central Chile of South America, marked by Mediterranean climate, also exhibits almost the same type of vegetal cover. Maquis like scrub vegetation is most wide spread with occasional patches of woodlands often dominated by trees strongly resembling evergreen oaks. In the Chilean forest, climbers, tuberous and balbous plants are quite common.

(e) **South Eastern, South Central Australia :** The sclerophyllous woodlands and scrublands of south-eastern, central and southern Australia are again, in many respects, reminiscent of those of the Northern Hemisphere. The most luxuriant expression of the woodlands is seen in the magestic forests of eucalyptus, with an abundant undergrowth of hard leaf shrubs. In many cases, the forest floors are covered with green carpet of grass, and the trees are widely scattered. The vegetation has been reduced to maquis like forest where human interventions are very common. In areas of intermediate water conditions this may be replaced by stunted eucalyptus, casurinas and various other trees.

D. **The temperate broad-leaved mixed forest :** This forest region is found in the areas having moderate amount of rainfall and temperature marked by dry winter and wet summer. Characteristically, deciduous trees predominate and are found just to the south of the coniferous forests. Along its northern boundary this forest merges with the conifers, whereas in the regions having higher rainfall they assume the character of evergreen forests. Again, the regions which lie beyond the limit of maritime influences bear the resemblance with steppe vegetation. Hence, the term mixed forests seems to be the most appropriate to describe this forest region.

The principal areas of occurrence of this forest are the north-eastern United States of America, west-central Europe and east-central Asia. These forests have been greatly depleted following the invasion of man and subsequent expansion of agriculture, industries and settlements. But the cause of depletion is not the same everywhere. In east-central Asia depletion of forests primarily resulted from the rapid expansion of agriculture and settlements, whereas in the north-eastern United States and west-central Europe deforestation was caused by industrialization and urbanization.

In the southern hemisphere some isolated patches of these forests are found in Patagonia, Tasmania, Chile and New Zealand, where the restricted occurrence of mixed forests is characterised by pure stands. In northern hemisphere the existing bases of this forest types are found on the high mountain slopes. It is because of the ruggedness of the mountain terrain, some of the areas of this forest have escaped from depletion.

The dominant tree species consist of oak, birch, buch, ash, chestnut, maple, elm, walnut etc. Because of the suitability of the physico-climatic condition of the region population density is very high, which accounts for great deterioration of this type of forest. Indeed, no other forest types of the world have been so ruthlessly destructed.

E. **Coniferous or Taiga forests :** Coniferous forests are charcteristics of the higher midlatitudes that stretch right across as a broad belt in the Northern Hemisphere. Such forests are characterized by comparatively low temperature and precipitation, the bulk of which occurs in the form of snow. The trees are predominantly evergreen and cone-shaped, which help prevent accumulation of snow on the trees. The region has very short summer season that hinders agricultural activities to a great extent.

The coniferous forests or taiga or boreal forest, as is most popularly known in the Siberian region, provide the world's greatest store house of softwood timber such as pine, fir, spruce, larch etc. Coniferous forests also occur in the sub-tropical region at an elevation between 1,500 m and 2,500 m in the Western Himalaya and also in the countries like Argentina and Chile in the Southern Hemisphere. This forest belt stretches right across North America through Fino-Scandinavia in Europe to the northern Former USSR; the same type of forests also occur in some isolated mountain patches of north-western and central Europe.

(3) **Desert Tundra** includes the vegetation which is found on bare rock surfaces.

7. SOILS

Soil is one of the basic components and natural resources on the earth's surface. Soil is the upper most loose and fine layer of the earth's surface. Soil is essential for the growth of vegetation as plants can not grow in the absence of soil. The existence of humanbeing directly or indirectly rests on soils, because man obtains food, clothing and shelter from soils. A number of his economic activities are associated with soil.

There are two stages in the soil formation : (1) rock weathering, and (2) pedogenesis. In the first stage of soil formation, parent rocks are weathered through several physical and chemical processes. Pedogenesis is related with biological factors. It turns the weathered materials into actual soil. During pedogenesis, many layers of soils are developed, thereby giving rise to soil profile. Many active and passive factors help in the formation of soil. Parent rocks, relief and time are the major passive factors while the active factors are climate, vegetation and other living organism including man.

Nearly all major types of soils are found in Asia. On the continent level, soils of Asia are grouped into three broad categories : (a) zonal soils, (b) intra-zonal soils, and (c) azonal soils.

(A) Zonal Soils

Zonal soils are fully mature with well developed soil profile under the long term impact

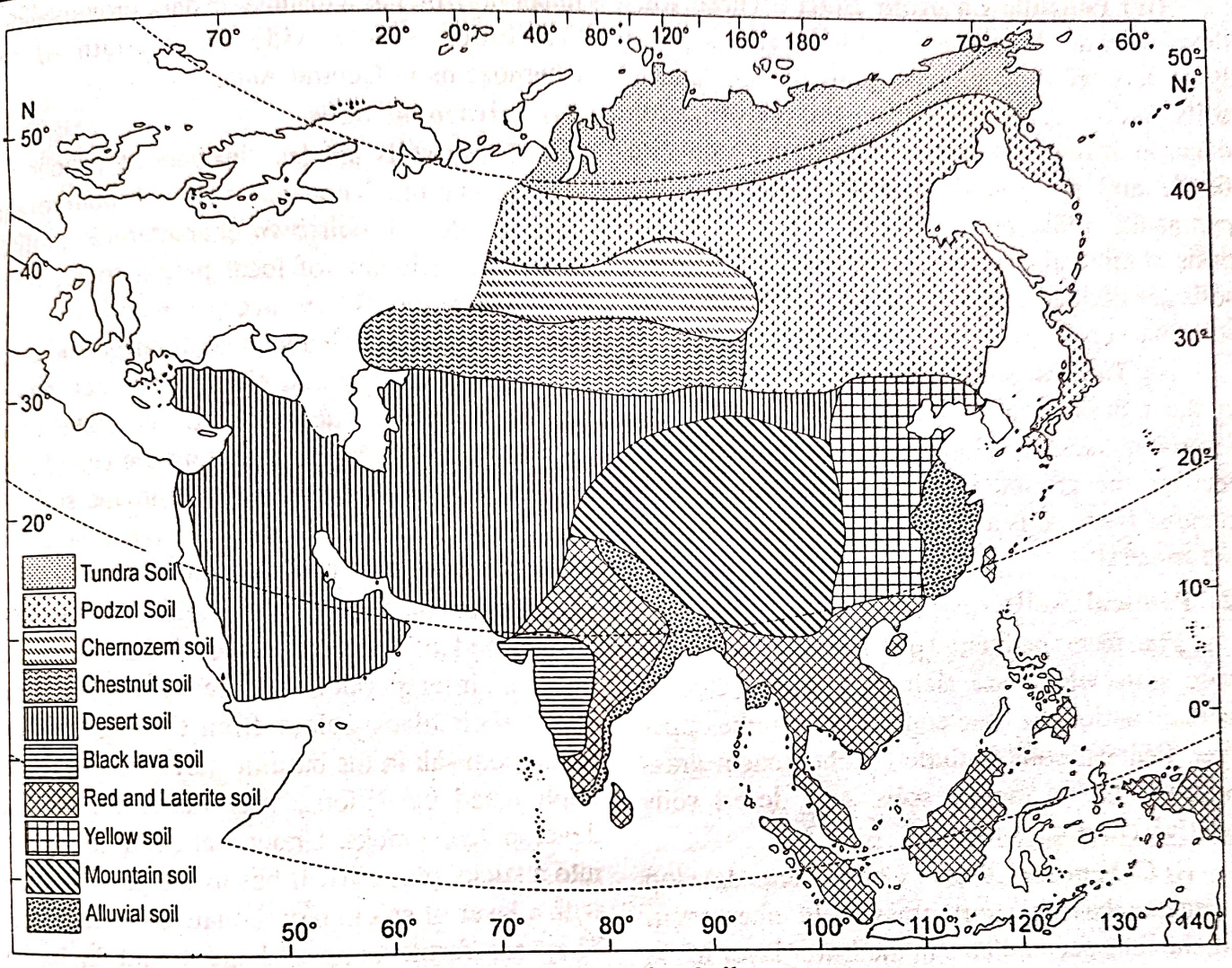

Fig. 5.16 : Asia : Soils

of climate and vegetation. The distribution of the zonal soils follows the climatic and vegetation zones, that is why such soils are known as zonal soils. Zonal soils are grouped into two major categories : (1) Pedalfer soils, and (2) Pedocal soils.

(1) Pedalfer Soils

Pedalfer (ped + al + fer) soils are rich in aluminium and ferrous (iron). Such soils develop in wetter regions where leaching and transportation helps the minerals and organic matters to seep below the ground while coarser and large sized minerals are left on the upper layer. Thus these soils lack in organic matter. Major pedalfer soils include (i) podzols, (ii) podzolic, (iii) laterite, (iv) podzolic-latozolic, and (v) tundra soil.

(i) Podzols : These soils develop in coniferous taiga forests where winters are long and summers are short. These soils are characteristic features of Siberian taiga forests. As podzols develop through podzolization process, they are deficient in organic matter, calcium and other minerals. Being shwallow these soils are generally infertile.

(ii) Podzolic Soils : These soils are found south of the podzols and are formed through the process of padzolization. Such soils are formed under broad leaf mixed forests and soils have moderate to high depth and more humus than podzols.

(iii) Laterite Soils : Laterite soils develop in hot and humid regions through the process of laterization. In equatorial rain forest regions (Malaysia, Indonesia and Philippines), consequent leaching causes the deficiency of organic and mineral matter in these soils and thus makes them infertile.

(iv) Podzolic-Latozolic Soils : These soils develop under long grasses in the wetter regions lying between the regions of podzolic and laterite soils. In this region laterization and podzolization occur in different ratios. These soils are moderate fertile and are found in south-eastern China, peninsular India and Japanese islands. On the basis of mineral content and organic matter, these soils are divided into tropical and subtropical red soil and sub tropical red and yellow soil.

(v) Tundra Soils : Tundra soils are found in the tundra region extending in the northern Siberia. It is less developed and lacks stratification becuase the ground remains frozen for 7 to 8 months. These soils are deficient in organic matter and minerals.

(2) Pedocal Soils

The term pedocal (pedo + cal) refers to those soils which are rich in calcium. Due to capillary action the lime concentrates in the upper layer. Pedocal soils include (i) chernozem grass soils, (ii) brown steppe soils, (iii) desert soils and (iv) chestnut soils.

(i) Chernozem Soils : Chernozems develop in regions having short grasses. In chernozem soil, the lime accumulates in the lower layer while the upper layer is rich in organic matter and fine soil particles. The soil is black is colour and occurs widely in southern Russia (Siberia).

(ii) Brown Steppe Soils : These soils occupy the region between chernozems in the north and desert soils in the south. These are deficient in organic matter and have a limited depth.

(iv) Desert Soils : Such soils are found in deserts and dry areas and are less fertile. They are deficient in organic matter and lime accumulates below the surface. They have undeveloped soil profiles.

(v) Chestnut Soils : Chestnut soils are characterized by calcium carbonate developed along their margins under greater aridity and sparse coarse steppe grasses growing in clumps. They have much humus because of little or no leaching due to low rainfall (20-25 cm.) Their upper horizon has a distinctive dark brown colour. Chestnuts occupy wide areas south of the Chernozems in Central Asia.

(B) Intrazonal Soils

These soils are less influenced by climate and vegetation. They are still not mature and have developed their own characteristic profiles under the influence of local parent rocks, relief and drainage. They are retarded in their development due to inadequate drainage and often suffer from salinity and alkalinity which makes them less fertile. These soils occur scattered in between zonal soils and therefore are called intra zonal. These soils include (1) Rendzina soil, (2) Terra Rosa soil, and (3) Regur or black lava soil. Rendzina and terra rossa are not found in Asia.

Regur or Black Lava Soils : These soils are formed of basalt rocks or lavas weathered under high temperature and heavy rainfall. They derive their black colour from the high content of titanium salt in the basaltic parent rocks. Under unploughed conditions, they become hard and develop deep cracks. Under wet condition it gets into a sticky plasticity. It has low organic content with a layer of calcium corbonate concentrations. They are fertile soils and are found in Indian Peninsula in the form of **black cotton soils** or **regurs.**

(C) Azonal Soils

Azonal soils are immature and young and therefore lack any real profile development. They are not subject to any specific process of soil formation. They are transported soils and are formed by deposition of sediments. Azonal soils include (1) alluvial soils, (2) loess soils, and (3) glacial soils.

(i) Alluvial Soils : Alluvial soils are geographically widespread fertile soils. They are constituted under water-deposited materials of fine sediments like silts, sands, loams and other materials including gravels and rock wastes. Deposits are made in horizontally level layered strata. They are replenished and renewed in annual or seasonal floods, over thousands of years particularly in great river valleys. Alluvial soils

vary widely in their physical, chemical and fertility properties mainly due to variations in sediment characteristics. Extensive alluvial plains are found in the river valleys including the Tigris and Euphrates (Iraq) in South-West Asia; Indus-Ganga-Brahmaputra river valley in the northern Indian sub-continent; Mahanadi, Godavari, Krishna and Kaveri valleys in South India; Irrawaddy valley in Myanmar, Chao Phraya (Menam) valley in Thailand, Mekong valley in Vietnam; Hwang Ho, Yangtze and Sikiang valleys in China. Alluvial soils are also found along sea coast which are deposited by sea waves.

(ii) Loess Soils : Wind blown and deposited soils are known as loess. These soils are found in areas far away from their origin of materials over hundreds of kilometres. They are found in various forms, size and depth. Loess is generally very fertile and fine-textured soil. There is a deep sheet deposit of yellow coloured, friable, porous material over 7.74 lakh sq. km. area upto a depth 90 to 300 metres in the North West China. The fine materials were lifted from the Gobi desert in Central Asia by strong winds coming from Central Asia during winter high-pressure times over a long period. Loess terrain spread in the Yellow (Hwang Ho) basin has been heavily ravinated and gullied resulting into the badland topography.

(iii) Glacial Soils : Glacial soils are widespread in Siberia, as the vestiges of the past glacial period. The materials deposited by glaciers include various type of sorted and unsorted glacial and fluvioglacial materials such as tills, outwash sand and gravels, resorted clays laid down in glacial lakes and other deposits. The melt water caused due to ablation of a glacier spread like sheet water and erodes the terminal moraines and deposits the eroded sediments in front of the terminal moraines and forms a plain known as outwash plain. Outwash plains are formed due to coalescence of several alluvial fans in front of terminal moraines.

3. DRAINAGE

Most of the sizeable rivers of Europe flow generally parallel to the mountain ranges. It is also notable that they hardly peirce through

mountain ranges. The central uplands extend from France in the west to the Ural in the east. These uplands slope towards north and south. The European rivers are mostly consequent type which follow the gradient of the ground. The rivers of Europe can be arranged in following categories :

(1) Rivers flowing towards Atlantic Ocean,
(2) Rivers flowing towards Mediterranean Sea,
(3) Rivers flowing towards Caspian Sea, and
(4) Rivers flowing towards Arctic Ocean.

(1) Rivers Flowing Towards Atlantic Ocean

This drainage system includes those rivers of Portugal, Spain, France, Germany, Poland, western Russia, Sweden and England etc. which flows into North Atlantic Ocean (North Sea, Bay of Biscay, Baltic Sea etc.).

(i) The rivers of Portugal and western Spain flowing from east to west joins the North Atlantic Ocean. Among them, Togus River is most important.

(ii) Garonne, Loire and Seine are important rivers of western and northern France which flow into North Atlantic Ocean. Garonne and Loire rivers flowing westward join the Bay of Biscay. The Loire is the longest river of France (1015 km.) which originates from Ardeche Mountain and flows westward. Seine River originates from Burgandy highland and flows northward to meet English Channel. Paris city is situated at the right bank of the Seine.

(iii) Three long rivers of Germany : The Rhine, the Weser and the Elb rising from the central uplands flow northwards and join the North Sea. About 1312 km. long Rhine river originates from the Constance lake in the Alps Mountain and flows northward to meet North Sea near Rotterdam. The Rhine flows into rift valley from Basel between the Vosges in the west and the Black Forest Mountain in the east.

(iv) The Oder and the Vistula rivers rise from the southern uplands and flow northward to meet Baltic Sea. They are 907 and 1080 km. long respectively. Warsaw, the capital of Poland lies on the bank of the Vistula.

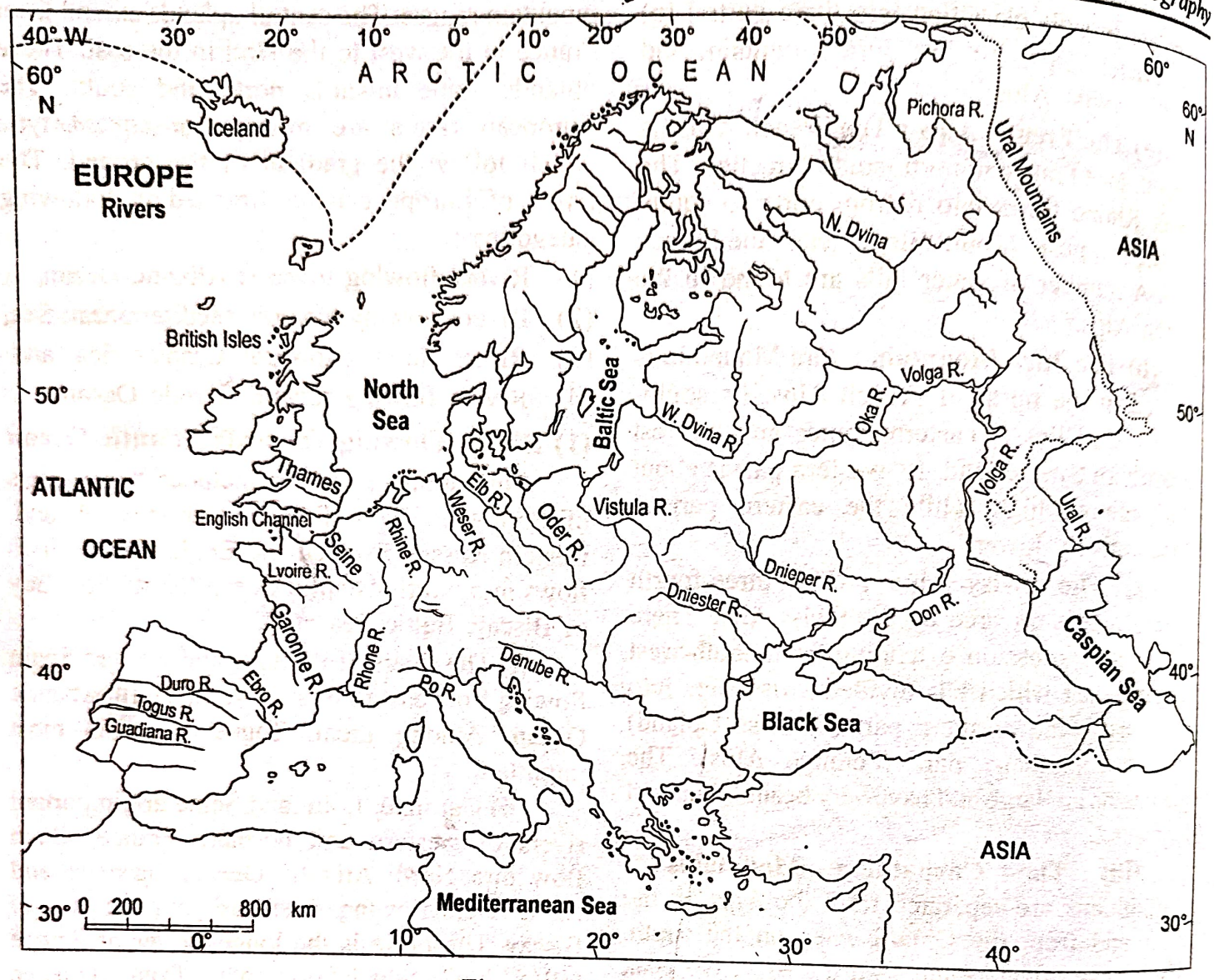

Fig. 13.4 : Europe : Rivers.

(v) In Sweden, numerous small rivers originating from the southern slope of Scandinavian Mountains join the Gulf of Bothnia (Baltic Sea).

(vi) The Thames River of England originates from Cotes Old Mountain and flowing eastward joins the North Sea. This river is 336 km. long. Metropolis of London is situated on the bank of the Thames.

(2) Rivers Flowing Towards Mediterranean Sea

This drainage system includes the rivers which originating from the central uplands or the southern Alpine Mountains flow southwards and lastly join the Mediterranean Sea. Such river are Rhone, Po, Denube, Dniester, Dnieper and Don.

(i) The Rhone River rises from the Jura Mountain of Switzerland and flowing southward through Jeneva Lake, meets the Gulf of Lions. This river is 808 km. long.

(ii) The Po is about 648 km. long river of Italy which rises from the Alps Mountain and flows eastward to meet Adriatic Sea. It is also known as the Ganga of Italy.

(iii) The Denube originates from the Black Forest Mountain and flowing through South Germany, Austria, Czech Republic, Hungary and Romania it joins the Black Sea in the South. About 2842 km. long Denube River is the second largest river of Europe after the Volga.

(iv) The Dniester River rises from the northern slope of the central Carpethians and flowing through Ukraine and Maldova it joins the

Black Sea. Its length is about 1403 km.

(v) **Dnieper** is an important river of eastern Europe which taking water from the glacial lakes of central highland of Valdai and Prepate marsh flows southward through Ukraine and meets the Black Sea.

(vi) **The Don River** rises near south of Moscow and flows southward through Ukraine to meet Azov Sea (Black Sea).

(3) Rivers Flowing Towards Caspian Sea

The Volga and the Ural are the constituents of this river system. Having a length of 3852 km., the Volga is the longest river of Europe. It originates from the glacial lakes of the Valdai Hills of the central highlands, and passing through many lakes it flows southward and lastly meets to the Caspian Sea. The Ural River rises from the southern end of the Ural Mountain and flowing southward joins the Caspian Sea.

(4) Rivers Flowing Towards Arctic Ocean

Some rivers of northern Russia are included in this group. The Onega, the North Dvina and the Pichora are main rivers which flow from south to north and meet the White Sea and Barents Sea. These rivers flow for a short period during spring season and are freezed in the winters.

fertile agricultural region.

3. DRAINAGE PATTERN

Drainage pattern of a region depends upon the topography and the source of running water. The Drainage pattern of North America can be divided into following 4 categories :

(1) The Arctic drainage system,
(2) The Pacific drainage system,
(3) The Atlantic drainage system, and
(4) Inland drainage system.

(1) The Arctic Drainage System

The Canadian shield provide a gentle slope northwards to the rivers of northern Canada which meet the Arctic Ocean. Water in the river

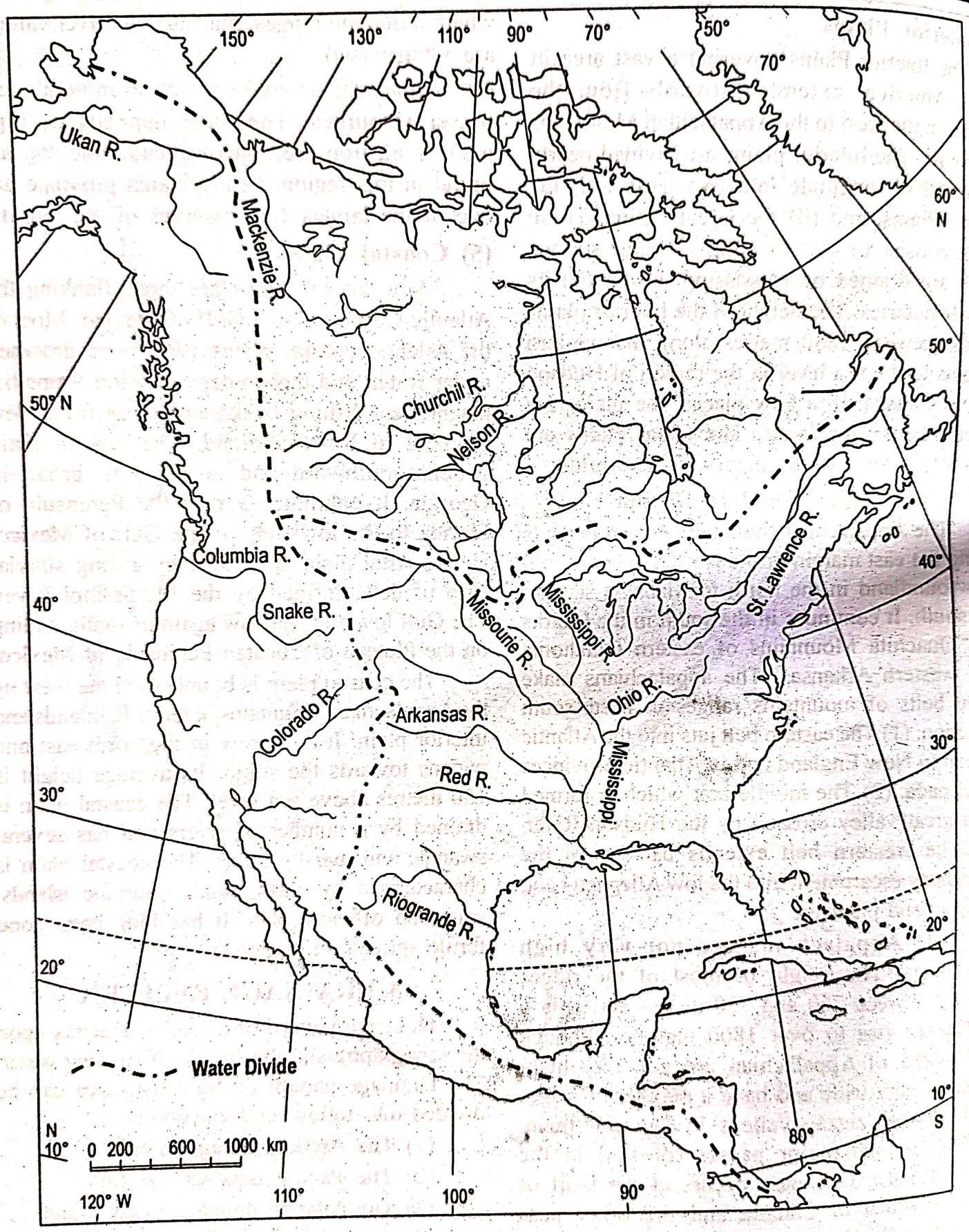

Fig. 20.3 : North America : Drainage.

flows only in short summers (3 to 4 months) while in the rest of the year (long winters) the rivers are almost frozen. Because of hard rocks, the rivers form several rapids and waterfalls. the Mackenzie is the main river which flows towards the north, other rivers include Churchill,

Nelson, Albony etc.

The Mackenzie rises from the Great Slave Lake in North-West province of Canada and flowing northward meets Beaufort Sea (Arctic Ocean). About 1806 km. long Mackenzie River flows from south to noth and parallel of Mackenzie Mountain. The Churchill, Nelson and Albony rivers rise from interior glacial lakes of Canada and flowing northword meet the Hudson Bay.

(2) The Pacific Drainage System

Among the rivers which flow towards the Pacific Ocean, the Columbia and the Colorado rivers are most important. Other rivers include the Yukon, the Fraser, the Snake, the Humboldt, the Sacramento, the San Joaquin etc. The Rocky Mountains are located very close to the western coast which makes the river courses smaller and slopes deeper.

(i) The Yukon River : It is most important river of Alaska which rises from the Rocky Mountain in British Columbia province. Flowing westwards it meets the Bering Sea. It is 2040 km. long.

(ii) The Fraser River : The Fraser rises from the Rocky in British Columbia and flowing southwards about 1360 km. it meets Pacific Ocean near Vancouver.

(iii) The Columbia River : It rises from the western slope of Rocky Mountain and flowing northwards and westwards it meets the Pacific Ocean near Portland.

(iv) The Colorado River : About 2320 km. long colorado River rises from the Rocky Mountain and flowing south-westwards through Calorado Plateau it falls into the Gulf of California. It makes deep canyons in the Rocky and flows through Great Canyon and Black Canyon.

(v) The San Joaquin River : This river flows in California province from north to south in the valley situated between sea coast and Sierra Nevada Mountain.

(3) The Atlantic Drainage System

This drainage system include the vast areas lying to the east of Rocky Mountain in the U.S.A. and Mexico. Major rivers of the Atlantic drainage system are St. Lawrence, Mississippi and Rio Grande.

(i) St. Lawrence River : This river originates from the Ontario Lake and flows towards north-east to join Gulf of St. Lawrence. It is navigable river throughout but its mouth freezes during winters. The Ottawa river is its most important tributary which rises from a lake in Ontario province and after traversing 1,115 distance it meets the St. Lawrence River.

(ii) The Mississippi River : The Mississippi is longest and most important river of North America. About 3751 km. long this river rises from Minnesota province, to the west of the Superior Lake and flowing south-eastwards fall into Gulf of Mexico. It has a number of tributaries, among them Missouri is most important. The combined length of the Mississippi and Missouri is 6,111 Km. The Missouri, the Arkansas and the Red are major right hand tributaries of Mississippi while main left hand tribularies include the Ohio and the Tennessee. The Mississippi forms birdfoot type delta along the Gulf of Mexico.

(iii) The Rio Grande River : About 3040 km. long this river rises from the SanJuan Mountain in Colorado province of the U.S.A. and flowing south-eastwards through the border of south-west Colorado and New Mexico provinces falls into the Gulf of Mexico. Rio Grande flows to the south and parallel of the Red River, a southern tributary of the Mississippi River.

(4) Inland Drainage System

There are many small rivers in the Great Basin area lying in the west of Rocky Mountains which do not reach the Pacific Ocean and terminate in the land. These rivers are seasonal and end up in saline lakes. For example, the Humboldt River ends up in a saline lake called Carson Sink.

4. CLIMATE

The vast latitudinal and longitudinal size of North America is much responsible for a lot of