

Coal

Coal is a combustible black or brownish-black sedimentary rock usually occurring in rock strata in layers or veins called coal beds or coal seams. The harder forms, such as anthracite coal, can be regarded as metamorphic rock because of later exposure to elevated temperature and pressure. Coal is composed primarily of carbon, along with variable quantities of other elements, chiefly hydrogen, sulfur, oxygen, and nitrogen. Coal is a fossil fuel that forms when dead plant matter is converted into peat, which in turn is converted into lignite, then sub-bituminous coal, after that bituminous coal, and lastly anthracite. This involves biological and geological processes. The geological processes take place over millions of years. Throughout human history, coal has been used as an energy resource, primarily burned for the production of electricity and heat, and is also used for industrial purposes, such as refining metals. Coal is the largest source of energy for the generation of electricity worldwide, as well as one of the largest worldwide anthropogenic sources of carbon dioxide releases. The extraction of coal, its use in energy production and its byproducts are all associated with environmental and health effects including climate change. Coal is extracted from the ground by coal mining. Since 1983, the world's top coal producer has been China. In 2015 China produced 3.747 billion tonnes of coal – 48% of 7.861 billion tonnes world coal production. In 2015 other large producers were United States (813 million tonnes), India (678), European Union (539) and Australia (503). In 2010 the largest exporters were Australia with 328 million tonnes (27% of world coal export) and Indonesia with 316 million tonnes (26%), while the largest importers were Japan with 207 million tonnes (18% of world coal import), China with 195 million tonnes (17%) and South Korea with 126 million tonnes (11%).

Major Coal Producing States in India

Coal is an important source of power in India. It is unevenly distributed in India. Majority of the coal producing states are found in the eastern part of India comprising part of Jharkhand, Orissa, Chhattisgarh and West Bengal. Jharkhand is the largest coal producing state in the country followed by Orissa, Chhattisgarh, West Bengal, Madhya Pradesh, Telangana (previous part of Andhra Pradesh) and Maharashtra.

1. Jharkhand: 38% of the total reserves of India are found in this state. Daria is the most important and most productive coal field in India. The field accounts for 100% of the country's prime coking coal production. Other significant coal producing regions of this state are Bokaro, North Karanpura, South Karanpura, Giridih, Ramgarh, Daltonganj and Rajmahal.

2. Orissa (Odisha): Orissa account for around 13.4% of the country's total production. Talcher and Ranapur Himgir are the two important coal fields. Talcher accounts for nearly 3/4th of the total coal reserve of the state.

3. Chhattisgarh and Madhya Pradesh: Major coal fields are Korba, Umaria, Singrauli, Chirmiri and Sohagpur. Other coal fields include PENCH Kanhan, Mohpani, Sonhat, Jhilimili, Bistrampur, Raigarh and Tatapani – Ramkola.

4. Andhra Pradesh: The major coal producing districts are Adilabad, Karimnagar, Warangal, Khammam, East Godavari and West Godavari. Major coal fields are Tandur, Singareni, Kothagudem and Ramagundam.

5. Maharashtra: The major coal fields are found in Nagpur-Wardha region. The important mining areas are – Wardha, Ballarpur, Chanda and Kampti.

6. West Bengal: Raniganj is the largest coal field of West Bengal and the second biggest in India in terms of total reserve. The coal fields of Asansol are also famous. Recently a large coal field has been discovered in Mejia in the Bankura district.

Tertiary coalfields:

Assam accounts for 63% of the total tertiary coal reserves. Major coal fields in Assam are the Makum, Nazira, Mikir Hills and Dilli-Jeypore. Of these, the Makum is the most developed field. Among the other fields West Darrangiri, Langrin and Bapung in Meghalaya, Namchik in Arunachal Pradesh and Borjan in Nagaland are important.

Lignite coalfields:

Lignite coal is mainly produced in two states – Tamil Nadu and Gujarat. Small lignite coal fields are also found in Rajasthan and Jammu and Kashmir. Neyveli is the lignite field in Tamil Nadu which is located in South Arcol district. Neyveli is the largest lignite coal mine of India. This field supplies fuel for thermal power generation in Tamil Nadu.

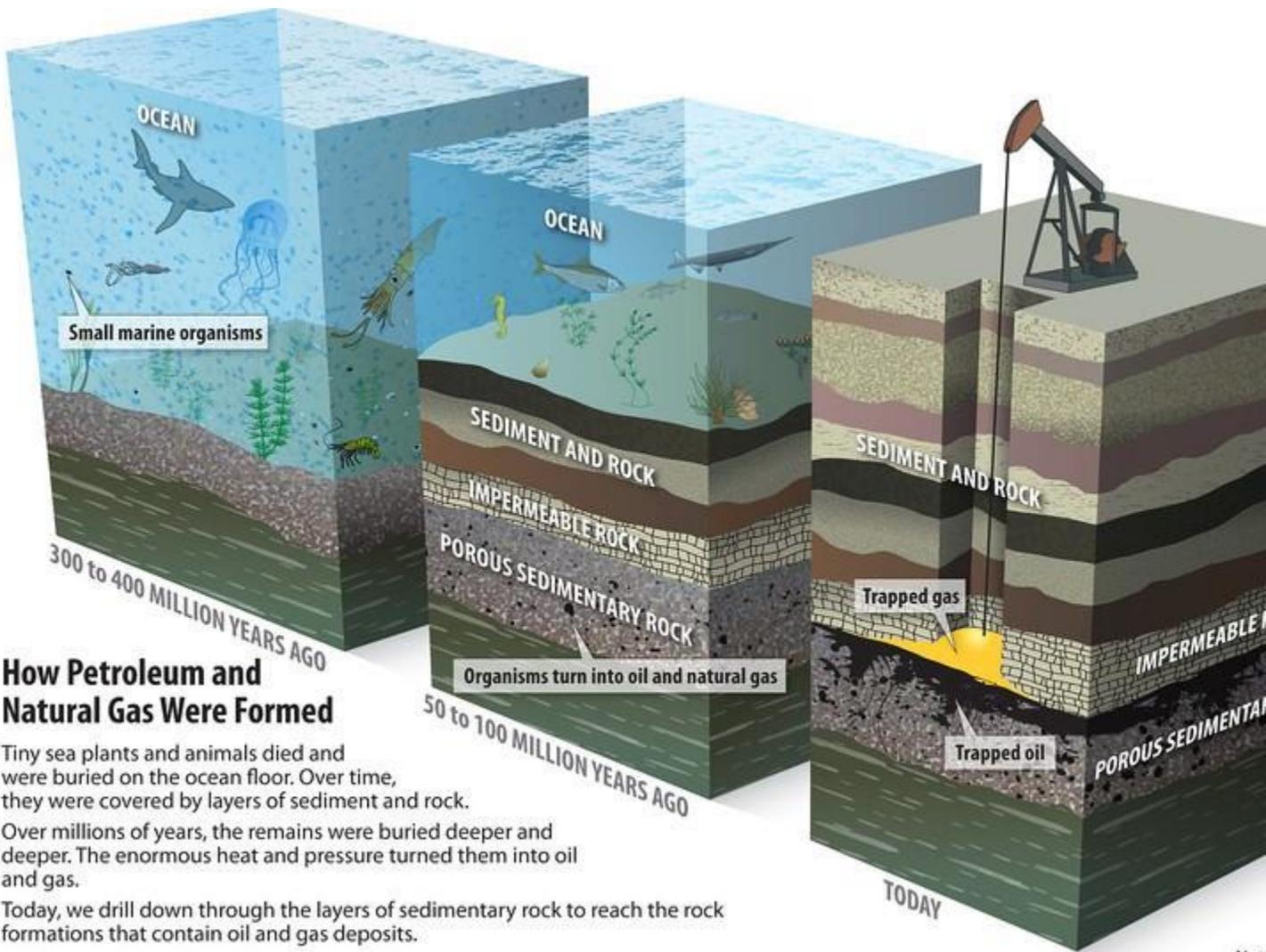
Petroleum and Mineral Oil

- Petra == rock; Oleum == oil.
- Petroleum or Mineral oil is obtained from **sedimentary rocks** of the earth.
- Petroleum fuels on burning gives little smoke and leaves no ash. So they are better than coal.

Constituents of Petroleum and Mineral Oil

- 90 to 95 per cent Hydrocarbons.
- 5 – 10% organic compounds containing oxygen, nitrogen, sulphur and traces of organometallic compounds.

Formation of Petroleum and Mineral Oil



How Petroleum and Natural Gas Were Formed

Tiny sea plants and animals died and were buried on the ocean floor. Over time, they were covered by layers of sediment and rock.

Over millions of years, the remains were buried deeper and deeper. The enormous heat and pressure turned them into oil and gas.

Today, we drill down through the layers of sedimentary rock to reach the rock formations that contain oil and gas deposits.

- All sedimentary rocks do not contain oil.
- An oil reservoir must have three prerequisite conditions.
 1. Porosity [tiny gaps in soil] so as to accommodate sufficiently large amounts of oil;
 2. permeability [allowing liquids or gases to pass through it.] to discharge oil and/or gas when well has been drilled;
 3. the porous sandstone beds or fissured limestone containing oil should be capped below by impervious beds [not allowing fluid to pass through.
- Most of the oil gets collected in the anticlines or fault traps.
- Oil on a commercial scale is usually found in crests of anticlines [where the sedimentary rock strata are inclined and folded].

Distribution of Petroleum and Mineral Oil in India

- Process began in tertiary period [3 million years ago].

- Most of the oil reserves in India are associated with anticlines and fault traps in the sedimentary rock formations of tertiary times.
- In tertiary period, aquatic life was abundant in various forms, especially the minor microscopic forms of flora and fauna.
- Conditions for oil formation were favourable especially in the lower and middle Tertiary period.
- Dense forests and sea organisms flourished in the gulfs, estuaries, deltas and the land surrounding them during this period.

Extent of Oil Bearing Strata in India

- 1 lakh sq km or 42 per cent of India covered with sedimentary rocks.
- 10 lakh sq km form marine basins of Mesozoic and Tertiary times.
- Total continental shelf of probable oil bearing rocks amounts to 2 lakh sq km.
- The total sedimentary area including both on shore and offshore comprises 27 basins.
- Mumbai High, the Khambhat Gulf and the Assam are the most productive areas.

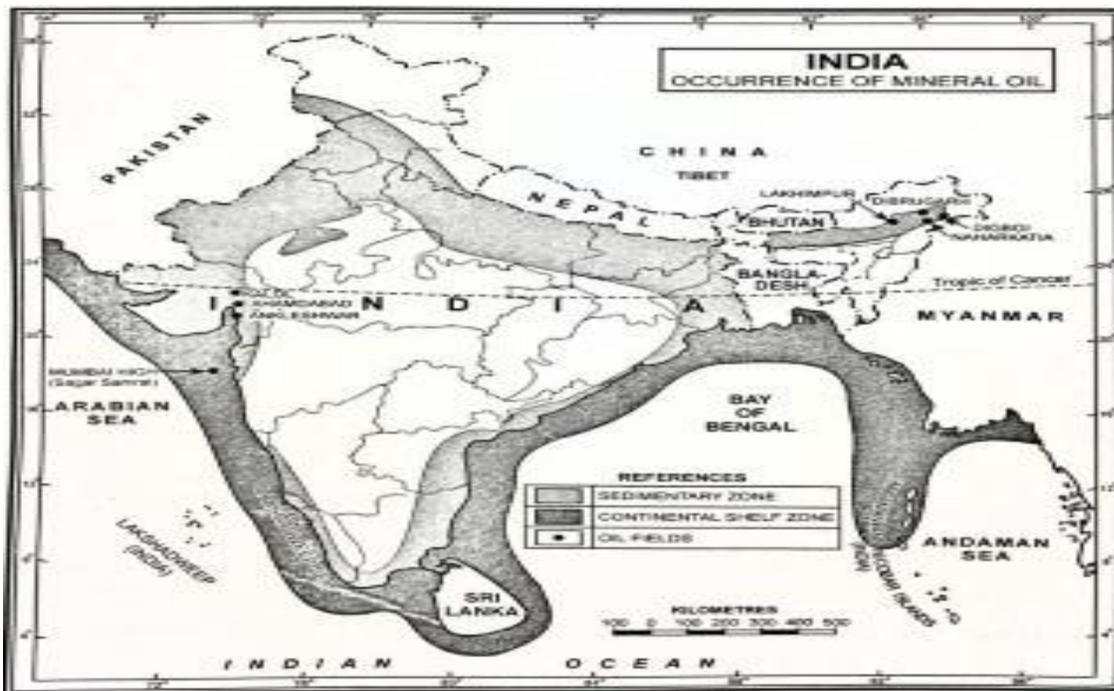


FIG. 24.4. India : Mineral Oil

On-shore Oil Production In India

- Brahmaputra valley of north-east India.
- Barmer area of Rajasthan.
- Gujarat coast in western India.
- Cauvery on-shore basin in Tamil Nadu.
- Andhra Pradesh has both on-shore and offshore oil reserves.

Assam Oilfields

- Oldest oil producing state in India
- The main oil bearing strata extend for a distance of 320 km in upper Assam along the Brahmaputra valley.
- Oilfields of Assam are relatively inaccessible and are distantly located from the main consuming areas.
- Oil from Assam is therefore, refined mostly in the refineries located at Digboi, Guwahati, Bongaigaon, Barauni and

The Digboi field

Tipam hills, Dibrugarh district

Oldest oil field of India
32 km southwest of Digboi

The Naharkatiya field

Left bank of Burhi Dihing river

Oil from this area is sent to oil refineries at Noonamati in Assam (443 km) and Barauni in Bihar (724 km) through pipeline.

The Moran-Hugrijan field

40 km south-west of Naharkatiya

Gujarat Oilfields

- Ankleshwar, Khambhat or Lunej, Ahmedabad and Kalol, Nawgam, Kosamba, Kathana, Barkol, Mahesana and Sanand are important oilfields of this region.
- Ankleshwar: Oil from this field is sent to refineries at Trombay and Koyali.

Rajasthan Oilfields

- One of the largest inland oil discoveries was made in Banner district of Rajasthan.
- Other important discoveries == Mangala oil field, Sarswati and Rajeshwari.
- Rajasthan is the largest on shore oil producing state of India.

Off-Shore Production in India

Western Coast

- Mumbai High, Bassein and Aliabet.
- Mumbai High: 1974; rock strata of Miocene age.
- Sagar Samrat, Bassein: south of Mumbai High.
- Aliabet: Aliabet island in the Gulf of Khambhat.

Eastern Coast

- The basin and delta regions of the Godawari, the Krishna and the Cauvery rivers hold great potential for oil and gas production.
- The Rawa field in Krishna-Godawari off-shore basin is an important one.
- The Narimanam and Kovilappal oilfields in the Cauvery on-shore basin are also important.

Petroleum Refining

- India's first oil refinery started working way back in 1901 at Digboi in Assam.
- 1954: another refinery at Tarapur (Mumbai).
- Refinery hub and refining capacity exceeds the demand. Excess refined oil and other petroleum products are exported.
- Oil from wells is transported to nearest refineries through pipelines.

Crude Oil Pipelines

- Salaya-Mathura Pipeline (SMPL)
- Paradip-Haldia-Barauni Pipeline (PHBPL)
- Mundra-Panipat Pipeline (MPPL)

Petroleum Product Pipelines

Remember locations of Oil Refineries and Major Oil producing centers. Pipeline are the ones that connect these centers.

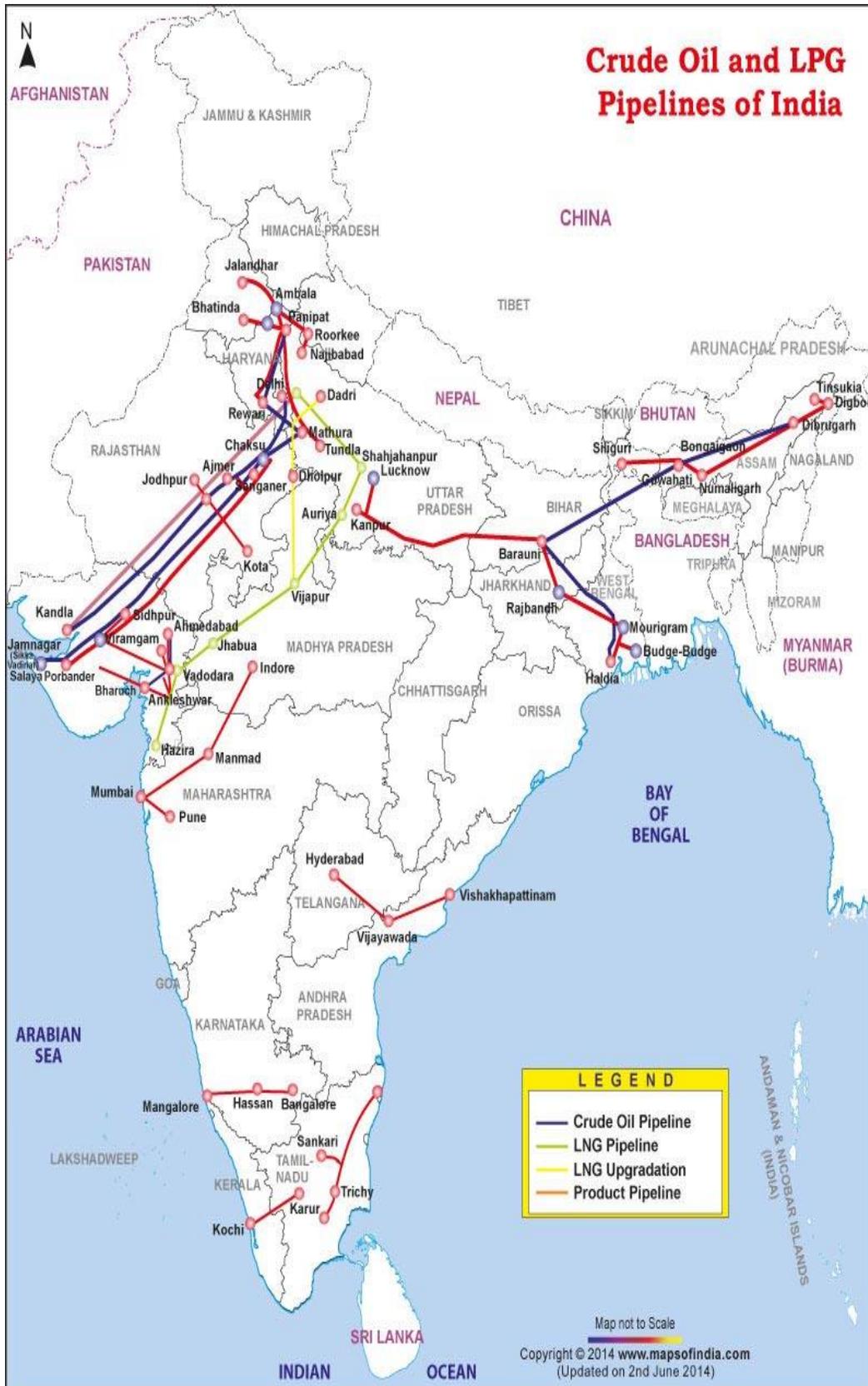
- Guwahati-Siliguri Pipeline (GSPL)
- Koyali-Ahmedabad Pipeline (KAPL)
- Barauni-Kanpur Pipeline (BKPL)
- Panipat-Delhi Pipeline (PDPL)
- Panipat-Rewari Pipeline (PRPL)
- Chennai – Trichy – Madurai Product Pipeline (CTMPL)
- Chennai-Bangalore Pipeline
- Naharkatia-Nunmati-Barauni Pipeline == first pipeline constructed in India
- Mumbai High-Mumbai-Ankleshwar-Koyali Pipeline.
- Hajira-Bijapur-Jagdishpur (HBJ) Gas Pipeline == world's largest underground pipeline
- Jamnagar-Loni LPG Pipeline == longest LPG pipeline in the world
- Kochi-Mangalore-Bangalore pipeline
- Vishakhapatnam Secunderabad pipeline
- Mangalore-Chennai pipeline
- Vijayawada-Vishakhapatnam pipeline

Major Oil Refineries in India

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Crude Oil and LPG Pipelines of India



LEGEND

- Crude Oil Pipeline
- LNG Pipeline
- LNG Upgradation
- Product Pipeline

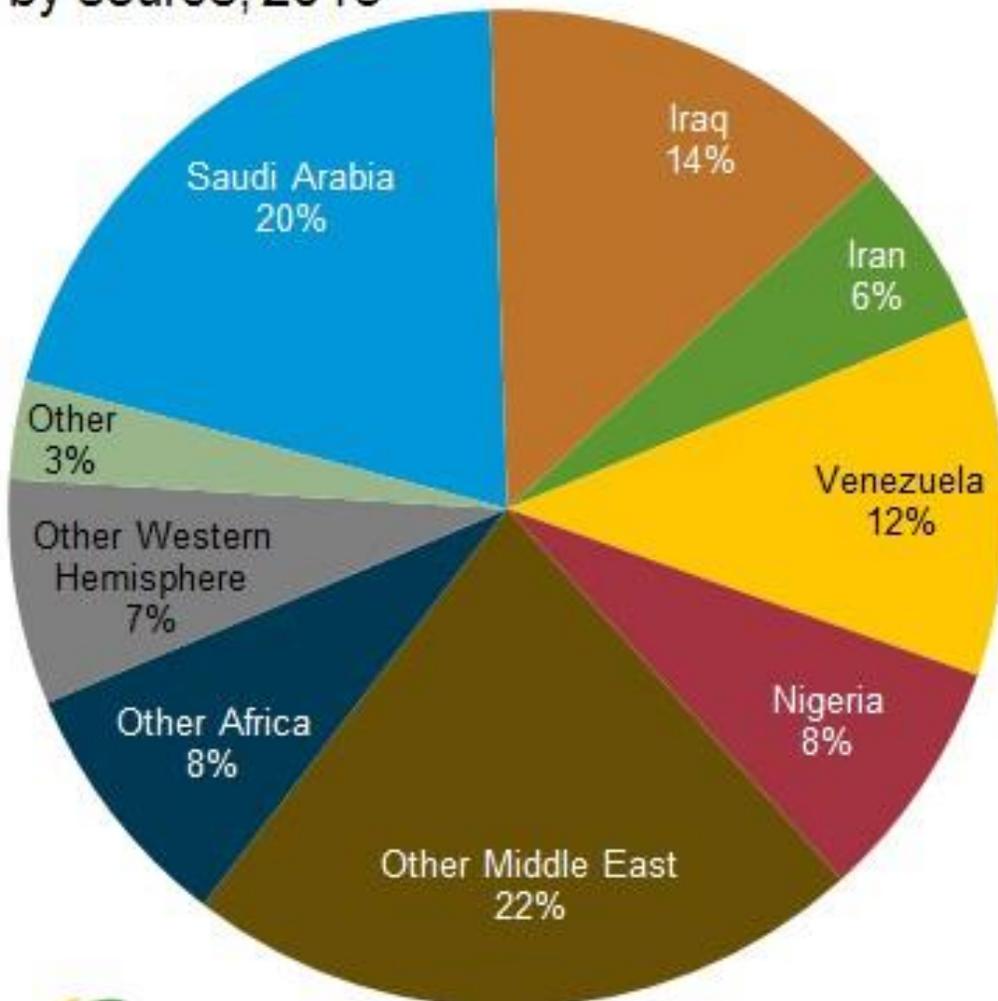
Map not to Scale

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(Updated on 2nd June 2014)

8. Gross Refining Margins

Company	Refinery
IOCL	Barauni
	Koyali
	Haldia
	Mathura
	Panipat
	Guwahati
	Digboi
	Bongaigaon
	Average
BPCL	Kochi
	Mumbai
	Average
HPCL	Mumbai
	Visakhapatnam
	Average
CPCL	Chennai
MRPL	Mangalore
NRL	Numaligarh
BORL	Bina
RIL	Jamnagar
Essar	Vadinar

India petroleum and other liquids imports by source, 2013



 Source: U.S. Energy Information Administration, Global Trade Atlas.

Sugar Industry in India: Growth; Problems and Distribution

Sugar can be produced from sugarcane, sugar-beet or any other crop having sugar content. But in India, sugarcane is the main source of sugar. At present, this is the second largest agro-based industry of India after cotton textile industry. India is the world's largest producer of sugarcane and second largest producer of sugar after Cuba. But India becomes the largest producer if gur and khandsari are also included. This industry involves a total capital investment of Rs. 1,250 crore and provides employment to 2.86 lakh workers. In addition, 2.50 crore sugarcane growers also get benefit from this industry.

Growth and Development:

India has a long tradition of manufacturing sugar. References of sugar making by the Indians are found even in the Atharva Veda. India is rightly called the homeland of sugar. But in ancient times, only gur and khandsari were made and modern sugar industry came on the Indian scene only in the middle of the 19th century, when it was introduced by the Dutch in North Bihar in about 1840. Unfortunately, this attempt could not succeed. The first successful attempt was made by the indigo planters at the initiative of Britishers in 1903 when Vacuum pan mills were started at Pursa, Pratabpur, Barachakia and Marhowrah and Rose in north-eastern U.P. and the adjoining Bihar. This happened when demand for indigo ceased to exist due to the introduction of synthetic blue in the market. In the early years of the 20th century, the industry grew rather sluggishly and there were only 18 mills in 1920-21 and 29 mills in 1930-31. The industry got a great fillip after the fiscal protection in 1931 and the number of mills rose to 137 in 1936-37. The production also shot up from 1.58 lakh tonnes to 9.19 lakh tonnes during the same period. The industry passed through an uncertain phase during and after the World War II and some stability was experienced only after 1950-51. There were 139 mills producing 11.34 lakh tonnes of sugar in 1950-51. After that, the plan period started and the industry made rapid strides. In the year 1994-95, there were 420 mills producing 148 lakh tonnes of sugar.

Table 27.28 shows that the year to year figures reveal great variations in production although there has been a steady increase in production on the long term basis.

Table 27.28 Production of Sugar in India (lakh tonnes):

Year	1950-1960-1970-1980-mo-					1996- mi-		1998-	1999-2000-2001-2002			
									00		03	
	51	61	71	81	91	97	98	99		01	02	
Production	11.34	30.29	37.4	51.48	120.47	153.03	131.60	155.20	175	192	185	189

Localisation of Sugar Industry:

Sugar industry in India is based on sugarcane which is a heavy, low value, weight losing and perishable raw material. Sugarcane cannot be stored for long as the loss of sucrose content is inevitable. Besides, it cannot be transported over long distances because any increase in transportation cost would raise the cost of production and the sugarcane may dry up on the way. It is estimated that 50 per cent cost of production is accounted for by sugarcane alone. Normally, it requires about 100 tonnes of sugarcane to produce 10-12 tonnes of sugar. Even today most of sugarcane is transported with the help of bullock carts and cannot be carried beyond 20-25 km. The introduction of tractor- trolleys, trucks and even railway wagon have increased the distance covered by sugarcane to 70-75 kms. beyond which the transportation cost would increase exorbitantly. Therefore, the sugar industry is established in areas of sugarcane cultivation.

Distribution:

Maharashtra: Maharashtra has progressed a lot and captured first position from U.P. to emerge as the largest producer of sugar in India. Large production of sugarcane, higher rate of recovery and longer crushing period are some of the factors which have helped the state to occupy this enviable position. The state has one-fourth of the total sugar mills and produces a little more than one-third of the total sugar of India. Sugar mills of Maharashtra are much larger as compared to the mills in other parts of the country. The major concentration of sugar mills is found in the river valleys in the western part of the Maharashtra Plateau. Ahmednagar is the largest centre. The other major centres are in the districts of Kolhapur, Solapur, Satara, Pune and Nashik.

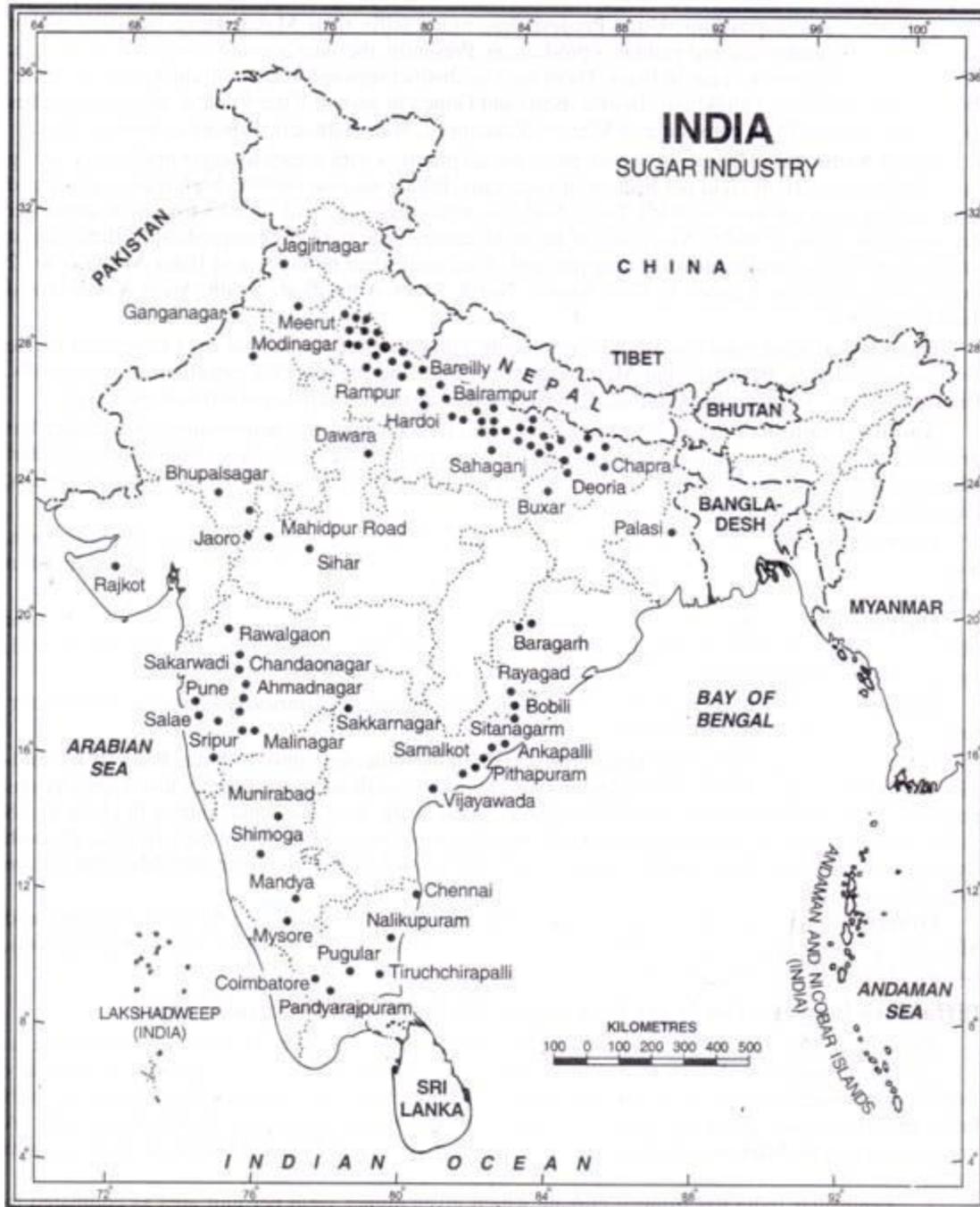


FIG. 27.17. India : Distribution of Sugar Industry

Uttar Pradesh: Uttar Pradesh is the traditional producer of sugar and has been occupying the first rank among the major sugar producing states of India. However, its relative importance has been reduced during the last few years and the state has conceded the top position to Maharashtra and now occupies the second position. Uttar Pradesh has more mills than Maharashtra but they are of comparatively smaller size and yield less production. Presently, the state accounts for about 24 per cent of the total production of sugar in India. There are two distinct regions of sugar production in this state. One region consists of

Gorakhpur, Deoria, Basti and Gonda in eastern Uttar Pradesh and the other lies in the upper Ganga Plain consisting of Meerut, Saharanpur, Muzaffamagar, Bijnore and Moradabad.

Tamil Nadu: Tamil Nadu has shown phenomenal progress with regard to sugar production during the last few years. High yield per hectare of sugarcane, higher sucrose content, high recovery rate and long crushing season have enabled Tamil Nadu to obtain highest yield of 9.53 tonnes of sugar per hectare in the whole of India. As a result of these advantages, the state has emerged as the third largest producer of sugar, contributing over nine per cent of the total sugar production of India. Most of the 32 mills of the state are located in Coimbatore, North Arcot Ambedkar, South Arcot Vallalur and Tiruchchirapalli.

Karnataka: Karnataka has 30 mills producing 1,151 thousand tonnes or over 6 per cent of the total sugar of India. Belgaum and Mandya districts have the highest concentration of sugar mills. Bijapur, Bellary, Shimoga and Chittradurga are the other districts where sugar mills are scattered.

Andhra Pradesh: Andhra Pradesh has more mills (35) than the neighbouring Karnataka but produces only 6.01 per cent of India's sugar. This means that the mills are comparatively smaller. Majority of the sugar mills are concentrated in East and West Godavari, Krishna, Vishakhapatnam, Nizamabad, Medak and Chittoor districts.

Gujarat: Gujarat's 16 mills are scattered in Surat, Bhavnagar, Amreli, Banaskantha, Junagarh, Rajkot and Jamnagar districts. The state produces about 5.56 per cent of the total sugar produced in India.

Haryana: Haryana has only 8 mills but their large size enables the state to contribute 1.91 per cent of the total sugar production. Sugar mills are located in Rohtak, Ambala, Panipat, Sonipat, Kamal, Faridabad and Hissar districts.

Punjab: Punjab has a total of 13 mills which are located in Amritsar, Jalandhar, Gurdaspur, Sangrur, Patiala and Rupnagar districts.

Bihar: Bihar was the second largest sugar producing state next only to Uttar Pradesh till mid- 1960s. Since then the state has been experiencing sluggish growth and consequently lost its prestigious position to the peninsular states like Maharashtra, Tamil Nadu, Karnataka and Andhra Pradesh. Its 28 mills make an insignificant contribution to the production of sugar. The belt of eastern Uttar Pradesh extends further east in Bihar and the districts of Darbhanga, Saran, Champaran and Muzaffarpur are included in this belt.

Others: Among the other producers are Madhya Pradesh (8 mills in Morena, Gwalior and Shivpuri districts), Rajasthan (5 mills in Ganganagar, Udaipur, Chittaurgarh and Bundi districts), Kerala, Orissa, West Bengal and Assam.

Difference between the Sugar Industry of Northern and Peninsular India:

There are marked differences between the sugar industry of the northern and the peninsular India. As a result of better conditions prevailing in the peninsular India, the sugar industry is gradually shifting from north India to the peninsular India. This is evident from the fact that previously north India used to produce about 90 per cent of India's sugar which is reduced to 35-40 per cent now. A brief description of differences between the sugar industry of the northern and peninsular India is given below:

1. Peninsular India has tropical climate which gives higher yield per unit area as compared to north India.
2. The sucrose content is also higher in tropical variety of sugarcane in the south.
3. The crushing season is also much longer in the south than in the north. For example, crushing season is of nearly four months only in the north from November to February, whereas it is of nearly 7-8 months in the south where it starts in October and continues till May and June.
4. The co-operative sugar mills are better managed in the south than in the north.
5. Most of the mills in the south are new which are equipped with modern machinery.

Problems of Sugar Industry:

Sugar industry in India is plagued with several serious and complicated problems which call for immediate attention and rational solutions. Some of the burning problems are briefly described as under:

1. Low Yield of Sugarcane
2. Short crushing season
3. Fluctuating Production Trends
4. Low rate of recovery
5. High cost of Production
6. Small and uneconomic size of mills
7. Old and obsolete machinery
8. Competition with Khandsari and Gur
9. Regional imbalances in distribution
10. Low per capita consumption

Cotton Textile Industry in India

Introduction: India is one of the important cotton-manufacturing countries of the world. Both short-staple and long-staple cotton is grown in the country. Cotton textile industry is one of the [important](#) and largest industries in India. It accounts for a large portion of the total industrial output in the country each year. This cotton textile industry is now in a position to meet the total demand for textiles in the home market and to leave a sufficient surplus for foreign export. The industry also contribute towards the total foreign income of our country and engage millions of people.

Production and Trade: India ranks among the largest producer and exporter of cotton textile products. India exports cotton textiles to the countries of Russia, U.K., Australia, Sri Lanka, Iran, Germany, Belgium, Italy, etc.

History, Growth and Development

The productions of cotton, hand spinning and weaving have been practiced in India from immemorial times. However, the factory production of cotton goods dates from the middle of the 19th century. The cotton textile industry in Indian was initiated with the establishment of the first cotton textile factory at Ghosuri near Kolkata in 1818. However, it was closed down very soon due to the shortage of raw material. Actual development of the industry had been taking place since 1859 with the establishment of cotton mill at Mumbai which is located in the cotton growing region of Western India. Since then there has been rapid growth of the industry around Mumbai and Ahmedabad. Industry has made rapid progress since 1880. The cotton mill industry made phenomenal progress during the period of 40 or 45 years since 1880. In the beginning, yarns spinning developed a great deal. There was an export trade in yarn with China. Now, however, both yarn and cloth are manufactured for home-consumption.

Raw materials

The cotton textile industry requires raw cotton as principal raw material and chemicals like caustic soda, dyes, arrowroot or starch, etc. for its production. The cotton growing regions are Maharashtra, Gujarat, Karnataka, Tamil Nadu, etc.

Classification

There are three types of cotton mills:

Spinning mills,

- Weaving mills and
- Composite mills – thread and cloth, both are produced.

Spinning mills are of two types:

1. Handloom and
2. Power loom.

Distribution

Cotton textile centers of India are distributed in four regions:

- Western Region,
- Southern Region,
- Northern Region and
- Eastern Region.

Western Region: Gujarat and Maharashtra are most advanced states of this region. Mumbai in Maharashtra and Ahmedabad in Gujarat are two principal centers of this region. Ahmedabad is known as the '[Manchester of India](#)'. The other centers include Nagpur, Pune, Sholapur, Jalgaon in Maharashtra and Surat, Bharuch, Vadodara, Bhavanagar, Rajkot in Gujarat.

Factors for the growth of the industry in this region are:

1. Local raw cotton from Gujarat and Maharashtra.
2. Availability of hydel power produced in Western Ghats,
3. Port facilities of Mumbai and Kandla,
4. Humid climate required for spinning of the yarn.
5. Large capital invested by Parsi and Bhatia businessmen.
6. Locally available cheap and skilled labor from Konkan, Satara, Sholapur etc.
7. Good demand for cotton garments and
8. Well-knit transport system.

Southern Region: In South India cotton mills are located in the states of Tamil Nadu, Kerala, Karnataka and Andhra Pradesh. Important centers are Madurai, Salem, Tiruchirapalli Chennai, Guntur, Mysore, Pondicherry etc. Coimbatore is the largest cotton textile centre of this region.

The factors for the development of cotton textile industry in this region are:

1. Supply of local raw cotton,
2. Supply of hydel power,
3. Good transportation network,
4. Port facility through the ports of Kochi, Chennai, Tuticorin etc.
5. Locally available cheap labor,
6. Warm and humid climate and
7. Dense population of the region.

Northern Region: The region includes the states of Uttar Pradesh, Delhi, Punjab, Haryana and Rajasthan. The principal centers are Kanpur, Delhi, Amritsar, Ludhiana, Agra etc. The factors for the development of the industry in this region are:

1. Long staple cotton produced here,
2. High demand for cotton goods,
3. Good transportation system and
4. Plenty of cheap labor.

Eastern Region: This region includes the states of West Bengal, Bihar, Orissa and Assam. Maximum mills are located at Kolkata, Sodepur, Belgharia, Shyamnagar, Ghusuri, Salkia, Shrirampur, Maurigram etc. The factors for the growth of this industry are:

1. Nearness to the Kolkata port,
2. Good transportation system,
3. Humid climate and
4. High demand for cotton goods.

Problems

The problems of Cotton Textile Industry in India:

- Long staple cotton is not well grown in many parts of India.
- Many of the factories are old and, as such, productivity has been lowered. The plants and machinery employed in many of our textile mills are now out of date. They were put to intensive use and have considerably deteriorated.
- High cost of advanced machinery is an unavoidable hindrance for the procurement of new machinery. For this reason, the much-needed replacement had to be deferred for many years.
- The high cost of production is also effectively retarding the growth of this important industry.
- There is competition from synthetic fibers like polyester, etc.
- There is competition in the International Market from Bangladesh, Japan, China, and Britain, etc.
- Great difficulties are being experienced by mill-owners in obtaining the capital needed for modernization.

Solutions

- The plant and machinery have to be replaced at an early date. Introduction of the more up-to-date and modernized type of machinery is so urgent that it has to be done without the least delay in the interest of producers and consumers alike.
- Easy loan facility should be extended to the industries intending to modernize their plant and machinery.
- Assured availability of raw-materials, labour, and power would ensure steady supply.
- Economies of large-scale production should be encouraged to keep down the prices of finished products.

Fertilizer Industry in India

Fertilizers are substances that supply one or more of the chemicals required for plant growth. Fertilizers can be both organic and inorganic. As per industry experts it is said that there are sixteen elements that are absolutely necessary for plant growth. Out of these sixteen 9 elements are required in large quantities while the other seven are needed in smaller amounts. Since agriculture is a very important sector it goes without saying that the fertilizer industry is one which the Indian economy cannot do without. The fertilizer industry in India is extremely vital as it manufactures some of the most important raw materials required for crop production. The primary objective of this industry is to ensure the inflow of both primary and secondary elements required for crop production in the desirable quantities. The success of the agricultural sector in India is largely dependent on the fertilizer industry. The benchmark that the food industry in India has set is mainly due to the many technically competent fertilizer producing companies in the country. India is home to numerous top class private and government fertilizer companies. Ranging from fertilizers to seeds to fungicides the many fertilizer companies in India are the major reason behind the success story of the sector in India. In the present scenario, there are more than 57 large and 64 medium and small fertilizer production units under the India fertilizer industry. The main products manufactured by the fertilizer industry in India are

phosphate based fertilizers, nitrogenous fertilizers, and complex fertilizers. The fertilizer industry in India with its rapid growth is all set to make a long lasting global impression.

Types of Fertilizers

Organic Fertilizer

These are the most commonly used fertilizers. Organic fertilizers are easily available and extremely safe. Some of the popular organic fertilizers include; manure, peat moss, worm castings, slurry, sewage, seaweed, and guano.

Advantages of Organic Fertilizers

- Advantages of Organic Fertilizers
- Improve the quality of the soil.
- Mobilize the existing soil nutrients.
- Release nitrogen slowly and consistently
- Soil moisture retention
- Do not harm the plants like chemical fertilizers

Inorganic or Chemical Fertilizer

These fertilizers are usually got from chemical compounds like potassium chloride, ammonium phosphates and ammonium nitrate. Some of the popular Inorganic fertilizers used in India re; limestone, mined rock phosphate and Chilean sodium nitrate

Advantages of Organic Fertilizers

- The more the amount of nitrogen the healthier are the stems and leaves of the plants.
- Increased levels of phosphorus result in healthier tubers and roots
- The Potassium obtained from potash promotes stems and leaves development.
- Releases nitrogen quickly

Public Sector Fertilizer Companies

- National Fertilizers Limited
- Fertilizers & Chemicals Travancore Limited
- Rashtriya Chemicals & Fertilizers Limited
- Madras Fertilizers Limited
- Steel Authority Of India Limited
- Neyveli Lignite Corporation Limited
- Paradeep Phosphates Limited
- Pyrites, Phosphates & Chemicals Limited
- Hindustan Fertilizer Corporation Limited

Private Sector Fertilizer Companies

- Ajay Farm-Chem Private Limited
- Balaji Fertilizers Private Limited
- Deepak Fertilizer and Petrochemicals Corporation Limited
- Bharat Fertilizer Industries Limited
- Coromandal Fertilizers Limited
- Gujarat Narmada Valley Fertilizer Co. Limited
- Meerut Agro Chemicals Private Limited
- Duncans Industries Limited
- Karnataka Agro Chemicals
- Godavari Fertilizers & Chemical Limited
- Shri Amba Fertilizers (I) Private Limited
- Tuticorin Alkali Chemi & Fertilizer Limited
- Gujarat State Fertilizers & Chemicals Limited
- Indo-Gulf Fertilizers & Chemicals Corporation Limited
- Southern PetroChemical Industries Corporation Limited
- Maharashtra Agro Industrial Development Corporation
- Zuari Industries Limited- Fertilizer Limited
- Mangalore Chemicals & Fertilizers Limited

Top Fertilizer Companies in India

Fertilizer Companies	Products
Basant Agro Tech India Limited	NPK Fertilizers SSP Fertilizers SSP Single Super Phosphate Seeds
Bharat Fertilizer Industries Limited	Prilled Urea Ammonia
Chambal Fertilizers and Chemicals Limited	Fertilizers Uttam Veer Urea (Urea) Uttam Neem (Neem Coated Urea) Uttam DAP (Di Ammonium Phosphate) Uttam MOP (Murate of Potesh) Uttam SSP (Single Super Phosphate) Seeds Hy Paddy - Khushi & Barkha Paddy - Uttam Kranti

	<p>Bt Cotton Dhruv Barley - Uttam Mustard - Uttam Kranti Soybean - Uttam Kranti & Chamtkar Hy Bajra - Albela & Uttam Kranti-2095 Hy Maize - Nandini & Muskan SSG - Manik & Moti Kranti Wheat - Uttam Kranti Insecticides Aceveer Endoveer Alphaveer Acto Lambda veer Chlorveer Monoveer Imidaveer Lambda Double</p>
<p>Dharamsi Morarji Chemical Company Limited</p>	<p>Disulphonic Acid p-Chloro Benzene Sulphonyl Chloride Ammonium Sulphamate Special Chemicals Methane Boronated Single Superphosphate (Borophos) Chlorosulphonic Acid Oleums Sulphuric Anhydride Fertilizers and Agri Business Single Superphosphate (Powder & Granule)</p>
<p>Gujarat State Fertilizer and Chemical limited, Vadodara</p>	<p>Rock Phosphate Ammonia Sulphur Sulphuric Acid Hydrochloric Acid Liquid Sulphur Methyl Ethyl Ketone Phosphoric Acid Benzene (MEK) Acetone</p>

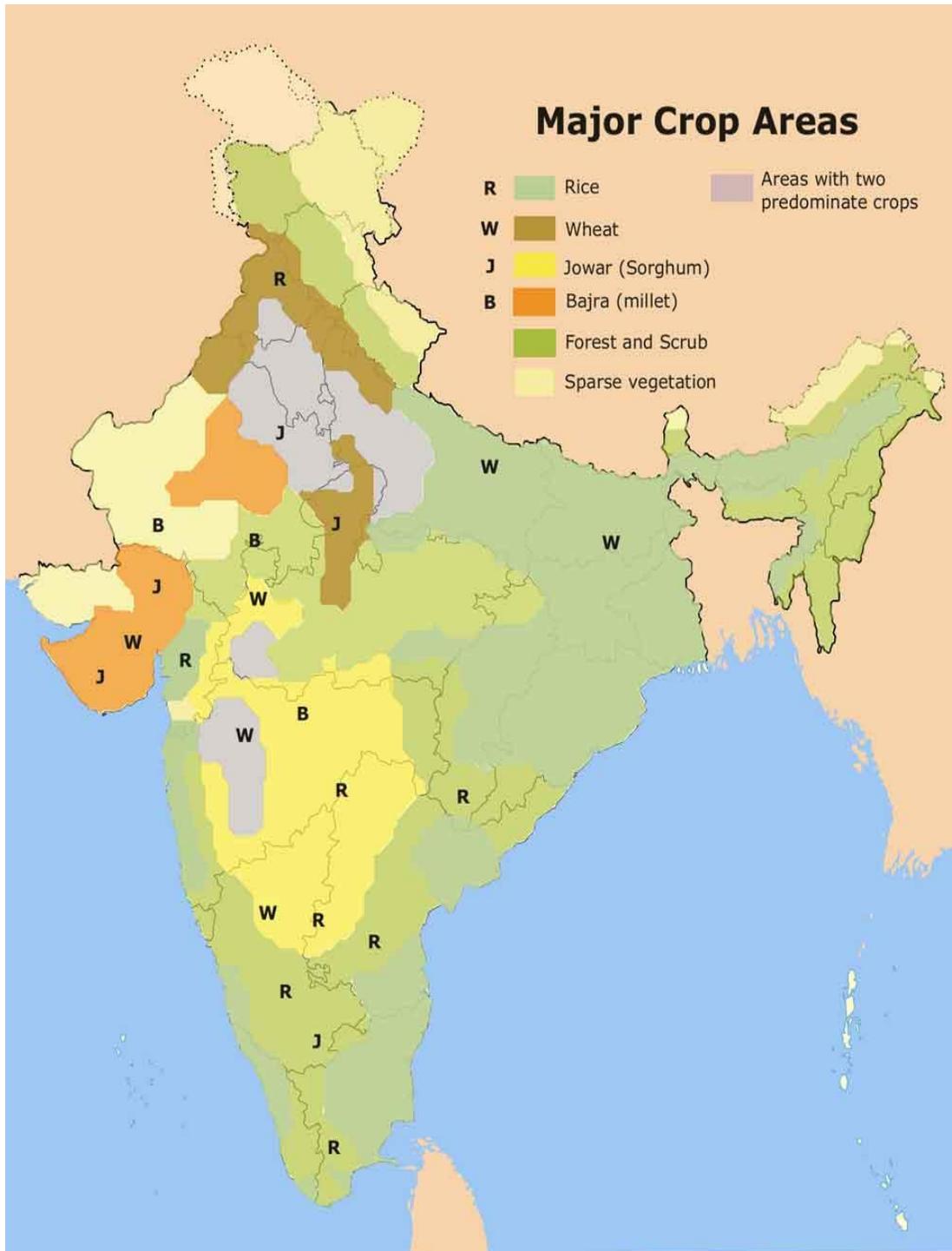
	Cyclohexanone Methyl Acrylate Caustic Soda Lye
Hindustan Copper Limited (HCL), Khetrinagar	Sulphuric Acid Copper Sulphate Anode Slime Copper Cathode
Indian Farmers Fertilizer Cooperative Limited (IFFCO)	Ammonium Chloride (ACI) Muriate of Potash (MOP) Ammonium Sulphate Di-ammonium Phosphate (DAP) Sulphate of Potash (SOP)
Zuari Industries Limited	Urea Bio Fertilizers Seeds
United Phosphorous Limited	Caustic Chlorine Industrial Chemicals Speciality Chemicals White Phosphorus

Map Showing Fertilizer Companies in India



Industrial Regions: 8 Major Industrial Regions of India

Following are the major industrial regions of India 1. Mumbai-Pune Industrial Region 2. Hugli Industrial Region. 3. Bangalore-Tamil Nadu Industrial Region 4. Gujarat Industrial Region 5. Chotanagpur Industrial Region 6. Vishakhapatnam-Guntur Industrial Region 7. Gurgaon-Delhi-Meerut Industrial Region 8. Kolfam-Thiruvananthapuram Industrial Region.



1. Mumbai-Pune Industrial Region:

This region extends from Thane to Pune and in adjoining districts of Nashik and Solapur. In addition, industries have grown at a rapid pace in Kolaba, Ahmednagar, Satara, Sangli and Jalgaon districts also. This region owes its origin to the British rule in India. The seeds of its growth were sown in 1774 when the island-site was obtained for construction of Mumbai port. The opening of the first railway track of 34 kms

between Mumbai and Thane in 1853, opening of the Bhor and Thai Ghats respectively to Pune and Nashik and that of Suez Canal in 1869 led to the development of Mumbai. The growth of this industrial region is fully connected with the growth of cotton textile industry in India. As the coal was far removed, hydel power was developed in Western Ghats. Cotton was cultivated in the black cotton soil area of the Narmada and Tapi basins. Cheap labour-force came from the hinterland, the port facilities for export-import and communication links with the peninsular hinterland made Mumbai the 'Cottonopolis of India'. With the development of cotton textile industry, the chemical industry developed too. Opening of the Mumbai High petroleum field and erection of nuclear energy plants added additional magnetic force to this region. Now the industrial centres have developed, from Mumbai to Kurla, Kolaba, Thane, Ghatkopar, Vile Parle, Jogeshwari, Andheri, Thane, Bhandup, Kalyan, Pimpri, Pune, Nashik, Manmad, Solapur, Ahmednagar, Satara and Sangli. In addition to cotton textile and chemical industries, engineering goods, leather, oil refineries; petrochemicals, synthetic and plastic goods, chemicals, drugs, fertilizers, electricals, electronics, software, ship-building, transport and food industries have also developed here. The partition of the country in 1947 adversely affected this region because 81% of the total irrigated cotton area growing long staple cotton went to Pakistan. Mumbai, the nucleus of this industrial region, is facing the current limitation of space for the expansion of the industry. Dispersal of industries is essential to bring about decongestion.

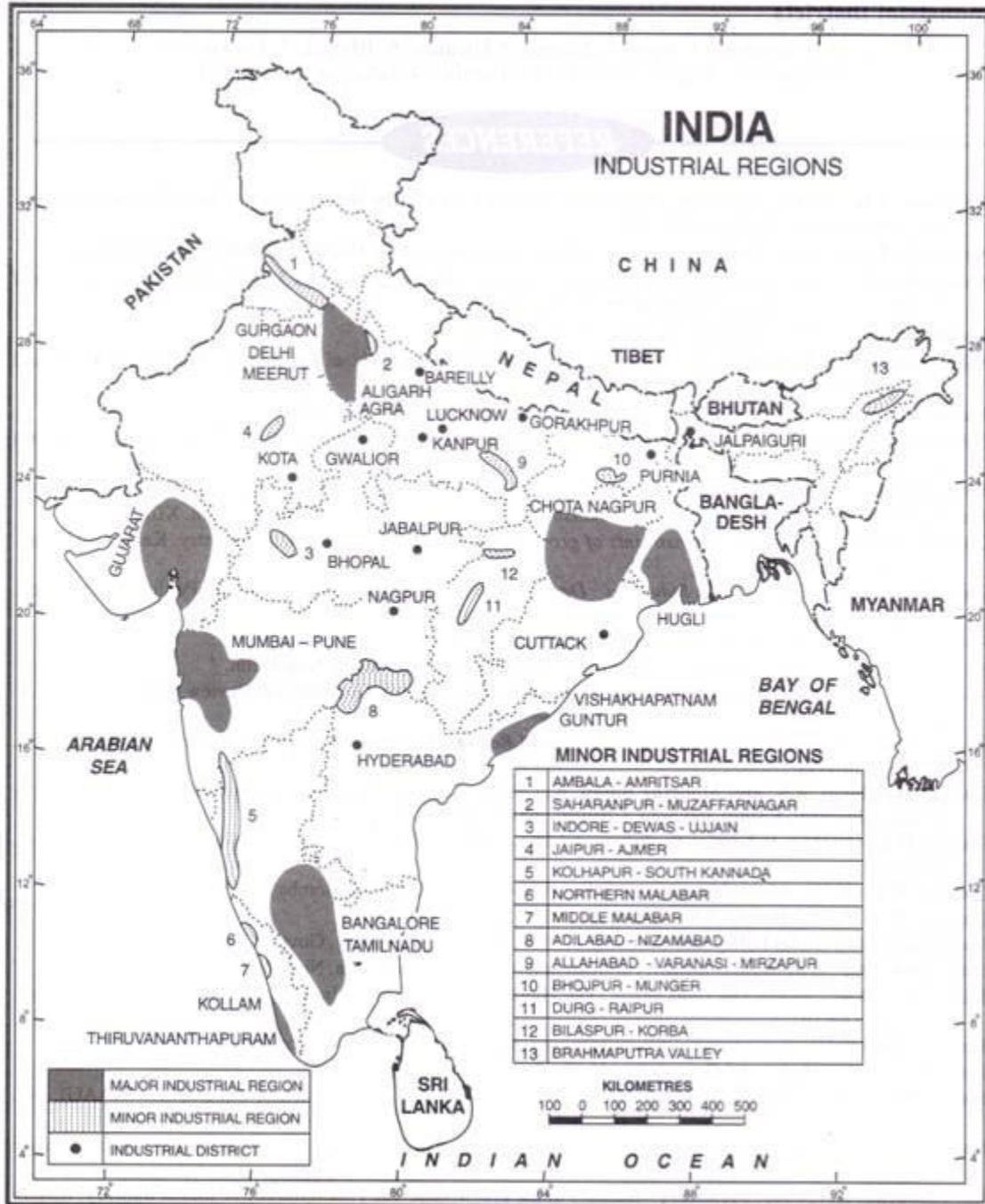


Fig. 27.18. India : Industrial Regions

2. The Hugli Industrial Region:

Located in West Bengal, this region extends as a narrow belt running along the river Hugli for a distance of about 100 km from Bansbaria and Naihati in the north to Birlanagar in the south. Industries have also developed in Midnapur district in the west. The river Hugli offered the best site for the development of an inland river port as nucleus for the development of Hugli industrial region. The old trading centre of late 17th century has developed into the present industrial hub of Kolkata. Thus Kolkata-Haora forms the

nucleus of this region. It is very well- connected by the Ganga and its tributaries with the rich hinterland of Ganga-Brahmaputra plains. Besides navigable rivers, roads and the railways provided subsequent links to the great benefit of Kolkata port. The discovery of coal and iron ore in Chotanagpur plateau, tea plantations in Assam and northern parts of West Bengal and the processing of deltaic Bengal's jute led to the industrial development in this region. Cheap labour could be found easily from the thickly populated states of Orissa, Bihar, Jharkhand and eastern part of U.P. Kolkata, having been designated capital city of the British India (1773-1912) attracted large scale British investment of capital. Establishment of first jute mill at Rishra in 1855 ushered in the era of modern industrial clustering in this region. A chain of jute mills and other factories could be established on either side of Hugli River with the help of Damodar valley coal. The port site was best-suited for export of raw materials to England and import of finished goods from that country. Kolkata's industries have established by drawing in the raw materials from adjoining regions and distributing the finished goods to consuming points. Thus, the role of transport and communication network has been as important as the favourable locational factors in the growth of this region. By 1921, Kolkata-Hugli region was responsible for two-thirds of factory employment in India. Just after the partition of old Bengal province in 1947, the region faced, for some years, the problem of shortage of jute as most of the jute-growing areas went to East Pakistan (now Bangladesh). The problem was solved by gradually increasing home production of jute. Cotton textile industry also grew along with jute industry. Paper, engineering, textile machinery, electrical, chemical, pharmaceuticals, fertilizers and petrochemical industries have also developed in this region. Factory of the Hindustan Motors Limited at Konanagar and diesel engine factory at Chittaranjan are landmarks of this region. Location of petroleum refinery at Haldia has facilitated the development of a variety of industries. The major centres of this industrial region are Kolkata, Haora, Haldia, Serampur, Rishra, Shibpur, Naihati, Kakinara, Shamnagar, Titagarh, Sodepur, Budge Budge, Birlanagar, Bansbaria, Belgurriah, Triveni, Hugli, Belur, etc. Alarming rate of silting of the Hugli River was a very serious problem. The depth of water in the channel from bay head to Kolkata docks must be kept at 9.2 metres for big ocean ships to come in. Dredging out of the silt rapidly filling up the water channel was very costly and not a permanent solution to save the life of Kolkata port. The construction of Farakka barrage about 300 kms upstream on Ganga and flushing of the channel are the only possible answers. The construction of Haldia port in the lower reaches of Hugli to the south of Kolkata is another landmark in relieving the great pressure of cargo ships on the port of Kolkata. However, the industrial growth of this region has slowed down as compared to the other regions. There are several reasons for this sluggish growth but decline in jute industry is said to be one of the main reasons.

3. Bangalore-Tamil Nadu Industrial Region:

Spread in two states of Karnataka and Tamil Nadu, this region experienced the fastest industrial growth in the post-independence era. Till 1960, industries were confined to Bangalore district of Karnataka and Salem and Madurai districts of Tamil Nadu. But now they have spread over all the districts of Tamil Nadu except Viluppuram. This region is a cotton-growing tract and is dominated by the cotton-textile industry. In fact cotton textile industry was the first to take roots in this region. But it has large number of silk-manufacturing units, sugar mills, leather industry, chemicals, rail wagons, diesel engines, radio, light engineering goods, rubber goods, medicines, aluminium, cement, glass, paper, cigarette, match box and machine tools, etc. This region is away from the main coal-producing areas of the country but cheap hydroelectric power is available from Mettur, Sivasamudram, Papanasam, Pykara and Sharavati dams. Cheap skilled labour and proximity to vast local market as well as good climate have also favoured the concentration of industries in this region. Coimbatore has grown rapidly mainly owing to its industrial growth based on Pykara power, local cotton, coffee mills, tanneries, oil presses and cement works. Coimbatore is known as Manchester of Tamilnadu because of its large-scale cotton textile industry. The establishment of public sector units at Bangalore like Hindustan Aeronautics, Hindustan Machine Tools,

Indian Telephone Industry and Bharat Electronics etc. has further pushed up the growth of industries in the region. Madurai is known for its cotton textiles. Visvesvarayya Iron and Steel Works is located at Bhadravati. The other important centres of this region are Sivakasi, Tiruchirapalli, Madukottai, Mettur, Mysore and Mandya. Petroleum refinery at Chennai and Narimanam and iron and steel plant at Salem are recent developments.

4. Gujarat Industrial Region:

The nucleus of this region lies between Ahmedabad and Vadodara as a result of which it is also known as Ahmedabad-Vadodara industrial region. However, this region extends upto Valsad and Surat in the south and Jamnagar in the west. The region corresponds to the cotton growing tracts of the Gujarat plains and the development of this region is associated with the location of textile industry since 1860s. This region became important textile region with the decline of cotton textile industry in Mumbai. Mumbai has the disadvantage of paying double freight charges for first bringing the raw cotton from the peninsular hinterland and then despatching the finished products to inland consuming points in India. But Ahmedabad is nearer the sources of raw material as well as the marketing centres of the Ganga and Satluj plains. Availability of cheap land, cheap skilled labour and other advantages helped the cotton textile industry to develop. This major industrial region of the country, mainly consisting of cotton textile industry, is expanding at a much faster rate in providing a greater factory employment. The discovery and production of oil at a number of places in the Gulf of Khambhat area led to the establishment of petrochemical industries around Ankleshwar, Vadodara and Jamnagar. Petroleum refineries at Koyali and Jamnagar provide necessary raw materials for the proper growth of petrochemical industries. The Kandla port, which was developed immediately after independence, provides the basic infrastructure for imports and exports and helps in rapid growth of industries in this region. The region can now boast of diversified industries. Besides textiles (cotton, silk and synthetic fibres) and petrochemical industries, other industries are heavy and basic chemicals, dyes, pesticides, engineering, diesel engines, textile machinery, pharmaceuticals, dairy products and food processing. The main industrial centres of this region are Ahmedabad, Vadodara, Bharuch, Koyali, Anand, Khera, Surendranagar, Surat, Jamnagar, Rajkot and Valsad. The region may become more important in the years to come.

5. Chotanagpur Industrial Region:

As its name indicates, this region is located on the Chotanagpur plateau and extends over Jharkhand, Northern Orissa and Western part of West Bengal. The birth and growth of this region is linked with the discovery of coal in Damodar Valley and iron ore in the Jharkhand-Orissa mineral belt. As both are found in close proximity, the region is known as the 'Ruhr of India'. Besides raw materials, power is available from the dam sites in the Damodar Valley and the thermal power stations based on the local coal. This region is surrounded by highly populated states of Jharkhand, Bihar, Orissa and West Bengal which provide cheap labour. The Kolkata region provides a large market for the goods produced in the Chotanagpur region. It also provides the port facility to the region. It has the advantages for developing ferrous metal industries. The Tata Iron and Steel Company at Jamshedpur, Indian Iron Steel Co., at Bumpur-Kulti, Hindustan Steel Limited at Durgapur, Rourkela and Bokaro are the important steel plants located in this region. Heavy engineering, machine tools, fertilizers, cement, paper, locomotives and heavy electricals are some of the other important industries in this region. Important nodal centres of this region are Ranchi, Dhanbad, Chaibasa, Sindri, Hazaribagh, Jamshedpur, Daltonganj, Garwa and Japla.

6. Vishakhapatnam-Guntur Industrial Region:

This industrial region extends from Vishakhapatnam district in the north-eastern part of Andhra Pradesh to Kurnool and Prakasham districts in the south-east and covers most of the coastal Andhra Pradesh. The industrial development of this region mainly depends upon Vishakhapatnam and Machilipatnam ports. Developed agriculture and rich mineral resources in the hinterlands of these ports provide solid base to the industrial growth in this region. Coal fields of the Godavari basin are the main source of energy. Hindustan Shipyard Ltd. set up at Vishakhapatnam, set up in 1941 is the main focus. Petroleum refinery at Vishakhapatnam facilitated the growth of several petrochemical industries. Vishakhapatnam has the most modern iron and steel plant which have the distinction of being the only plant in India having coastal location. It uses high quality iron ore from Bailadila in Chhattisgarh. One lead-zinc smelter is functioning in Guntur district. The other industries of this region include sugar, textiles, paper, fertilizers, cement, aluminium and light engineering. The important industrial centres of this region are Vishakhapatnam, Vijaywada, Vijaynagar, Rajahmundry, Kurnool, Elum and Guntur. Recent discovery of natural gas in Krishna- Godavari basin is likely to provide much needed energy and help in accelerated growth of this industrial region.

7. Gurgaon-Delhi-Meerut Industrial Region:

This region developed after independence, but is one of the fastest growing regions of India. It consists of two industrial belts adjoining Delhi. One belt extends over Agra-Mathura-Meerut and Saharanpur in U.P. and the other between Faridabad-Gurgaon- Ambala in Haryana. The region is located far away from the mineral and power resources, and therefore, the industries are light and market oriented. The region owes its development and growth to hydro-electricity from Bhakra-Nangal complex and thermal power from Harduaganj, Faridabad and Panipat. Sugar, agricultural implements, vanaspati, textile, glass, chemicals, engineering, paper, electronics and cycle are some of the important industries of this region. Software industry is a recent addition, Agra and its environs have glass industry. Mathura has an oil refinery with its petro-chemical complex. One oil refinery has been set up at Panipat also. This will go a long way to boost the industrial growth of this region. Gurgaon has Maruti car factory as well as one unit of the IDPL. Faridabad has a number of engineering and electronic industries. Ghaziabad is a large-centre of agro-industries. Saharanpur and Yamunanagar have paper mills. Modinagar, Sonipat, Panipat and Ballabgarh are other important industrial nodes of this region.

8. Kollam-Thiruvananthapuram Industrial Region:

This is comparatively small industrial region and spreads over Thiruvananthapuram, Kollam, Alwaye, Emakulam and Allapuzha districts of south Kerala. The region is located far away from the mineral belt of the country as a result of which the industrial scene here is dominated by agricultural products processing and market oriented light industries. Plantation agriculture and hydroelectricity provide the industrial base to this region. The main industries are textiles, sugar, rubber, match box, glass, chemical fertilizers, food and fish processing, paper, coconut coir products, aluminium and cement. Oil refinery set up in 1966 at Kochi provides solid base to petrochemical industries. Important industrial centres are Kollam, Thiruvananthapuram, Alluva, Kochi, Alappuzha and Punalur.