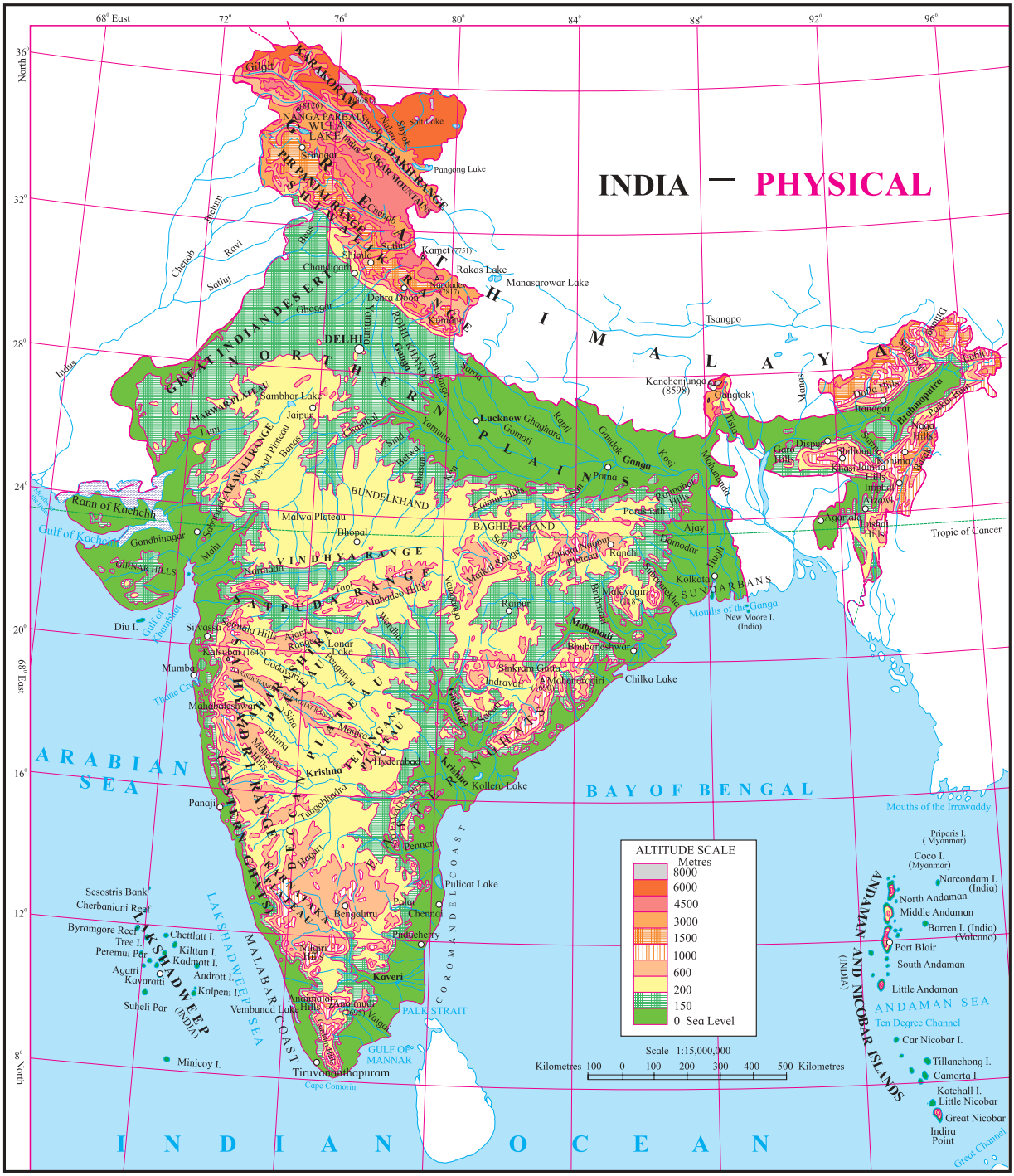

Figure 3.1

Observe the map given in figure 3.1 and answer the following questions:

- In which direction does the region with an altitude of more than 6000m lie in India ?
- Look for the south-flowing river in the peninsular region. In which river basin does it lie?
- In which direction is the slope of the region in the north shown in dark green?
- Make a list of plateaus located in between Aravali ranges and Chhota Nagpur Plateau.
- Name the peak shown in the Eastern Ghats
- Which mountains demarcate the deep plains of Brahmaputra?

- Give the relative location of the Nilgiri Hills.
- In which direction does the height of the Sahyadri hills increase?
- The Vindhyas act as water divide between which two river basins?

Observe figure 3.2 and answer the following questions :

- What is the range of the altitude of Amazon river basin?
- Between which two highlands is the Amazon river basin located?
- Observe the region with the altitude 500 to 1000 metres. Describe the locational extent of this region shown in yellow with reference to direction.
- What do the isolated regions shown in yellow indicate?
- Besides the Amazon river basin, where else do you find regions with an altitude of less than 200m?
- Describe the plateau region with height of 200 to 500 m through which tributaries of Amazon how in your own words.

Make friends with maps!

Figure 3.2

Geographical explanation

India :

Figure 3.1 shows the physiography of India. The country is divided into five major physiographic divisions

• The Himalayas • The North Indian Plains • The Peninsula • Coastal Plains • Island groups.

Himalayas : The Himalayas is one of the young fold mountains in the world. The Himalayas extend from Pamir Knot in Tajikistan to the east. It is a major mountain system of the Asian continent. In India, it extends from Jammu and Kashmir to Arunachal Pradesh.

The Himalayas is not a single mountain range. There are many parallel ranges in the system. The southernmost is known as Siwaliks. It is also the youngest range. Next to Siwaliks are Lesser Himalayas, Greater Himalayas (Himadri) and Trans Himalayan ranges from south to north. These ranges are young to old respectively.

These mountain ranges are also divided into Western Himalayas (or Kashmir Himalayas), Central Himalayas (or Kumaun Himalayas) and Eastern Himalayas (or Assam Himalayas).

North Indian Plains : This division lies between Himalaya Mountains in the north and the Peninsula in the south. Similarly, it extends from Rajasthan and Punjab in the west to Assam in the east. It is mostly a flat low lying area.The North Indian Plains are divided into two parts. The part lying to the east of the Aravalis is the basin of the river Ganga and is therefore known as the Ganga Plains. It slopes eastward.

Most of the West Bengal State of India and Bangladesh together constitute the delta of Ganga-Brahmaputra system. It is known as Sunderbans. It is considered to be the worlds largest delta. See Fig 3.3.

Figure 3.3 : The image of Sunderban Delta

The western part of the North Indian Plains is occupied by desert. It is also known as Thar Desert or Marusthali. Most of Rajasthan is occupied by this desert. To the north of the desert lie the plains of Punjab. This region is spread to the west of Aravalis and Delhi ranges. These plains have formed as a result of the depositonal work by river Sutlej and its tributaries. The slope of the plains is towards the west. Because the soil here is very fertile, agriculture is largely practised in this region.

The Peninsula : The area lying to the south of North Indian Plains and tapering towards the Indian Ocean is called Indian Peninsula. It consists of many plateaus and hill ranges. The Aravalis in the north are the oldest fold mountains here. It includes a series of plateaus bordering the Plains, Vindnyas and Satpuda ranges in the central part and the hilly regions of Western and Eastern Ghats.

Can you tell ?

On the basis of Fig 3.1, answer the following questions:

- In which direction do the Aravalis lie ?
- Aravali ranges act as a water divide between which rivers?
- Name the hills located on the plateaus to the eat of Aravalis.
- Across which states has the Deccan Plateau spread?

- Which hill ranges lie to to the west of the Deccan Plateau?
- Enumerate the characteristics of the Western Ghats.
- Compare the Eastern and the Western Ghats.
- Why are the Western Ghats called a water divide?

The Coastal Plains : India is blessed with a long coastline extending for approximately 7500 km. It lies to the western and eastern part of the Peninsula. Its western and eastern coastlines show remarkable dissimilarities.

The western coast borders the Arabian Sea. It is by and large a rocky coast. At places, spurs taking off from the Western Ghats have extended right up to the coast. Its width is also less. Rivers originating from Western Ghats are short and swift and hence they form estuaries and not deltas.

The eastern coast borders the Bay of Bengal. It has formed as a result of depositional work of rivers. Many east flowing rivers using from the Western and Eastern Ghats meet this coast. Because of the gentle slope of the land, rivers flow at lower velocities and deposit the sediments brought with them at the coast. As a result, deltas are found along this coast.

The Island group : India has many small and large islands along the coast of the mainland. These are included in the coastal island group.. Besides, India has two large group of islands, one each in the Arabian Sea and in Bay of Bengal. The islands in the Arabian Sea are known as Lakshadweep whereas the islands in the Bay of Bengal are called the Andaman and Nicobar Islands.

Most of the islands in Lakshadweep are atoll islands. They are small in extent and not very high.

Islands in the Andaman group are mainly volcanic islands. They are large with hills in their interior parts of includes an island called Barren Island which has the only active volcano in India. There are atolls in the Nicobar group too.

Brazil :

Even a cursory look at the map will make you realize that a large part of Brazil is occupied by highlands, plateaus and small mountains. There are no very high and long extending mountains in the country. Except for the northern Amazon basin and in southwest along the upper parts of Paraguay basin, there are no wide plains in the country. Even the coastal plains are restricted in their expanse. The physiographic divisions of Brazil are as follows.

- The Highlands
- The Coastal region
- The Island groups :
- The Great Escarpment
- The Plains.

The Highlands : The southern Brazil is occupied by an extensive plateau. It is differently described as Brazilian Highlands or Brazilian Shield or Brazilian Plateau. Brazilian and Guyana Highlands together form the core of South American continent.

The main part of the Guyana highlands is in Venezuela and it extends upto French Guiana. In Brazil, it covers the states of Roraima, Para and Amapa in the north. The lower part of these highlands is found in Brazil. But the highest peak of Brazil, Pico de Neblina, is 3014 m high and lies on the border between Brazil and Venezuela.

The regions to the east and south of the Brazilian highlands have an altitude of more than 1000m. But in other parts, the altitude is between 500 to 1000m. The highlands gradually slope towards north and slopes are not very steep. The tributaries of Amazon flowing through this region make rapids and waterfalls. Towards the north the slopes are steep but not abrupt. A number of rivers take off from the terminal portion of the highlands and flow northwards to meet Atlantic Ocean.

Some major rivers like Uruguay, Paraguay and Parana originate from the southern slopes of the highlands and enter Argentina. Its slope towards the east is steep and it appears in the form of an escarpment.

The Great Escarpment : Though it occupies a very small area, the nature of its slope and the effect it has on the climate makes it a separate physiographic region. The eastern side of the Highlands is demarcated because of the escarpment. In this region, the altitude of the escarpment is 790m. In some regions, the height decreases gradually. The escarpment is very steep particularly from Sao Paulo to Porto Alegre. The escarpment act as a barrier to the Southeast Trade winds giving rise to the rain--shadow area in the northeastern part of the highlands. The region to the north of this area is called 'Drought Quadrilateral'.

The coasts : Brazil has a coastline of about 7400 km. One may divide that into two parts namely northern and eastern coast. The northern coast extends from Amapa province in the north to Rio de Grande de Norte in the east. This can be called as the North Atlantic coast. From there, the eastern coast extends towards the south.

The northern coast is characterized by mouths of many rivers including the Amazon. Therefore this region is a low-lying region. On this coast lie the Marajo island, Marajo and Sao Marcos Bays. Marajo is a large coastal island located between the mouths of River Amazon and River Tocantins.

The eastern coast receives large number of smaller rivers. The only major river which meets the Atlantic Ocean here is Sao Francisco. The Brazilian coast is characterized by a large number of beaches and sand dune complexes. The Brazilian coast is protected in some areas by coral reefs and atoll islands.

The Plains : The plains in Brazil are confined to two areas namely the Amazon basin in the north and Paraguay-Parana source region in the southwest. Amazon plains lying between the two highlands form the largest plain land of Brazil. Amazon plains lying in the northern parts of Brazil generally slope eastwards. The Amazon basin is quite wide in the west (about 1300 km) and it narrows eastward. Its width is minimum where the Guiana Highlands and Brazilian Highland come closer. (240 km.) As the river approaches the Atlantic Ocean, the width of the plains increases. These are mostly forested areas and largely inaccessible due to frequent flooding and dense undergrowth. Most of the Amazon plains are covered by tropical rainforests.

The other plains in Brazil are located to the southwestern part of the highlands. They form the source region of Paraguay and Parana rivers. The source region of Paraguay slopes towards the south while the source region of Parana slopes towards the southwest.

Pantanal is one of the largest wetlands in the world. It lies towards the southwest part of the highland areas . It is a region of swamps and marshes in northwestern Mato Grosso do Sul in Brazil and it extends into Argentina too.

Islands : Besides the mainland, some islands are also included in Brazil. They can be classified into coastal islands and marine islands. Most of the coastal islands have formed due to deposition. Marine islands were a part of the mainland. They are more than 300 km away from the mainland in the Atlantic Ocean. These islands are mostly rocky and they are the top of the submerged mountains. The islands near the coast of the South Atlantic Ocean are coral islands and they are called atolls.

Do you know ?

Praia do Cassino or Casino Beach is the southernmost beach of the Brazilian coast on the South Atlantic Ocean. It is considered to be the longest sandy beach in the world. It is a continuous beach extending for more than 200 km

Colours of Both

Figures 3.1 and 3.2 show the physiography of India and Brazil. Use the maps and the indices to answer the following.

- Compare the indices of both the maps.
- In which parts do the areas with highest altitude lie in both the countries, respectively?
- In which country is the range of altitude higher?
- Compare the highest range of altitudes given in both the countries. What difference do you see?
- In which direction is the slope of the Amazon river basin region?
- In which direction is the slope of the Deccan Plateau of India ?
- Tell the regions of rain shadow in both the countries.
- Considering the distribution of altitude, direction of slope of land and other characteristics of physiography, write 10 sentences each about the physiography of India and Brazil.

DRAINAGE :

Try this.

Maps showing major rivers of Brazil and India are shown in figure 3.3 and 3.4 . Take two tracing papers and prepare drainage basin maps of Amazon and Ganga. Name the basins.

Write a comparative note on the basins of Ganga and Amazon river. You may consider following points for the comparison.

- Size of catchment area (consider the map)
- Their relative location within respective countries
- Headwater regions of rivers.
- Orientation of the rivers
- Major tributaries and their orientation.
- Any other point(s).

Some more information :

	Ganga River	Amazon River
Total catchment area (in sq.km)	10,16,124	70, 50, 000
Total length of river (in kms)	2,525	6,400
Water discharge (Cu.m. per sec)	16 , 648	2,09,000

Geographical explanation

Brazil :

Drainage of Brazil : As far as the drainage in Brazil is concerned, there are three major river Basins.

- Amazon Basin
- Paraguay-Parana system in the southwest
- Sao Francisco in the eastern part of highland and other rivers at the coasts

Amazon basin : Amazon collects its headwaters from the eastern slopes of Andes Mountains in Peru.. Amazon River receives huge discharge. This is about 2 lakh m3/s . As a result, Amazon washes off the load supplied to it from the catchment. Consequently, sediments are not deposited even at the mouth. A dense network of distributaries, which is a characteristic feature of river mouth areas, is by and large absent in the mouth region of Amazon. Instead we find a series of islands developed along the mouth of Amazon beyond the coast line in to the Atlantic Ocean. It will be interesting to note that at the mouth the width of Amazon channel is 150 km. (Take into consideration a place which is 150kms away from your home. You will get an idea of the width). Most of the course of the Amazon river is suitable for navigation.

Figure 3.4 : Brazil - Drianage

Paraguay-Parana system : These two rivers are located in the southwestern part of Brazil. Both the rivers form the catchment of River Plata in Argentina. These two rivers and river Uruguay in extreme south of the highlands collect their headwaters from the southern portion of the highlands.

Sao Francisco : It is the third important river of Brazil. The entire basin of this river is within Brazil. It occupies the eastern portion of the highlands. The river flows towards the north for a distance of about 1000 km over the plateau and then takes a sharp eastward turn to enter the coastal strip along the Atlantic Ocean. The river is navigable for a distance of about 250 km in its downstream reaches.

Coastal Rivers : Brazil has a number of short coastal rivers. The coastal area being densely populated these rivers attain significance. River Paraniba and River Itapecuru flowing northwards meet the North Atlantic Ocean. The rivers that enter South

Atlantic Ocean collect their headwaters along the escarpment. River Puraguaco enters the Atlantic Ocean near Salvador town.

India :

Drainage of India : Rivers in India are largely classified according to their source region into Himalayan and Peninsular rivers.

Himalayan drainage : Most of the major rivers in the Himalayas originate from various glaciers. In summers when glaciers melt, the discharge of water increases in summer. They flood during monsoons too. They are perennial rivers.

The drainage covers two major river systems such as Sindhu river system and Ganga river system. Sindhu and its tribuatries

Make friends with maps !

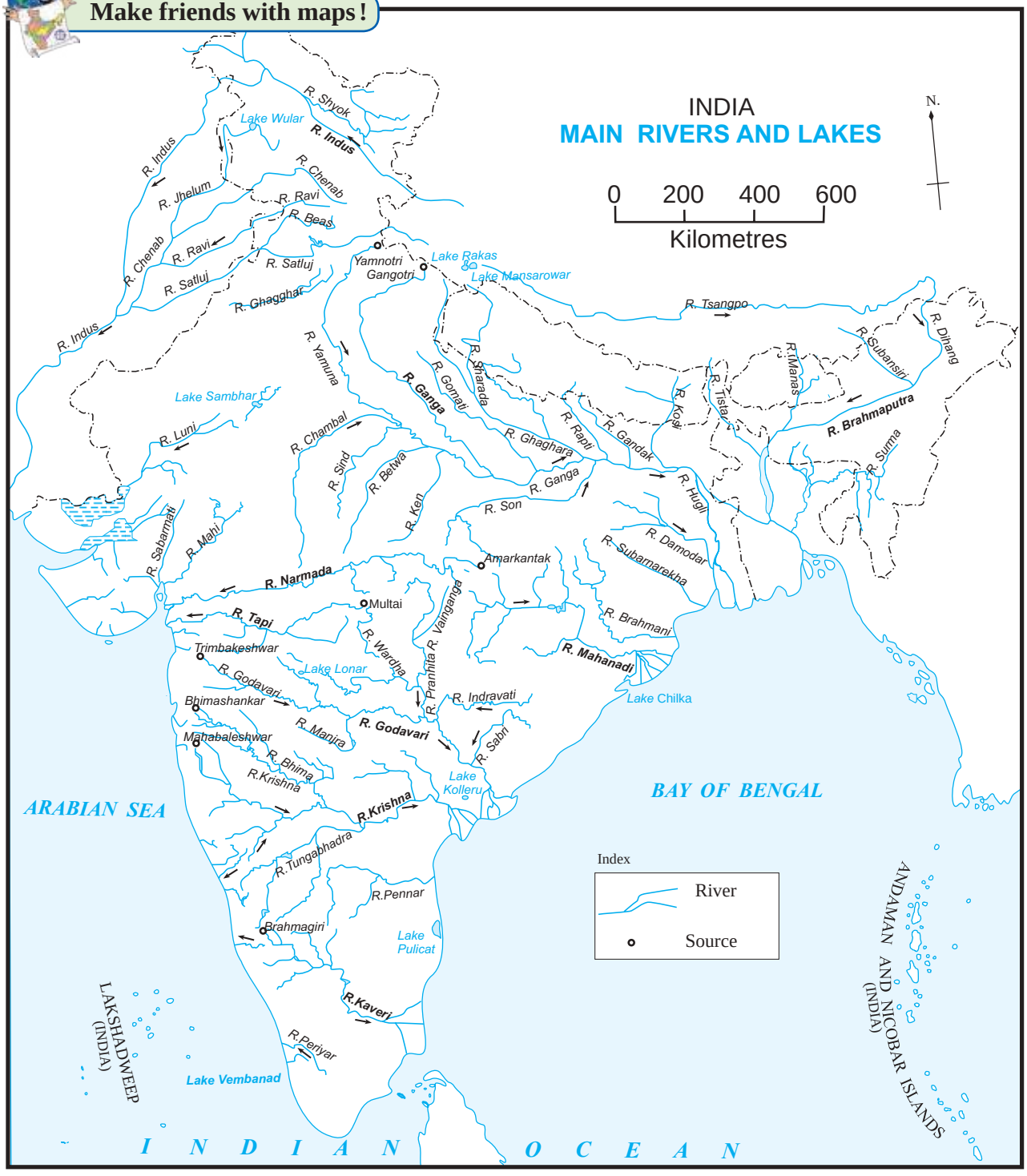

Figure 3.5 : Drainage of India

Find out.

Many geologists say that the rivers of the Himalayas are older than the Himalayas themself. Try to find out the reason behind this.

(Jhelum, Chenab, Ravi and Satluj) drain the Western Himalayas i.e. they flow through the state of Jammu and Kashmir. They flow almost parallel to each other.

A major tributary of river Sindhu , the Satluj, originates near Man Sarovar and flows westwards. Punjab Plains have formed from the depositional work of this river and its tributaries. Sindhu flows through Pakistan and then meets the Arabian Sea.

The river Ganga originates from the Gangotri glacier and crosses the Himalayas to become an east-flowing river. Many tributaries of the Ganga also flow in a similar manner. Yamuna, originating at Yamunotri, is a major tributary of Ganga.

Another major tributary of the Ganga flows through the northern part of the Greater Himalayas, crosses the Himalayas to enter India. When it flows through the Himalayas it is called Tsang Po. When it crosses the Himalayas, it is called Dihang and its eastward flow thereafter is called as Brahmaputra. From time to time, Ganga meets its trbuatries, hence its discharge increases. Ganga receives Brahmaputra as its tributary in its lower reaches in Bangladesh. The huge volume of water and huge deposition has led to the formation of a large delta. Besides these Himalayan rivers, Ganga receives a number of tributaries from Peninsula like Chambal, Ken, Betawa, Shon, Damodar etc.

Peninsular Rivers : The Peninsular river systems can further be divided into east flowing (meeting the Bay of Bengal) and west-flowing (meeting the Arabian Sea) . The Western Ghats form a major water divide in the Peninsula. The peninsular rivers, being rain fed rivers, seldom face the problem of floods. They are seasonal in nature.

The west flowing rivers occupying the area between the Western Ghats and the Arabian Coastline are short in length but swift. This condition of short and swift river system exists in the states of Kerala, Karnataka, Maharashtra and Southern Gujarat.

Do you know ?

The coastal rivers in Kerala have long extending backwaters near their mouths. These water bodies are locally known as 'Kayals'

Further northwards one comes across the river system flowing in to the Gulf of Khambhat. These river systems are Tapi, Narmada, Mahi and Sabarmati.

Tapi and Narmada flow slowly through rift valleys. Mahi River flows from North East to South West direction whereas River Sabarmati collecting its headwaters from the southern slopes of Aravali ranges flows in somewhat North-South direction. Another noteworthy river forming the catchment of Arabian Sea is River Luni. It originates along the western slopes of Aravali range and flows in somewhat northwest to southeast direction and flows into Gulf of Kutchch.

Rivers meeting the Bay of Bengal : Most of the area of the Peninsula is drained by the rivers flowing towards Bay of Bengal. The important river systems of this group are Mahanadi, Godavari, Krishna and Kaveri. Mahanadi basin occupies the northeastern part of the Peninsula. Godavadri, Krishna and Kaveri originate in the eastern slopes of the Western Ghats.

River Godavari is the second largest river system of India in terms of the catchment area.

To the south of Godavari is located the basin of River Krishna. It major tributaries are Bhima and Tungbhadra.

River Kaveri Basin flows through the states of Karnataka and Tamil Nadu. It is one of the major rivers of Peninsula. It is a river that has been harnessed for irrigation since a long time.

Do you know ?

The Chola king constructed a dam on the river Kaveri in the 2nd century A.D. near Tiruchirapalli and started irrigation in this deltaic region. Till today, the dam and its canals are operational.

Think about it.

Look at the map on Pg. No 18 in Class IX Geography textbook. Compare it with the physical map of Brazil. Think about the potential areas where earthquakes may occur.

Exercise

Q 1. Complete the sentences by choosing the right option :

(a) Brazil is covered mainly by ..... .
- (i) Highlands.
- (ii) Plains.
- (iii) Mountainous region.
- (iv) Dissected hills.

(b) Like Brazil, India too has ..... .
- (i) high mountains.
- (ii) ancient plateau.
- (iii) west-flowing rivers.
- (iv) snow-capped mountains.

(c) The Amazon Basin is mainly ..... .
- (i) characterized by droughts.
- (ii) filled by swamps.
- (iii) covered by dense forests.
- (iv) fertile.

(d) Amazon is a large river in the world. Near its mouth ..... .
- (i) deltaic regions are found.
- (ii) no deltas are found.
- (iii) deposition of sediments occurs.
- (iv) fishing is done.

(e) The Lakshadweep Islands of Arabian Sea are ..... .
- (i) made from the part separated from the mainland.
- (ii) coral islands.
- (iii) volcanic islands.
- (iv) continental islands.

(f) To the foot hills of The Aravalis ..... .
- (i) lies the Bundelkhand Plateau.
- (ii) lies the Mewad Plateau.
- (iii) lies the Malwa Plateau.
- (iv) lies the Deccan Plateau.

Q 2. Answer the following questions

(a) Differentiate between the physiography of Brazil and India.

(b) What measures are being taken to control pollution in the rivers of India?

(c) Explain the characteristics of the North Indian Plains.

(d) What could be the reasons behind the formation of swamps in the extensive continental location of Pantanal ?

(e) Which are the major water divides of India giving examples.

Q 3. Write notes on

(a) Amazon River basin
(b) Himalayas
(c) The coasts of Brazil
(d) The Indian peninsula
(e) The Great Escarpment

Q 4. Write geographical reasons.

(a) There are no west-flowing rivers in Brazil.
(b) There are dissimilarities between the eastern and western coasts of India.
(c) There are fewer natural ports on the eastern coast of India.
(d) As compared to Amazon, pollution in river Ganga will affect human life greatly.

Q 5. Identify the correct group

(a) The order of physiograpic units in Brazil while going from North-West to South -East.
- (i) Parana River basin- Guyana Highlands- Brazilan Highlands
- (ii) Guyana Highlands- Amazon river basin - Brazilan Highlands
- (iii) Coastal Plains - Amazon river basin - Brazilan Highlands

(b) These rivers of Brazil are north-flowing
- (i) Juruika- Xingu- Aragua
- (ii) Negro-Branco-Paru
- (iii) Japura-Jarua-Purus

(c) The order of plateaus of India from south to north

(i) Karnataka- Maharashtra-Bundelkhand

(ii) Chhota Nagpur- Malwa- Marwad

(iii) Telangana-Maharashtra-Marwad

Q 6. Look at the digital elevated model (DEM) of India and name the major physiographic divisions.

Activity:

Observe figure 3.1 and 3.2 and fill in the following table with the physiographic divisions found in the States of India and Brazil respectively.

States of India	Physical Divisions	States of Brazil	Physiographic Divisions

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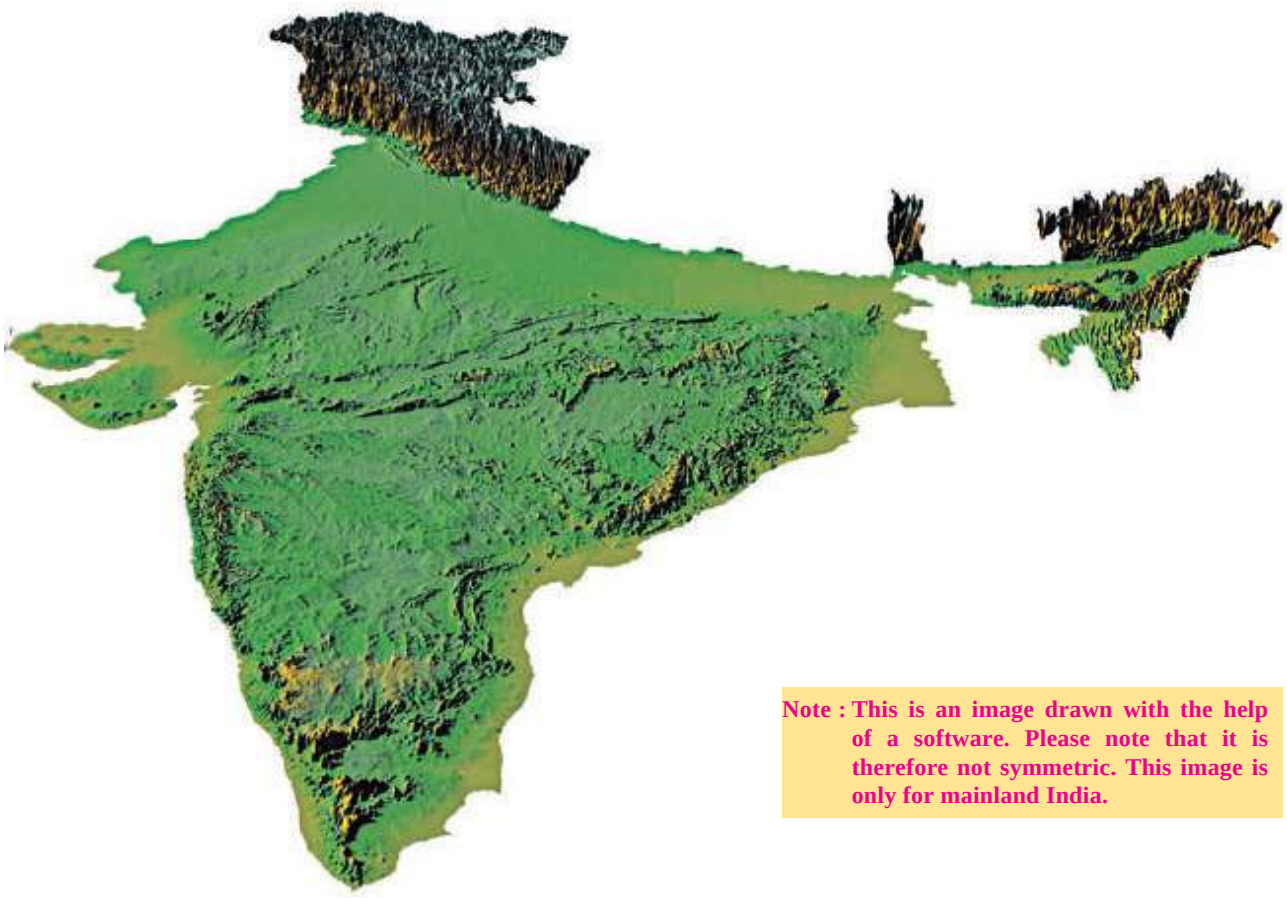

Note : This is an image drawn with the help of a software. Please note that it is therefore not symmetric. This image is only for mainland India.

Shield Area : Shield is considered to be the core portion of a continent. These shields are made up of igneous crystalline rocks and high grade metamorphic rocks. Rocks in the shield area are ancient. Their period can be from 580 million to 2 billion years. Brazil and Guyana shields are considered to be the core of the South American continent.

SETAU5