Physiography of India

1. Main Physiographic Divisions:

India can be divided into 5 major physiographical divisions

* The Himalayan Mountains
* The Great Indian Plains
* The Peninsular Plateau
* The Coastal Plains
* The Indian Islands

2. The Himalayan Mountains

2.1 Introduction

* Youngest and loftiest mountain chain in the world
* Stretches over 2400Km (22° longitude)
* Width varies from 500km in Kashmir to 200Km in Arunachal Pradesh
* Area covered 5 Lakh Km2
* Pamir knot is the connecting link between Himalayas and the high ranges of central Asia

2.2 Physiographic Divisions of the Himalayas – Divided into 3 parts

2.2.1 The Himalayan Ranges

2.2.1.1 The Shiwaliks

* Outer Himalayas
* **Hogback** appearance with steep southern slopes
* **Width** varies from 50 Km in Himachal Pradesh to 15 Km in Arunachal Pradesh
* **Altitude** varies from 600-1500 m.
* **Gorges** of Tista and Raidak have jointly formed a gap of 80-90 Km, in the otherwise unbroken range
* This range, being **created last**, at some point obstructed courses of river draining from higher reaches and lakes were created
* These lakes drained out after the rivers carved out a course through the Shiwaliks
* **‘Duns’**or **‘Doons’** left behind in the West and ‘Duars’in the East.
* The southern slopes of this range in Punjab and Himachal Pradesh, are completely devoid of forests, and are dissected by several seasonal streams called **‘Chos’**
* The Shiwaliks are **known by different names** in different regions
  + Jammu Hills in Kashmir
  + Dhang, Dhundwa in Uttarakhand
  + Churiaghat in Nepal
  + Miri, Dafa, Abor, Mishmi in Arunachal Pradesh

2.2.1.2 The Himachals

* Intricate system of ranges 60-80 Km **wide**
* **Altitude** varying from 3500-4500 m.
* **Steep**, bare **southern slopes** and gentle forested northern slopes
* **Important ranges** are
  + Pir Panjal (Kashmir)
  + Dhauladhar (Himachal Pradesh)
  + Moussourie, Nag Tibba (Uttarakhand)
  + Mahabharat, Lekh (Nepal)
* **Pir Panjal** range extends from the Jhelum river to the upper Beas river (300-400 Km)
* It is separated from the Zanskar range by the **Kashmir valley** (135 Km long 40 Km wide)
* Other notable valleys are Kangra, Kullu (Himachal Pradesh) and Kathmandu valley (Nepal)
* **Best known passes** of the Pir Panjal range are – Pir Panjal pass, Banihal pass, Bidil pass, Golabghar pass
* Middle Himalayas are friendly to human contact, **majority of Himalayan hill resorts** – Shimla, Mussourie, Almora, Ranikhet, Nainital, Darjeeling are located here

2.2.1.3 The Himadris

* Northernmost or innermost of all the Himalayan ranges
* **Average elevation** of 6100 m
* **Average width** of 25 Km
* Abrupt termination or **Syntactical bend** in the Namcha-Barwa in the north east and the Nanga Parbat in the north west
* **Most of the notable peaks** of the Himalayas lie in this range
* **Major passes** of this range are Burzil, Zozila, Bara Lacha, Shipki La, Nathu La, Jelep La, Bomdi La

2.2.2 The Trans Himalayan Ranges

* The Himalayan ranges immediately north of the Himadri are called the Trans Himalayas or Tibetan Himalayas
* **Zaskar**, **Ladakh**, **Karakoram** and **Kailash** are the main ranges of the trans Himalayas
* **Zaskar** range Branches off from the great Himalayas at 80 E longitude, runs parallel to it, terminates at Nanga Parbat (8126 m)
* The **Ladakh** range lies to the north of the Zaskar range
* It is about 300 Km long, average elevation is 5800 m.
* The **Kailash** range in western Tibet is an offshoot of the Ladakh range
* **Mt. Kailash** (6714 m) is the highest peak of Kailash range
* Northernmost range of the Trans Himalayas is the **Karakoram** range or **Krishnagiri** range
* **K2** is the highest peak of the Karakoram range
* **Ladakh plateau** lies to the north west of the Karakoram range, elevation about 5000 m.

2.2.3 The Eastern Hills

* Himalayas take a sudden southern turn after crossing the **Dihang gorge.**
* Extends from Arunachal Pradesh to Mizoram, forms India’s boundary with Myanmar
* **Patkai-Bum** in Arunachal Pradesh
* **Kangto** is the highest peak of Arunachal Pradesh
* Merges into the **Naga hills** of Nagaland
* **Saramati** is the highest peak of Naga hills (3826 m)
* South of Naga hills are the **Manipur hills**.
* **Barali** range separate Naga hills from Manipur hills
* South of Manipur hills are the **Mizo hills** (Lushai hills)
* Highest point is the **Blue Mountain** (2157 m)

2.3 Karewa Deposits

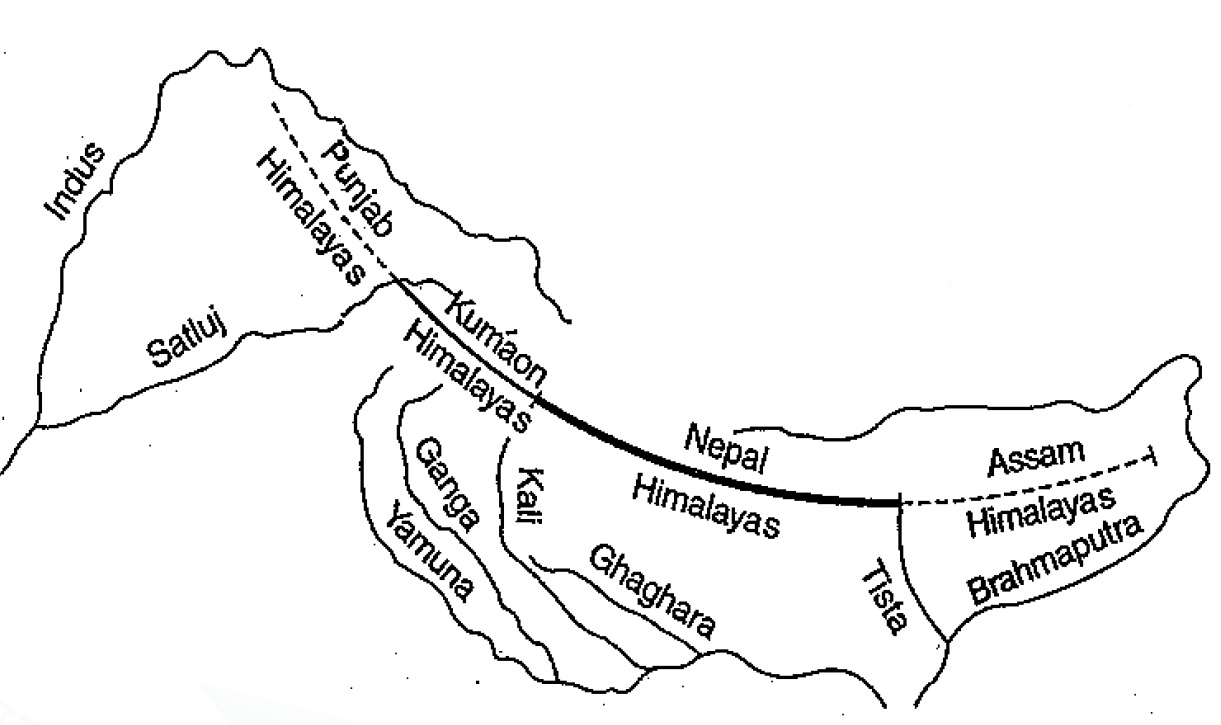
* Intermountain valley fill, (lacustrine deposits) made up of unconsolidated grovel and mud
* Formed during Pleistocene period
* Famous for farming of saffron, nuts etc.
* Kashmir valley is known for its Karewa deposits
* Thickness of Karewas is about 1400 m

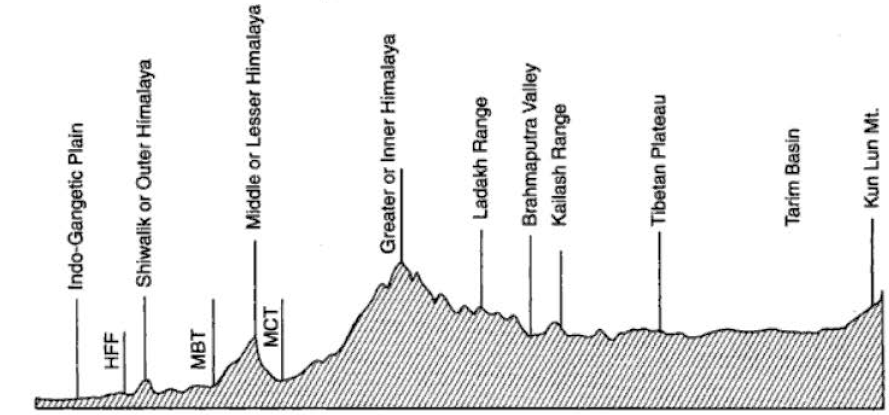
2.4 Himalayan Glaciers

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Length (Km)** | **Location** | **Mountain Range** |
| Siachen | 75 | Nubra Valley | Karakoram |
| Fedchenko | 74 | S.W Pamir | Karakoram |
| Hispar | 62 | Tributary of Hunza | Karakoram |
| Biafo | 59 | Brabloh valley | Karakoram |
| Batura | 58 | Hunza | Karakoram |
| Baltoro | 58 | Hunza | Karakoram |
| Chogo Lungma | 50 | Rakaposhi Range | Karakoram |
| Khurdopla | 47 | Shingshal Valley | Karakoram |
| Sonapani | 15 | Chandra Valley | Pir Panjal |
| Bara Shigri | 10-20 | Chandra Valley | Pir Panjal |
| Rakhiot | 15 | Nanga Parbat | Pir Panjal |
| Gangri | 13 | Nun Kun Massif | Pir Panjal |
| Chungpar | 13 | Nanga Parbat | Pir Panjal |
| Gangotri | 30 | Source of Ganges (UK) | Kumaon |
| Milam | 20 | Gori Ganga (UK) | Kumaon |
| Pindari |  | (UK) | Kumaon |
| Yepokangara | 13.5 | Gosaithan | Central Nepal |
| Lidanda | 11 | Mansalu | Central Nepal |
| Chhuling | 11 | Mansalu | Central Nepal |
| Rongbuk | 52 | Tibetan side of Everest | Kanchenjunga |
| Zemu | 25 | Zemu valley (Teesta) | Kanchenjunga |

2.5 Regional Division of the Himalayas

* Proposed by Sydney S. Burrard
* Himalayas divided into 4 parts based on river valleys



2.6 The Himalayan Complex

3. The Great Indian Plains

3.1 Introduction

* Lies to the south of the Himalayas and to the north of the Indian Peninsular region.
* **Arcuate** (Bow shaped) plain known as Indo-Gangetic-Brahmaputra plains
* **Length** of 3200 km
* **Width** varies from 150 km to 300 km.
* Thick layer of alluvium throughout the length and breadth of the plain
* Classic example of aggradational plain.
* According to Oldham, maximum depth of alluvium is 6100 m.
* **Average elevation** about 200 m.
* Highest elevation of 291 m between Saharanpur and Ambala.

3.2. Geomorphology of the plain

3.2.1. The Bhabar

* Narrow belt about 8-16 km wide running in east-west direction along the foot of the Shiwaliks
* It forms the northern boundary of the great plains
* Rivers descending from the Himalayas deposit their load along the foothills in the form of alluvial fans.
* High porosity of the pebble studded rocks causes the streams to flow underground
* Not suitable for agriculture

3.2.2. The Tarai

* 15-30 km wide marshy tract to the south of the Bhabar region
* It runs parallel to the Bhabar region
* It is marked by the re-emergence of the underground streams of the Bhabar belt
* Re-emerged waters convert large areas along the rivers into ill-drained marshy lands
* Covered with thick forests giving shelter to various wildlife
* The Tarai is more marked in the eastern part as it receives more rainfall
* Most of the tarai specially in Punjab, Uttar Pradesh have been reclaimed and turned into agricultural land
* Yields good crops of sugarcane, rice, wheat.

3.2.3. The Bhangar

* **Composed of old alluvium** of the Middle Pleistocene age
* Forms the alluvial terrace above the level of the flood plains.
* Often impregnated with **calcareous concretions** known as ‘Kankar’
* Remnants of the Bhangar are eroded by change in direction of river channels and levelled down by their meandering tendencies
* **‘The Barind plains’** in the deltaic region of Bengal and the **‘Bhur formations’** in the middle Ganga and Yamuna doab are regional variations of Bhangar.
* Contains fossils of animals like rhinoceros, elephant, hippopotamus etc.

3.2.4. The Khadar

* **Composed of newer alluvium**
* **Forms** the **flood plains** along the river banks
* New layer of alluvium deposited by river floods almost every year
* These deposits are confined to the vicinity of the present river channels
* The clays have less ‘Kankar’

3.2.5. The Reh or Kellar

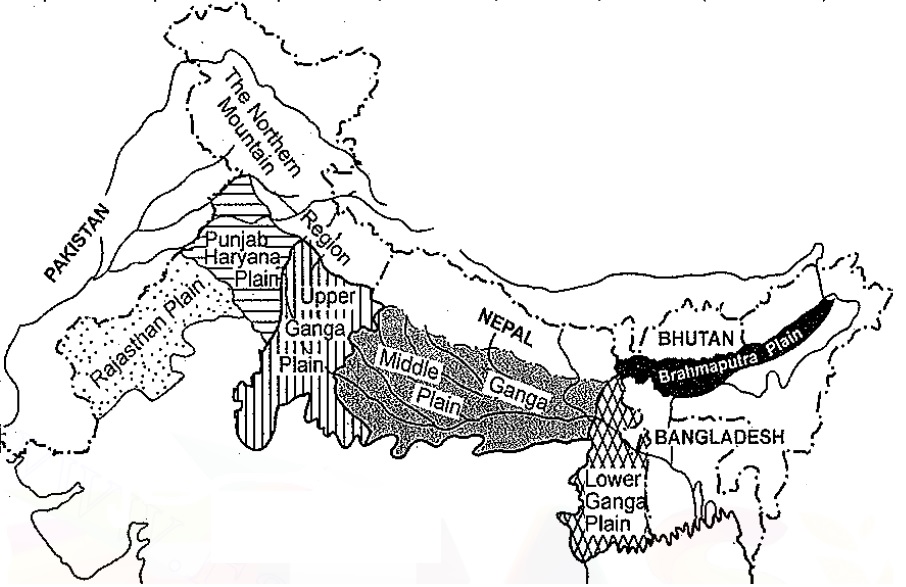
* **Barren saline efflorescence** of drier areas of Uttar Pradesh and Haryana
* Reh areas have spread in recent time due to increase in irrigation

3.2.6. The Bhur

* **Elevated piece of land** situated along the banks of the Ganga river, especially in the Ganga-Yamuna doab.
* This has been **formed due to accumulation of wind-blown sands** during the hot dry months of the year

3.3. Regional Division of the Great Plains – Divided into 4 major regions

* The Rajasthan plain
* The Punjab-Haryana plains
* The Ganga plain
* The Brahmaputra plain



3.3.1 The Rajasthan plains

3.3.1.1. Introduction

* Located in between the Aravalli range and the Sutlej and Indus plains
* Height Gradually diminishes from the Arvallis in the south east (350 m) to the Pakistan plains in the north west (150 m)
* In the lower areas and to the north of Jaisalmer, some salt lakes or Ranns can be seen.
* Lake Sambar is the largest lake of this region

3.3.1.2. Division – Can be divided into 5 sections

3.3.1.2.1. Bagar

* The foot area of the Aravallis i.e. the easternmost region of the Rajasthan plains is known as Bagar
* Almost all the region is covered in grass and some agriculture is seen

3.3.1.2.2. Rohi

* Lies to the immediate west of the Bagar region
* Some rivers have originated from the western slopes of the Aravallis
* These rivers have dried up and have merged into the desert region
* Alluvial deposits on both sides of these rivers, makes the basins fertile
* These fertile lands are known as Rohi

3.3.1.2.3. Little Desert Region

* Located to the immediate west of the Rohi region
* Marks the beginning of the desert

3.3.1.2.4. Stony Region or Hamada

* Lies to the north of the little desert region
* Made up of sandy soft rock deposits

3.3.1.2.5. Sandy Region

* Located to the West of the stony region
* This region is the great Indian Thar desert, which has crossed over into Pakistan
* This region is also known as **Marusthali**
* **Dhrian** – Moving sand dunes
* **Dhand** – Longitudinal lakes in between two parallel sand dunes

3.3.2. The Punjab-Haryana plains

* Desert region gives way to the fertile plains of the Punjab-Haryana.
* Length 640 Km, and 300 Km wide (East-West)
* **Eastern boundary** formed by the **Yamuna river**
* Elevation varies from 300 m in the north to 200 m is the south east
* This plain is formed by the **alluvial deposits of** 5 rivers i.e. **Sutlej, Beas, Ravi, Chenab and Jhelum.**
* It is **primarily made up of doabs** (land between rivers) from east to west these doabs are
  + Bist-Jalandhar doab (Beas and Sutlej)
  + Bari doab (Beas and Ravi)
  + Rachna doab (Ravi and Chenab)
  + Chaj doab (Chenab and Jhelum)
  + Sind sagar doab (Jhelum-Chenab and the Indus)
* The long depositional process of the rivers has united these doabs and given a homogeneous geomorphological identity to the entire area
* Mass of alluvium has been broken by the river courses.
* River courses have carved broad flood plains of khadar **flanked by bluffs** known as **Dhayas**
* These bluffs are as high as 3 m or more are heavily gullied
* The khadar belt known as **Bet lands**, though liable to flooding is agriculturally valuable
* Northern part of the plains bordered by the shiwaliks has been intensively eroded by several streams called **chos.**
* **Chos** are particularly noticeable in the Hoshiarpur district of Punjab.
* Area between Ghaggar and Yamuna river lies the so called **‘Haryana tract’**, which acts as a water divide between Yamuna and the Sutlej rivers
* Only river between Yamuna and the Sutlej is the Ghaggar river, which is considered to be the present-day successor of the legendary **Saraswati** river.

3.3.3. The Ganga Plain

3.3.3.1. Introduction and Subdivision

* Largest unit of the great plain of India covering 3.75 lakh Km2
* The Ganga and its large number of tributaries have brought large amount of alluvium from the mountains and deposited it here to form extensive plains.
* The peninsular rivers which have merged in to Ganga such as Chambal, Betwa, Ken have also contributed in the building of this plain
* The plain can be subdivided into 3 sections
  + The Upper Ganga Plain
  + The Middle Ganga Plain
  + The Lower Ganga Plain

3.3.3.2. The Upper Ganga Plain

* **Yamuna** is its **western border**
* 100m contour line is considered to be its eastern demarcation
* 500 Km long in the east west direction and 380 km wide in north-south direction
* Elevation varies from 100-300 m
* The plain is drained by Ganga and its tributaries i.e. **Yamuna, Ram Ganga, Sarda, Gomati, and Ghaghara** rivers**.**
* Monotony of this flat featureless plain is broken by the tarai-bhabar submonate belt.
* River bluffs, ox-bow lakes, river meanders, abandoned river courses, sandy stretches (Bhurs) are its main features
* Western part of the plain consists of the higher **Ganga-Yamuna doab**
* East of this doab lies the low **Rohilkhand plains** which merge into **Avadh plains** further east
* Ghaghara is the main stream of the Avadh plains

3.3.3.3. The Middle Ganga Plain

* Lies to the east of the Upper Ganga plains
* Occupies the Eastern part of Uttar Pradesh and Bihar
* Eastern boundary of this region is ill-defined
* Very low plain not exceeding 150 m in elevation
* Drained by **Ghaghara, Gandak, Kosi** rivers
* Marked by local prominences like levees, bluffs, oxbow-lakes, marshes, tals, ravines etc.
* ‘Kankar’ formations are less here due to preponderance of Khadar
* Almost all rivers keep shifting their courses, making this region prone to flooding.
* **Kosi** river is called the **‘Sorrow of Bihar’**.
* Several attempts to tame this river has been made by both India and Nepal.
* Major units of this plains are
  + Ganga-Ghaghara doab
  + Ghaghara-Gandak doab
  + Gandak-Kosi doab or **Mithila plain**
* Some rivers join the Ganga from the South as well, **Son** being the most important
* East of Son river lies the **Magadh plain**

3.3.3.4. The Lower Ganga Plain

* Includes the Kishanganj tehsil of Purnea district of Bihar, the whole of West Bengal (except Purulia and mountainous parts of Darjeeling)
* Its length is about 580 Km North-South
* Width of this region varies greatly
* Total area of this plain is about 81 thousand Km2
* Northern part of this plain is formed by the sediment deposited by Tista, Jakdhaka, Torsa
* This area is also marked by the Duars (Left side of Tista river) and the Barind plains (Older alluvium tract)
* The delta formation accounts for 2/3rds of this region
* This is the largest delta of the world
* Large part of the coastal delta is covered by thick impenetrable tidal forests. These are called Sundarbans because of the predominance of the Sundari tree.

3.3.4. The Brahmaputra Plain

* This is also known as the Brahmaputra valley or Assam Valley or Assam Plain as most of the Brahmaputra valley is situated in Assam.
* Extends from easternmost end of Assam to the west of Dhubri near Bangladesh border.
* Length of 720 Km and width of 60-100 Km
* Its western boundary is formed by the Indo-Bangladesh border as well as the boundary of the lower Ganga Plain. Its eastern boundary is formed by Purvanchal hills.
* Entire plain cover an area of 56 thousand Km2
* It is an **aggradational plain** built up by the depositional work of the **Brahmaputra and its tributaries.**
* The innumerable tributaries of the Brahmaputra river coming from the north form a number of **alluvial fans**.
* The tributaries branch out in many channels giving birth to river meandering leading to formation of bill and ox-bow lakes.
* There are **large marshy tracts** in this area. The alluvial fans formed by the coarse alluvial debris have led to the formation of **terai** or **semi-terai** conditions.

4. The Peninsular Plateau

4.1. Introduction

* Roughly triangular in shape, it is the largest physiographic division, covering an area of 16 lakh Km2
* The average height of the plateau is 600-900 m above sea level (varies from region to region). ­
* The Peninsular Plateau is one of the oldest landforms on earth.
* It is a highly stable block composed mostly of the Archaean gneisses and schists

4.2. Division of the Peninsular plateau – The peninsular plateau can be roughly divided into 3 parts

* Central Highlands
* Eastern Highlands
* Deccan Plateau/Southern Highlands

4.2.1. Central Highlands

* Consists of Aravalli and Vindhya ranges
* Malwa, Bundelkhand plateau and Narmada valley

4.2.1.1. The Aravalli Range

* They are aligned in north-east to south-west direction, and run for about 800 km between Delhi and Palanpur in Gujarat.
* They are one of the oldest (very old) fold mountains of the world and the oldest in India.
* The range is conspicuous in Rajasthan (continuous range south of Ajmer 900m)
* Becomes less distinct in Haryana and Delhi (characterized by a chain of detached and discontinuous ridges beyond Ajmer)
* Its general elevation is only 400-600 m, with few hills well above 1,000 m.
* Notable peaks are Mt.Abu (1158 m) and Guru Shikhar (1722 m, highest peak)
* Mt.Abu is separated from the main range by the valley of the Banas
* **Goranghat pass** lies south of Mt. Abu, it joins Udaipur with Sirohi and Jalore
* **Haldighat pass** located 40 Km from Udaipur joins Rajasmand and Pali districts
* Pipli ghat, Dewair and Desuri passes allow movement by roads and railways.

4.2.1.2. The Malwa Plateau

* Bounded by Aravalli to the North West, Bundelkhand plateau to the East and Vindhya to the South.
* This plateau has two systems of drainage
  + Towards Arabian Sea → Narmada, Tapi and Mahi
  + Towards Bay of Bengal → Chambal and Betwa (joining Yamuna)
* It is composed of extensive lava flow and is covered with black soils.
* This is a rolling plateau dissected by rivers. In the north, the plateau is marked by the Chambal ravines.

4.2.1.3. The Bundelkhand Plateau

* Bounded by Yamuna river in the North, Vindhya in the South, and Malwa plateau to the West.
* It is the old dissected (divided by a number of deep valleys) upland of the ‘Bundelkhand gneiss’ comprising of granite and gneiss.
* Spreads over five districts of Uttar Pradesh and four districts of Madhya Pradesh.
* Average elevation of 300-600 m above sea level, this area slopes down from the Vindhyan Scarp toward the Yamuna River.
* Streams like Betwa, Dhasan and Ken flow through the plateau
* The erosional work of the rivers flowing here have converted it into an undulating (wave like surface) area and rendered it unfit for cultivation.

4.2.1.4. The Vindhya Range

* It runs more or less parallel to the Narmada Valley in an east-west direction from Jobat in Gujarat to Sasaram in Bihar for a distance of over 1,200 km.
* The rivers Chambal, Betwa and Ken rise within 30 km of the Narmada
* The general elevation of the Vindhyan Range is 300 to 650 m.
* Most parts of the Vindhyan Range are composed of horizontally bedded sedimentary rocks of ancient age.
* The Vindhyas are continued eastwards as the **Bharner** and **Kaimur** hills
* This range acts as a watershed between the Ganga system and the river systems of south India.
* **Sadbhawna Shikhar/Kalumar Peak** is the higheat peak of the Vindhyas, only 750 m

4.2.1.5. The Narmada Valley

* Situated to the south of the Vindhya range
* Created due to parallel fault lines
* Denotes the boundary of the central highlands