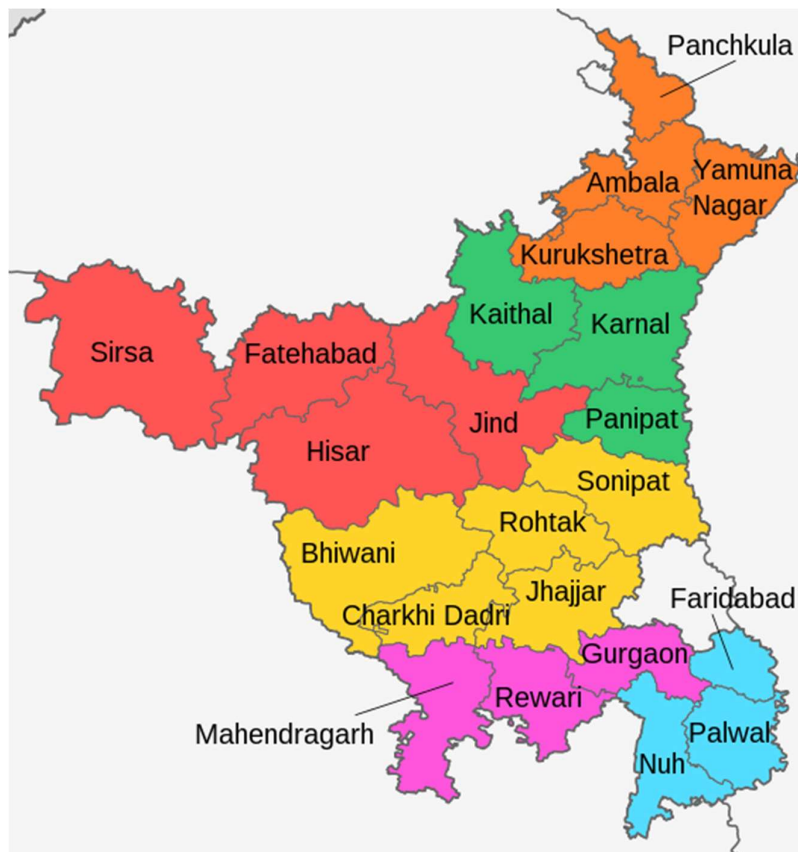


Chapter 1

Haryana and its Geographical Features

On 1 November 1966, Haryana, a state in North India, was separated from the Punjab on a linguistic basis as 17th Indian state. With less than 1.4% (44,212 km² or 17,070 square metres) of India's total land area, it is placed 21st in terms of size. The most populated city is Faridabad, which is a part of the National Capital Region, and the state's capital is Chandigarh, which it shares with Punjab. Gurgaon is among India's greatest financial and technological hubs is Gurgaon.

Haryana has 6 administrative divisions, 22 districts, 72 sub-divisions, 93 revenue tehsils, 50 sub-tehsils, 140 community development blocks, 154 cities and towns, 7,356 villages, and 6,222 *Gram Panchayats*



HARYANA AND ITS DISTRICTS

Haryana is divided into five natural topographic divisions, which are:

1. The Bagar and the undulating sandy plains-the sand dunes and the tals(230-350 metres
2. The Alluvial Plain or the Ghaggar-Yamuna Plain comprising Bangar, Khadar, Naili and Bet (below 300 metres).
3. The Aravali outliers (300-600metres)
4. The Shivaliks-The hills (over 400 metres), and
5. The Foot Hill Zone-The piedmont plain (300-400 metres).

The Bagar

In the south-western regions of Haryana, sand dunes of varying sizes and shapes create a parched environment that is covered in stoppe flora. The Bagar lies in parts of Sirsa, Hisar and Bhiwani districts. The significant amount of wind-blown sand that has been heaped up several metres above the local flats and extended for many kilometres is noteworthy. On around 11% of the State's total territory, this creates a continuous strip of densely packed sand dunes next to the Thar Desert. This belt of sand dunes, which are enormous in magnitude, stretches from the southeast of Sirsa district to the Rajasthan border with Hisar district, progressively widening through Bhiwani district.

Locally called as Bagar, the area resembles a nearly treeless, undulating, arid desert. The principal features of the south-west are sand dunes of various sizes. Although the local relief can reach heights of 15 metres in some locations, most dunes are permanent and just a few are movable. Their axes may run parallel to the direction of the wind. Longitudinal dunes are typically prevalent. As the name suggests, the area is not entirely devoid of trees, but it does support a sparse scrubby vegetation in tals. Furthermore, rocky outcrops, like those in the Bhiwani district, break up the monotony of sand mounds. The area steadily gains elevation as it moves towards the southeast, where it ends at the Sohana Plateau of the Aravalli hills.

The mobile sand dunes seriously threaten to impair the prosperity of fertile alluvial plains lying to their north and north-east. As a result of meagre rainfall and its highly unreliable character, the climatic conditions of the Bagar and the undulating sandy plains are arid. Most of the arid region possesses a very scanty vegetation partly due to cultivation and grazing practices, and primarily due to the prevailing desert conditions. The soil moisture deficit is very acute and it persists throughout the year.

The Alluvial Plain

The alluvial plain of Haryana as usual has the alluvial richness. It is one of the socioeconomic hinterlands of India, contributing a major and significant share

to the foodgrain reserve of the nation. Besides, it occupies an important position in the sub-continent as it forms the water divide between the two mighty river systems of the Ganga and the Indus flowing into the Bay of Bengal and the Arabian sea respectively. It comprises vast riverine plains of the older and the newer alluvium and, therefore, the lithological diversity in alluvial monotony has a strong bearing upon the distributional pattern of land use, cropping pattern and agricultural productivity. The Ghaggar and Markanda streams and Yamuna River have left their imprint on the local relief of the alluvial plain. The region is considerably vast, more fertile and populous. Indeed, the 300 metres significant contour represents a more meaningful boundary between the plain and the upland. The plain imperceptibly slopes from north-east to south and south-west, the gradients to which follow the lines of natural drainage.

The plain is remarkably flat in the districts of Ambala, Yamuna Nagar, Kurukshetra, Karnal, Kaithal, Jind, Sonipat and the north-eastern part of Hisar. Within the alluvial plain are the narrow low lying flood plains, known as Khadar of Yamuna, Nali of Ghaggar, and Bet of Markanda. Besides, the flat of the saucer in Sonipat and northern parts of Rohtak districts forms a part of the said plain. At places, there are occasional local undulations forming old rolling alluvial plains which include the Rohi of Dabwali and Sirsa tehsils (Sirsa district). The Rohi has many abandoned beds of old streams, in particular that of the Ghaggar, which provide fertile land suited to agriculture. The Rohi is not completely flat because of the presence of *tals* and *tibbas*. The local relief of the *tibbas* is very insignificant and these have either been under the process of levelling or completely graded on account of the extension of irrigation facilities with Bhakra Canal. The older alluvial plain is covered by the Pleistocene deposits.

The old alluvial plain (Bangar) at a varying depths contains carbonate of lime, usually occurring in nodules called Kankar, which are from less than one centimetre to more than 5 centimetres in diameter. In Bangar these Kankar formations occur much below the root-zone of the soil and such parts of the land are known as Nardak. In the upper reaches of the Saraswati stream in Thancsar tehsil of Kurukshetra district, the Kankar seems to occur in the form of a pan close to the root-zone and this tract is termed as Chhachhra. The older alluvium of the Nardak and the Chhachhra has lower level of fertility as compared to the Bangar alluvium on account of the Kankar formations in the former. On the whole, the Bangar region is characterised by patches of saline efflorescence which is the result of the mechanical composition of alluvium, gentle slope of the land and the capillary action during hot dry season.

The damage caused by salinity has, however, been considerably minimised by the tubewell and canal irrigation facilities. On the east of the alluvial plain is the flood plain of the Yamuna extending from its existing course to its old high bank. It is narrow in Jagadhri tehsil of Yamuna Nagar district, it broadens towards

Sonipat after passing through the district of Kurukshetra, Karnal and Panipat and again narrows down in the district of Faridabad. In the north-west of the alluvial plain lie the flood plains of the Ghaggar and the Markanda called Nali and Bet respectively. Gulha Nali, Shahbad Bet, and Sirsa Nali are wide and a larger area is liable to inundation during the floods. The wide flood plains gradually merge into adjacent old plains. On the other hand, the flood plain in Fatehabad tehsil is narrow with a recognizable change into the old plains. Ghaggar Nali is gently sloping, and largely cleared of natural vegetation for cultivation. This area has experienced agricultural revolution of significant magnitude during the fifties resulting from agricultural colonization of the cultivable waste land, where the irrigation facilities provided through the minor irrigation schemes and the Bhakra Canal brought dynamic changes in agrarian economy. Sirsa Nali is wide and shallow. The result is that a far larger area is flooded in the south-east of Sirsa tehsil. In this part sand dunes are common as it lies close to the Marusthali of Rajasthan. These dunes are of shifting nature and crescentic in shape. Their march has been checked with the extension of irrigation facilities. The water table in the Khadar, Nali and Bet regions is fairly high, facilitating irrigation from tubewells. The regions have fertile soils of recent deposits which are replenished every year.

The topography of Haryana offers both opportunities and challenges to agricultural pursuits. Topography as such has little effect on agriculture, for the proportion of the land which is too steep or too rocky & to cultivate is considerably small. Paradoxically, in the saucer and the bowl which are often the marginal lands in the plains of Haryana, the surface drainage is rather poor. Actually, Haryana, is blessed with extensive level land possessing a wealth of agriculture. The vast alluvial plain forms the heartland binding the hilly region and the sand dune belt together. The combination of level or rolling land and favourable temperature conditions is the most promising aspect of the State. In its extensive areas lie the future prospects for the development of irrigation, agriculture and dry farming. Topographically large areas of level to nearly-level land are suited to cultivation and extensive use of farm machinery, provided the fields can be adequately supplied with irrigation water.

The Aravalli Outliers

The Aravallis are regarded as one of the world's oldest mountain ranges. They begin in Gujarat and Rajasthan and continue across south Haryana before coming to a finish in Delhi. Since the Aravallis are widely dispersed throughout Haryana's districts, including Mewat, Faridabad, Gurugram, Mahendragarh, and Rewari, and because they are heavily mined, they have seen significant growth and construction activities. According to a recent report presented to the NGT, Gurugram's Aravallis have lost more than 10,000 acres (4,046 hectares) of the Natural Conversation Zone (NCZ), the part of the city's forest cover that is thought to be the greenest.

A report claims that between 1975 and 2019, 3,676 square kilometres (4.86 percent) and 776.8 square kilometres (1.02 percent) of the total Aravalli forest land across the states were converted into barren land and settlement, respectively, and that the amount of forest land in the Aravallis has decreased by 5,772.7 square kilometres (7.63 percent). A total of 16,360.8 sq. km. (21.64 percent) of forest land "will be converted to a settlement class" by 2059, according to the report.

A study was conducted to compare surface water bodies in the Faridabad area with changes in land use and mining operations, and to track such changes over a 35-year period, from 1970 to 2006. According to the study's findings, significant changes were largely found in formerly used areas for agricultural, forestry, and vegetation that were later developed for residential purposes. According to the data, between 1970 and 2006, the metropolitan area grew by 310.8 percent, while mining operations—both legal and illicit—grew by 587.9 percent. These developments harmed the vegetation and surface water. It was discovered that there was a lack of surface water as a result of excessive water removal brought on by mining activity.

At the Dadam mining zone in Haryana, a landslide claimed the five lives. Dadam is merely a reflection of other mines. Dadri and Mahendargarh Mining Zones are also at a comparable level, in addition to the Dadam Mining Zone, which encompasses the region of Dadam and Khanak. It comprises the villages of Pichopa Kalan, Atela Kalan, Kaliyana, and Mayee. Due to mines sucking up all the groundwater in these villages, agriculture has died there, and the population is now without any.

There are various other concerns with Haryana's situation. One of these is the ownership of land in the Aravallis and the privatisation process. When the rules governing common land ownership were altered in the 1970s, the state government gave the village *panchayats* ownership of the common property rather than giving it to the forest department in accordance with the Punjab Village Common Lands Act.

The revenue department later permitted the "transfer of share in common land to the stakeholders" during the 1970s and 1980s. As a result, the land was divided up among the owners and sold at a low price, opening the door for a profitable resale.

Environmentalists claim that this is the rationale behind the privatisation of the Aravallis in Haryana, particularly in the areas close to Delhi where real estate demand is still high.

Regarding how a forest area is defined, there is another problem. In accordance with the Regional Plan 2021 of the National Capital Regional Planning Board, created in 2005, the state has also neglected to formally declare about 60,000

acres (24,281 hectares) of the Aravallis as the NCZ. Construction is only permitted in 0.5% of the NCZ, and it must be for "regional recreational activities" according to the regulations. The Aravallis forests are still endangered by deforestation and other development activities, and the real estate lobby continues to exploit them since they are not legally protected.

In 2009, the Supreme Court of India had imposed a blanket ban on mining in Haryana after analysing the ecological damage in Haryana. But, in November 2011, the Mines and Geology Department of Haryana issued an auction notice for several mining quarries adjoining Aravallis in the state. In 2013, Dadam was also included.

Despite the Supreme Court ban, mining is widespread in Haryana. The authorities very tactfully granted miners access to the mining locations near the Aravallis. These miners operate in the Aravallis in such a situation. Protection zones and forests don't interest them. In fact, things have gone worse in Aravallis even after the mining prohibition has been in place for ten years.

The Shivaliks

The Shivalik Hills, also known as the Shivalik Hills and Churia Hills, are a mountain range of the outer Himalayas that runs across the northern regions of the Indian subcontinent for roughly 2,400 km, from the Indus River eastward near to the Brahmaputra River. With an average elevation of 1,500-2,000 metre it is 10–50 kilometre broad. In Assam, there is a distance of around 90 kilometre between the Teesta and Raidak Rivers. Shivalik means, literally, "the tresses of Shiva". Shivalik region is home to the Soanian archaeological culture. The hills are well known for their Neogene and Pleistocene aged vertebrate fossils.

Geologically, the Shivalik Hills belong to the Tertiary deposits of the outer Himalayas. They are chiefly composed of sandstone and conglomerate rock formations, which are the solidified detritus of the Himalayas to their north; they are poorly consolidated.

The Shivaliks region in Haryana is spread over 3,514 square kilometres of districts Ambala, Panchkula and parts of Yamunanagar. The extent of the Shivaliks covers 430 Gram Panchayats from Ambala, 162 Gram Panchayats from Panchkula and 282 Gram Panchayats from Yamunanagar. In district Panchkula, 45% of total area falls under hilly tracts, whereas Yamunanagar has 9% of hilly area and Ambala only 0.2%.

The districts described above show distinct variation in topography, lithology and water availability. Based on the topography and geomorphology they can be divided into four major groups as under.

Highly dissected region (with gradient more than 15%) found in Pinjore and Morni blocks of Panchkula district.

Moderately dissected region (with gradient between 10 to 15%) found in some parts of Sadaura and Bilaspur blocks of Yamunanagar, also Morni and Pinjore block of Panchkula.

Un-dissected region (with gradient between 5 to 10%) found in some parts of Bilaspur block of Yamunanagar and Naraingarh block of Ambala.

Plains (with gradient less than 5 %) found in the rest of the area. Karoh Peak, a 1,467-metre (4,813 ft) tall mountain peak in the Shivalik mountain ranges near Morni Hills area of Panchkula district, is the highest point in Haryana.