21
MINERAL RESOURCES IN INDIA

21.1 INTRODUCTION

In the previous two lessons, we have read about land, soils, water, forests and wild life resources. In this lesson, we will study another two vital resources namely minerals and mineral fuels. Minerals like land and water are invaluable treasures of the earth. Without them, we cannot think of industrialisation and hence the development of our economy. In many countries, they are the main source of national income. The most important characteristics of minerals which have bearing on our present and future well-being is that they are practically lost, once used. They are non-renewable resources. Hence, the need to conserve these resources and to recycle them cannot be over emphasised.

Among the many causes of the fall of the Roman Empire, the depletion of the mineral deposit and the erosion of soil is said to be one. Even during the recent past, several mining towns turned into 'ghost towns' in many parts of the developed world. The Canadian township of Elliot Lake which turned out to be "the first nuclear-age ghost town" is the most recent example of this process. Built at an enormous cost in response to the discovery of uranium in mid fifties, its population declined from 25,000 in 1958 to 5,000 in 1961 as soon as an alternative source was found by the U.S.A. It only shows that prosperity based exclusively on mineral resources cannot be taken for granted as permanent.

The social and economic development of a nation depends on its capacity to utilise its natural resources, avoiding its wasteful use to the extent possible. Mineral and power resources are important natural resources which help in the industrial development of a nation and ultimately in improving the standard of living of the people.

In this lesson, we will be studying some of the important minerals, mineral fuels, their geographical distribution problems associated with these resources and the need for their conservation.

21.2 OBJECTIVES

After studying this lesson, you will be able to :

- explain the importance of minerals and power resources for the development of a country;
- list the minerals in which India is surplus, self sufficient and deficient;
- locate the important areas of concentration of minerals and mineral fuels on the map of India;
- list the important mining areas of iron ores, bauxite, manganese, lime stone and mica;
- explain the need and methods of conservation of minerals and mineral fuels of our country.

21.3 MINERALS IN INDIA

India's mineral resources are sufficiently rich and varied to provide the country with a strong industrial base. The country is particularly rich in the metallic minerals of the ferrous group such as iron ores, manganese, chromite and titanium. It has the world's largest reserves in mica and bauxite. The situation is also satisfactory in coal, felspar, fluorides, limestone, dolomite and gypsum. But the reserves of petroleum and some non-ferrous metallic minerals especially copper, lead, zinc, tin, graphite are inadequate. Country fulfils internal demands for these metallic minerals by importing them from other countries.

> * India is rich in the metalic minerals of the ferous groups such as iron ores, manganese, chromite and titanium. But the reserves of petroleum and some non ferous metalic minerals especially copper, lead, zinc, tin, graphite are inadequate.

21.4 MINERAL FUELS

Mineral fuels include coal, petroleum, natural gas and atomic or radio-active minerals.

(a) Coal

In India, coal is the primary source of commercial energy. It is used as fuel in industries, thermal power stations and also for domestic purposes in some parts of the country. It is also used as a raw material in chemical and fertiliser industries and in the production of thousands of items of daily use.

As per the assessment of January, 1996, the total coal reserves of the country stand at 2,01,95,370 million tonnes. Unfortunately, the bulk of the Indian coal reserves are of rather poor quality. We meet part of our coking coal requirements through import. In India, emphasis is being laid on setting thermal and super thermal power station on or near the coal fields and electricity generated is supplied to far off places through transmission lines. At one time Indian railways were the largest consumer of coal. Since they have switched on to the use of diesel and electricity they are no more the direct consumer of coal.

TABLE 21.1 Production of Coal in India (including Lignite)

Year	Production (in Million Tonnes)
1950-51	32.8
1960-61	55.7
1970-71	76.3
1980-81	118.8
1990-91	225.7
1995-96	270.1 (plus 22 million tonnes of lignite)

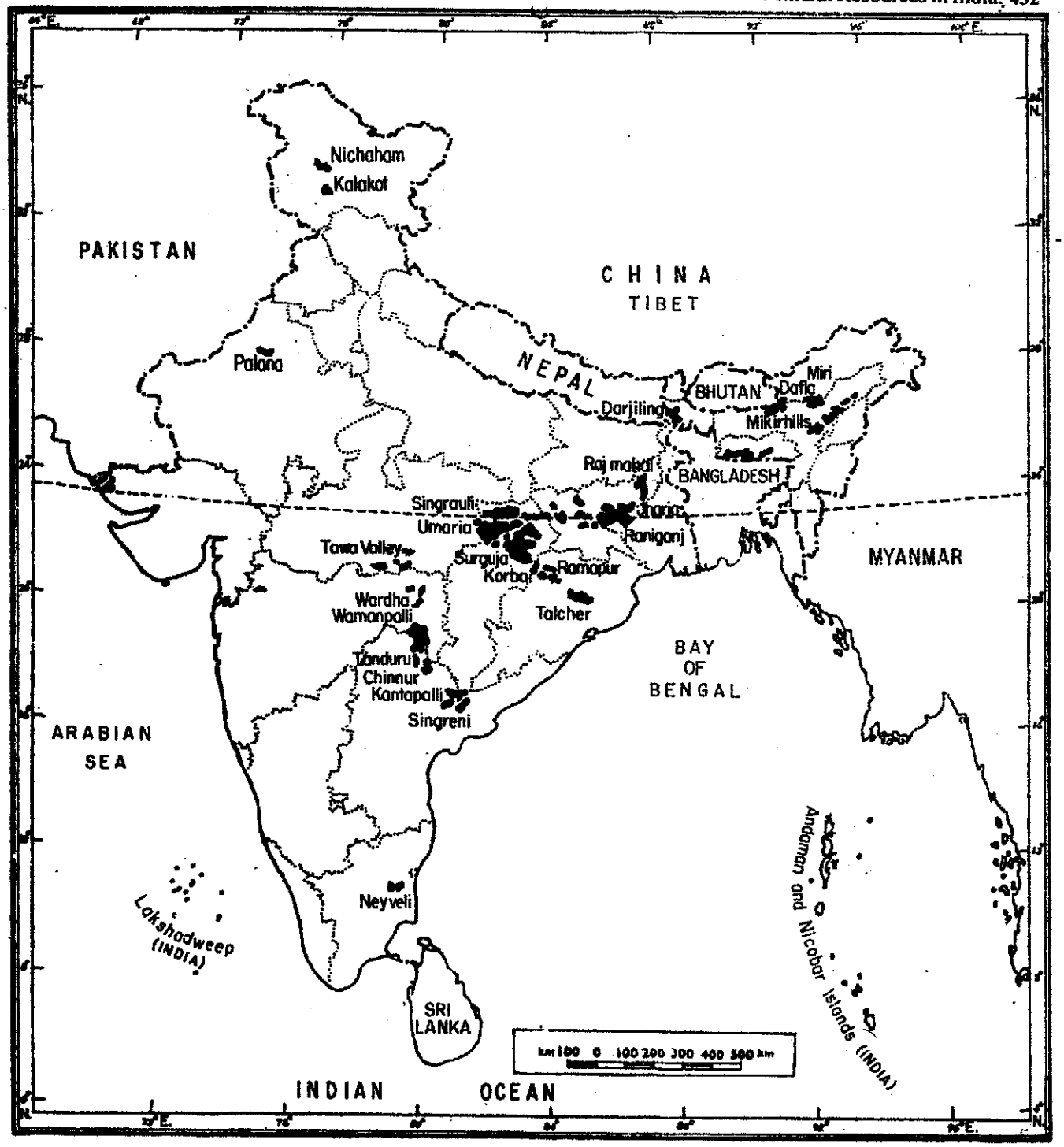
Distribution

Coal in India occurs in two important types of coal fields. They are the Gondwana coal fields and Tertiary coal fields. Out of the total coal reserves and production in India, Gondwana coal fields contribute 98% and the rest 2% is produced by tertiary coal fields. The Gondwana coal fields are located in the sedimentary rock systems of lower Gondwana Age. They are distributed chiefly in the valleys of the Damodar (Bihar - West Bengal); the Son (Madhya Pradesh); the Mahanadi (Orissa), the Godavari (Andhra Pradesh) and the Wardha (Maharashtra). Tetiary coalfields occur in the extra-peninsular areas which include Assam, Meghalaya, Nagaland, Arunachal Pradesh, Jammu & Kashmir and Sikkim.

Bihar ranks highest in production as well as reserves of coal in India. The coal deposites of Bihar occur in Dhanbad, Hazaribagh and Palamau district. In Dhanbad district the most important coalfields of Jharia and Chandrapura are located. The oldest coal fields of Raniganj is situated in West Bengal. It is the second largest coalfield in India. Raniganj coalfield stretches over Burdwan and Purulia districts. In Madhya Pradesh, coal deposits occur in Sidhi, Shahdol, Chhindwara, Bilaspur and Sarguja districts. Singrauli coalfield in Shadhol and Sidhi districts is the largest in the state. In Andhra Pradesh, coal occurs in the district of Adilabad, Karimnagar, Warangal, Khammam and West Godavari. In Orissa, Talcher is an important coal field. Other coalfield are in Sambalpur and Sundargarh districts. In Maharashtra the coal fields are found in the districts of Chandrapura, Yeotmal and Nagpur.

In comparison to India's coal reserves, lignite reserves are relatively modest. The bulk of lignite reserves are located in and around Neyveli in Tamil Nadu. Significant lignite reserves are found in Rajasthan, Gujurat, Pondichery and J & K.

* Coal is used as raw material in chemical and fertiliser industries and in the production of thousands of items of daily use.
* Coal are mainly found in the Gondwana and Tertiary coal field.
* The states of Bihar, West Bengal, Madhya Pradesh, Andhra Pradesh and Orissa are the leading producers of coal.
* The bulk of lignite reserves are found in and around Neyveli in Tamil Nadu.



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(b) Petroleum

Petroleum has often been called liquid gold because of its value in our modern civilization.. Our agriculture, industry and transport system depend on petroleum in several ways.

The crude petroleum is a mixture of combustible hydrocarbons in solid, liquid and gaseous forms. Petroleum -products used as fuel, lubricants material for manufacturing synthetic derivatives and chemicals required in industries. Petrol, kerosene, diesel, detergents, synthetic fibres, plastics, cosmetics etc. are important products derived from petroleum.

Distribution

Petroleum occurs in anticlines and fault traps. In India, it is found in the sedimentary rock formation. Most of such areas lie in the Assam, Gujarat and off shore areas along the western coast.

The entire production of India till today comes from the Assam belt, Gujarat-Cambay belt and Bombay High. The Assem belt extends from Dehang basin in the extreme north-east of Assam along the outer flanks of hill ranges forming the eastern border of Bhitra and Surma Valley. The Gujarat-Cambay belt extends from Mehsana (Gujarat) in the north to the continental shelf off the coast right up to Ratnagiri (Maharashtra) in the south. It covers Bombay High which is the largest producer of petroleum in the country.

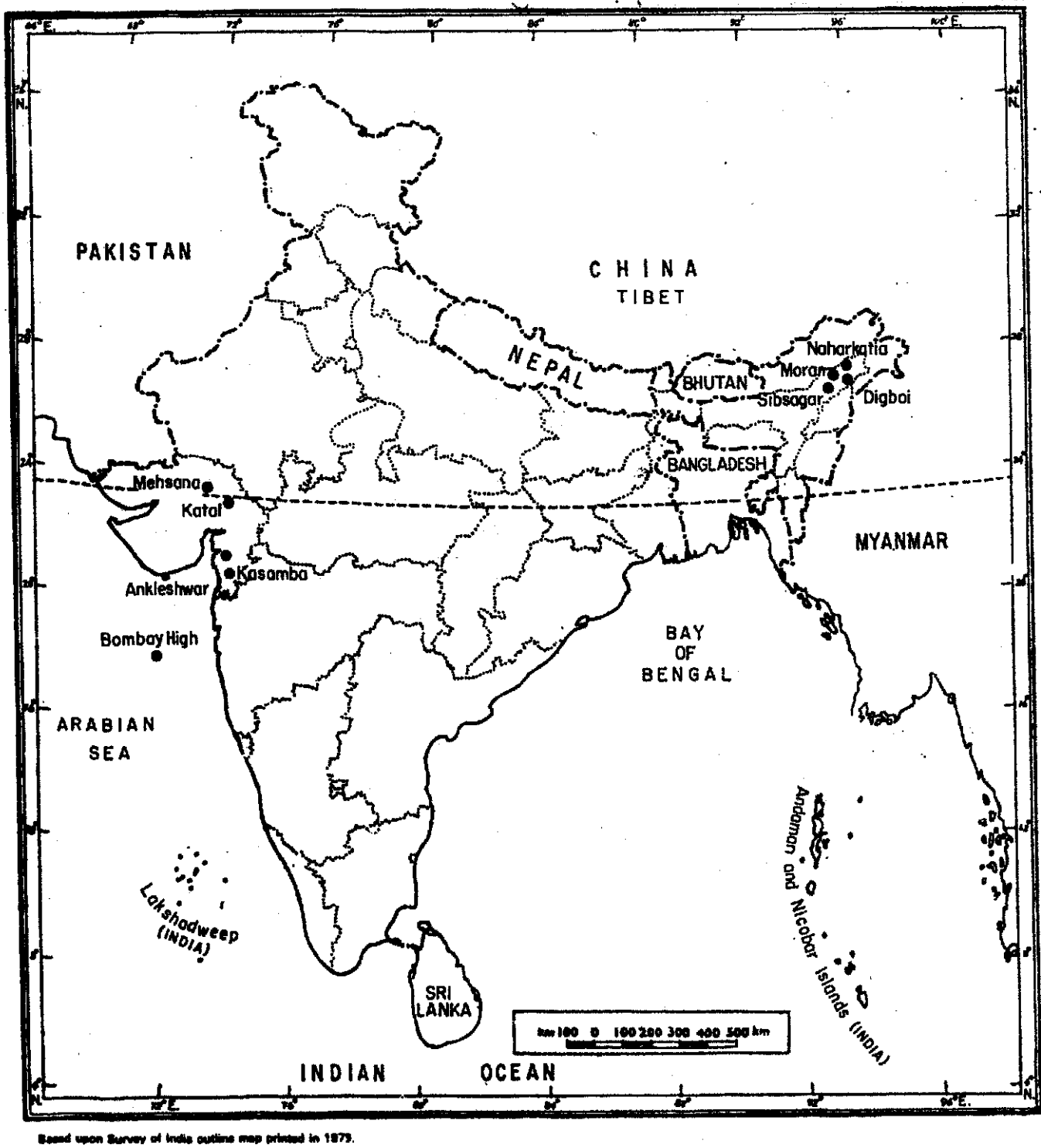
In Assam, the oil producing area is located in the Lakhimpur and Sibsagar districts. The oil wells are located mainly around Digboi, Naharkatiya, Sibsagar and Rudrasagar.

In Gujarat, the oil producing area covers Vadodara, Broach, Kheda, Mehasana and Surat districts.

In addition, Ganga-Brahmaputra delta, Ganga valley and Rajasthan are also likely to have petroleum and natural gas deposits. Oil and gas has been discovered along the east coast in the Godavari and Krishna deltas. The prospective areas lie in the Bay of Bengal. West Bengal, Orissa, Andhra Pradesh T.N. and A&N Islands.

The total known reserves of crude oil are estimated at 511 million tonnes during 1995-96. These reserves are insignificant as the consumption of petroleum products has been increasing very fast - nearly 10% per annum.

* Petroleum occurs in anticlines and fault traps. In India it is found in sedimentary rocks. Most of such areas lie in the Assam, Gujarat and off shore areas along the western coast.
* Petrol, kerosene, diesel, detergents, synthetic fibres plastics, cosmetics etc. are important products derived from petroleum.
* Petroleum products are used a fuel, lubricant material for manufacturing synthetic derivatives and chemicals required in industries.



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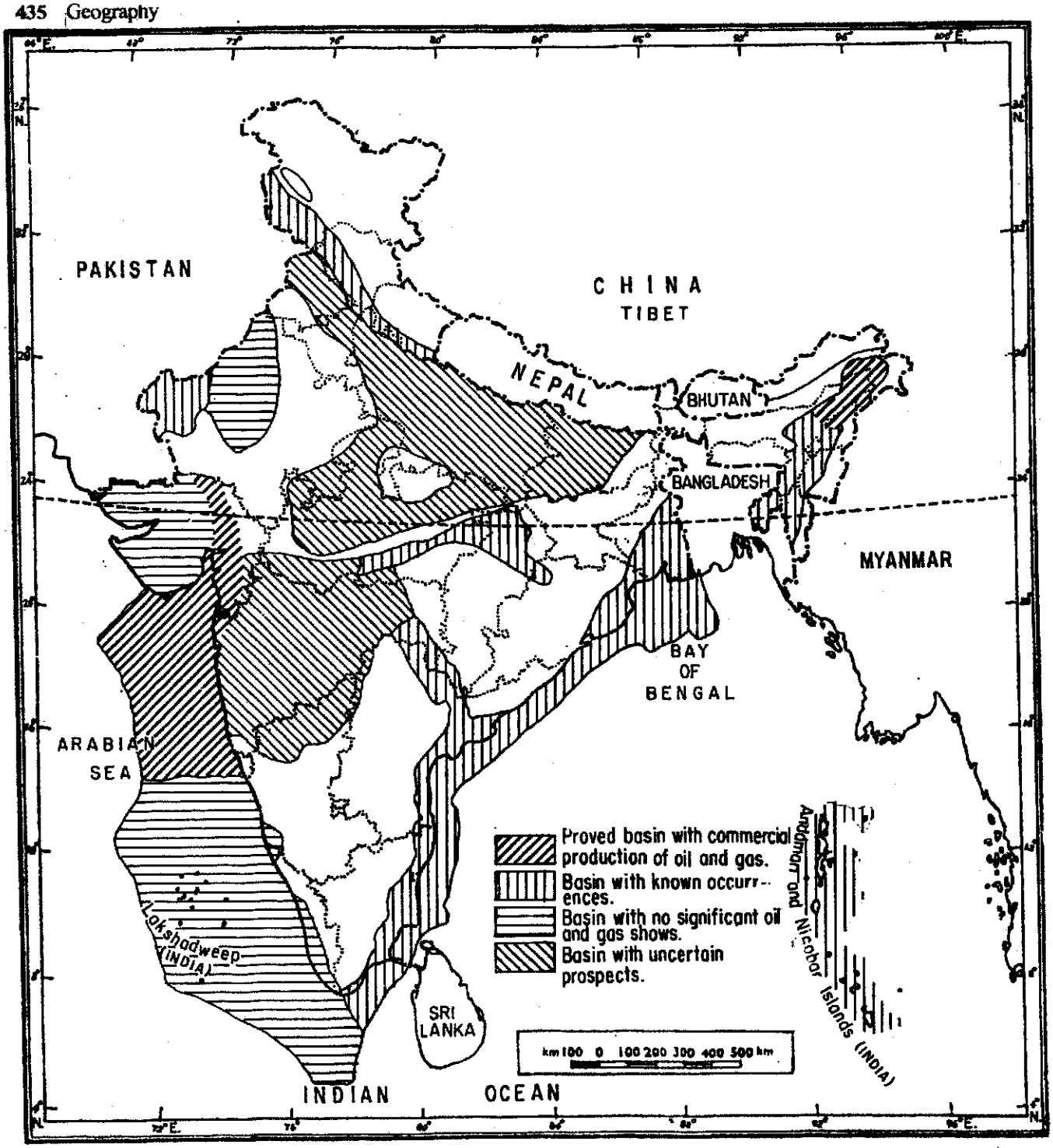

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Table 21.2 Production of Crude Petroleum in India

Year	Production (in million tonnes)	
1960-61	0.5	
1970-71	6.8	
1980-81	10.5	
1990-91	33.0	
1995-96	35.19	
1995-96 On-shore production	11.9	(The remaining 0.6 million tonnes
Off-shore production	22.7	has come from joint venture companies.)

Oil Refineries in India

The crude petroleum taken from oil fields needs to be refined before it can be used. Oil refining is really a big chemical engineering industry involving a complicated process. Presently there are 13 oil refineries in India under public sector. These refineries are at Digboi (Assam), Mumbai (two) (Maharashtra), Vishakhapatnam, (Andhra Pradesh) Guwahati (Assam), Barauni (Bihar), Koyali (Gujarat), Bongaigaon (Assam), Mathura (U.P.), Panipat (Haryana), Kochi (Kerala) and Mangalore (Karnataka), Chennai (Tamil Nadu). These oil refineries are supplied crude oil either by ships or by pipelines. You will be studying about the various pipeline in the lesson 24.

Although the annual production shows an increasing, trend, the country has to import petroleum and petroleum products to meet its requirements. In 1996, the output of all the refineries was of the order of 58.6 million tonnes and production of petroleum products was 55.1 million tonnes. During that year nearly 46 million tonnes of crude petroleum was imported. The actual consumption of petroleum products in 1995-96 was 72.6 million tonnes.

* Presently, there are 13 oil refineries in India under the Public sector.
* Although the annual production shows an increasing trend, the country has to import petroleum and petroleum product to meet its requirement.

Atomic Minerals

Atomic energy can be produced by fission or fusion of the atoms or rather the nuclear parts of radio-active minerals like uranium, thorium and radium. India possesses the world's largest reserves of monazite, the principle source of thorium and some reserves of uranium.

Uranium

In India, uranium is embedded in the igneous and metamorphic rocks in Bihar, Rajasthan, Andhra Pradesh and some parts of Himalayas. It occurs in igneous rocks of Bihar, Rajasthan and Andhra Pradesh. A substantial source of uranium deposits is also found in the monazite sands along the Kerala coasts.

The production of uranium at present is confined to the mines at Jaduguda in Singhbhum district of Bihar. The total reserves of uranium in the country are of the order of 30,000 tonnes, the inferred reserve are estimated at 76,000 tonnes, which are enough to support 5,000-10,000 mw of electricity generating capacity.

Thorium

Thorium is principally obtained from monazite. The beach sands of Kerala in Palghat and Quilon district contain the world's richest monazite deposits. It also occurs on the sands of Vishakhapatnam in Andhra Pradesh.

* The production of Uranium is presently confined to the mines of Jaduguda in Singhbhum district of Bihar.
* India posseses the world's largest monazite reserves, the principal source of thorium.
* The beach sand of Kerala in Palghat and Quilon districts contain world's richest monazite deposits.
* In India Uranium is found in the igneous and metamorphic rocks in Bihar, Rajasthan, Andhra Pradesh and some parts of Himalaya.

INTEXT QUESTIONS 21.1

1. Tick (✓) the correct alternative from the given with each statement

(a) Oil refining is done at

(i) Kanpur (ii) Barauni
(iii) Kandla (iv) Masulipatnam

(b) the chief oil fields of India are in

(i) Assam and Gujarat
(ii) Andhra Pradesh and Rajasthan
(iii) Madhya Pradesh and Assam
(iv) Gujarat and Bihar

(c) 80 percent of coal reserves of India are in

(i) Godavari Valley (ii) Wardha Valley
(iii) Damodar Valley (iv) Mahanadi Valley

(d) Tertiary coal is found in the state of

(i) Kerala (ii) Jammu & Kashmir
(iii) Bihar (iv) Uttar Pradesh

(e) The largest coal producing coal field is

(i) Raniganj (ii) Jharia
(iii) Bailadila (iv) Talcher

21.5 DISTRIBUTION OF SOME IMPORTANT MINERALS

In India mineral resources are very unevenly distributed. Most of the minerals are found in the ancient crystalline rocks of the Deccan and Chotanagpur Plateau. Some minerals are found in the Himalayan region, although they are difficult to exploit.

Minerals are broadly divided into two groups metallic and non metallic minerals. Metallic-minerals are further subdivided into ferrous and non ferrous minerals.

(A) FERROUS MINERALS

Ferrous minerals are those which contain iron in substantial quantity.

(a) Ferrous Metallic Minerals :

Ferrous minerals account for about three-fourth of the total value of the production of metallic minerals. They constitute the most important mineral group after fuel minerals. They include iron, manganese, chromite, pyrite etc. These minerals provide a strong base for the development of metallurgical industries, particularly iron, steel and alloys.

(i) Iron Ore

India is one of the few countries of the world which is endowed with vast reserves of good quality of iron ore. She possesses over 20 percent of the world's total reserves. The quality of Indian ore is very high with iron content of above 60 percent.

Most of iron ore found in the country is of three types :- Haematite, magnetite and limonite. Haematite ore contains up to 68 percent of iron. It is red in color and is often refered to as 'red ore'. Next to haematite in quanitity and richness is the magnetite ore. It contains up to 60 percent of the iron. It is dark brown to blackish in colour, and is often referred as 'black ores', Limonite is the third type of ore which has iron content of 35-50 percent. It is yellow in colour. Since India has large reserves of haematite and magnetite ores, inferior quality ore like limonite is rarely exploited.

The total estimated reserves of iron ore in the country are placed at 12,749 million tonnes of which 9606 million tonnes are haematite ore and 3,143 million tonnes of magnetite ore. This is roughly about one fourth of the world reserves.

Table 21.3 Production of iron ore in India

Year	Production (In million tonnes)
1950-51	3.0
1960-61	11.0
1970-71	32.5
1980-81	42.2
1990-91	53.7
1995-96	64.1

Distribution

Iron ore deposits are found practically in every state of India. However, 96 percent of the total reserves are in Orissa, Madhya Pradesh, Karnataka and Goa. These states also account for 96 percent to the total production of iron ore in the country. About 3 percent of the country's total production comes from Tamil Nadu, Maharashtra and Andhra Pradesh.

Orissa and Bihar together possess about 50 percent of India's reserves of high-grade iron ore. The principal deposits are located in Sundargarh, Mayurbhanj and Keonjhar districts of Orissa and Singhbhum of Bihar.

Madhya Pradesh contributed about 25 percent of country's total iron ore reserves and about 20-25 percent of country's production of iron ore. The reserves are located in Bailadila range. Raoghat area near Aridongri in Baster district and Dhalli Rajhari range in Durg district.

Goa posseses inferior quality ore but its contribution to the country's total production is impressive. Most of the mines are open cast and mechanized. Almost the entire production of iron from Goa is exported from Marmagao Port to Japan. In Karnataka, the most important deposits are found in the Sandur-Hospet area of Bellary district; Babaudan hills of Chikmagalur district and in Simoga and Chitradurga district.

Iron ore deposits of Andhra Pradesh are scattered in the Anantpur, Khammam, Krishna, Kurnool, Cuddapah and Nellore districts. Some deposits are also located in the state of Tamil Nadu, Maharashtra and Rajasthan.

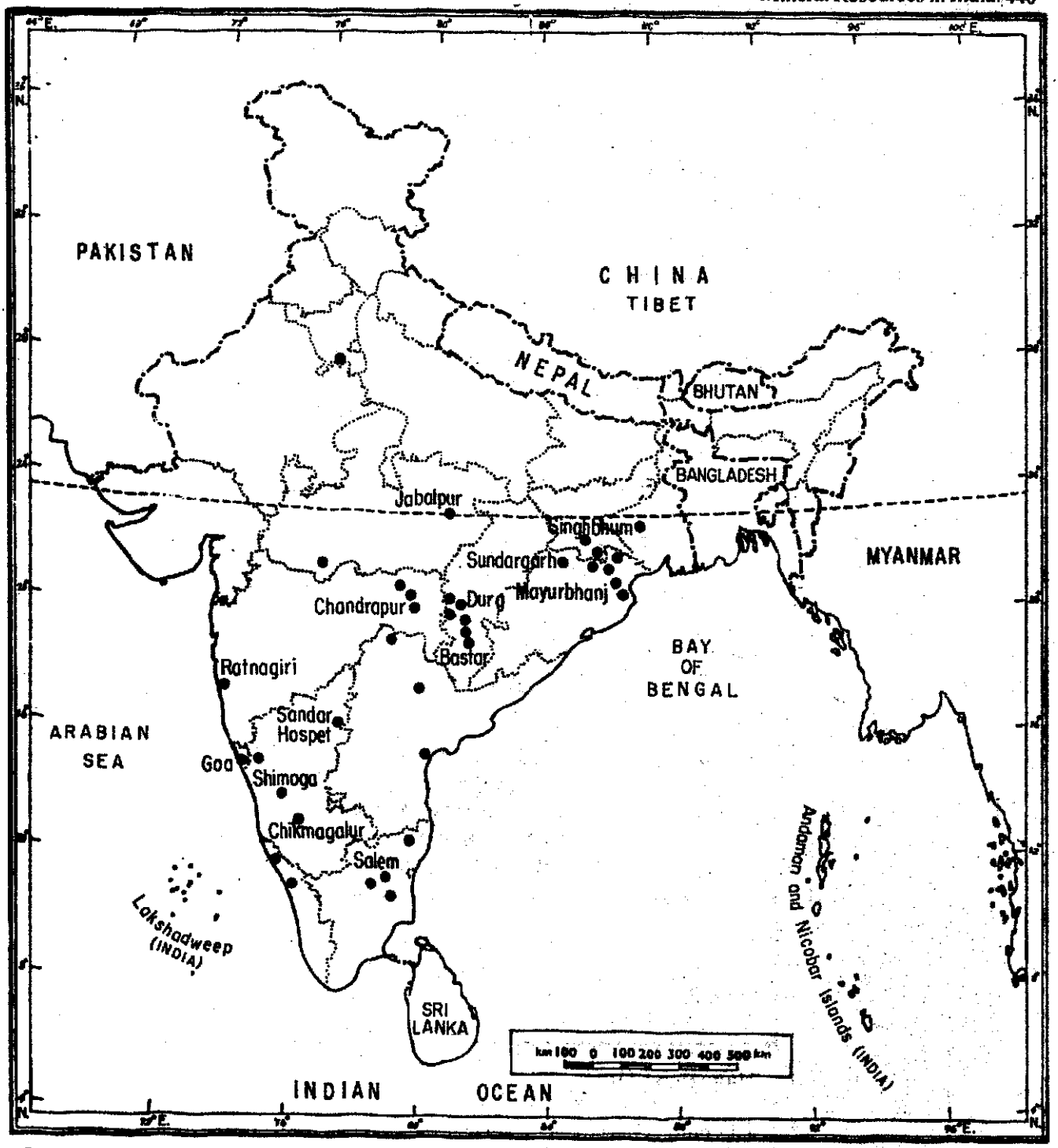
India contributes about 7 to 8 percent of the total world trade. Now deposits are being worked out specially for export purpose. For example, Baliadila and Rajhara mines of Madhya Pradesh and Kiruburu mines in Orissa are being worked for this purpose. Japan, Romania, the former Czekoslovakia and Poland are important importing countries. Iron ore is exported from Haldia, Pardip, Marmagao, Mangalore and Visakhapatnam ports.

* Indis posseses over 20 percent of the world's total reserves in iron.
* Iron ore deposits are found practically in every state. However, 96 percent of the total reserves are in Orissa, Madhya Pradesh, Karnataka and Goa.
* Bailadilla and Rajhra mines in Madhya Pradesh and Kiriburu mines in Orissa are being worked out specially for export purpose.

(ii) Manganese Ore

India ranks third in the production of manganese ore in the world, next only to Russia and South Africa. About one fourth of the total production of India is exported.

Manganese ore forms an important ingredient in the manufacture of iron and steel. It is also used in manufacture of dry batteries, in photography, leather and match industries. About 85 per cent of total manganese consumption in India is used by metallurgical industries.



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Distribution

The important areas of production are in Orissa, Madhya Pradesh, Maharashtra, Karnataka and Andhra Pradesh. Over 78 per cent of total reserves of manganese ore of India occur in a belt stretching from Nagpur and Bhandara districts of Maharashtra to Balaghat and Chindwara district of Madhya Pradesh. But these two states contribute only 12 and 14 per cent of total production respectively. The remaining 22 percent of reserves are distributed in Orissa, Karnataka, Gujarat, Rajasthan, Goa and Andhra Pradesh.

Orissa tops in the production of manganese accounting for 37% of the total production of the country. Its reserves are only 12 per cent of total reserves of India. The important mining districts are Sundargarh, Koraput, Bolangir, Keonjhar, Cuttack and Mayurbhanj.

In Karnataka, the deposits are located in the districts of Shimoga, Chitradurga, Tumkur and Bellary. Small deposits are reported in Bijapur, Chikmagalur and Dharwar districts. Karnataka is the second largest producer of manganese ore, accounting for 26 percent of country's total productions. It accounts for 6.41 percent of country's total reserves.

Andhra Pradesh is a significant producer of manganese ore, contributing about 8 percent of India's total production, although her reserves are insignificant. Goa, Bihar and Gujarat also have some deposits of manganese ore.

* India ranks third in the production of manganese ore in the world.
* About 85 percent of total manganese consumption in India is used by metalurgical industries.
* The important areas of production are in Orissa, Madhya Pradesh, Maharashtra, Karnataka & Andhra Pradesh.

IN-TEXT QUESTIONS 21.2

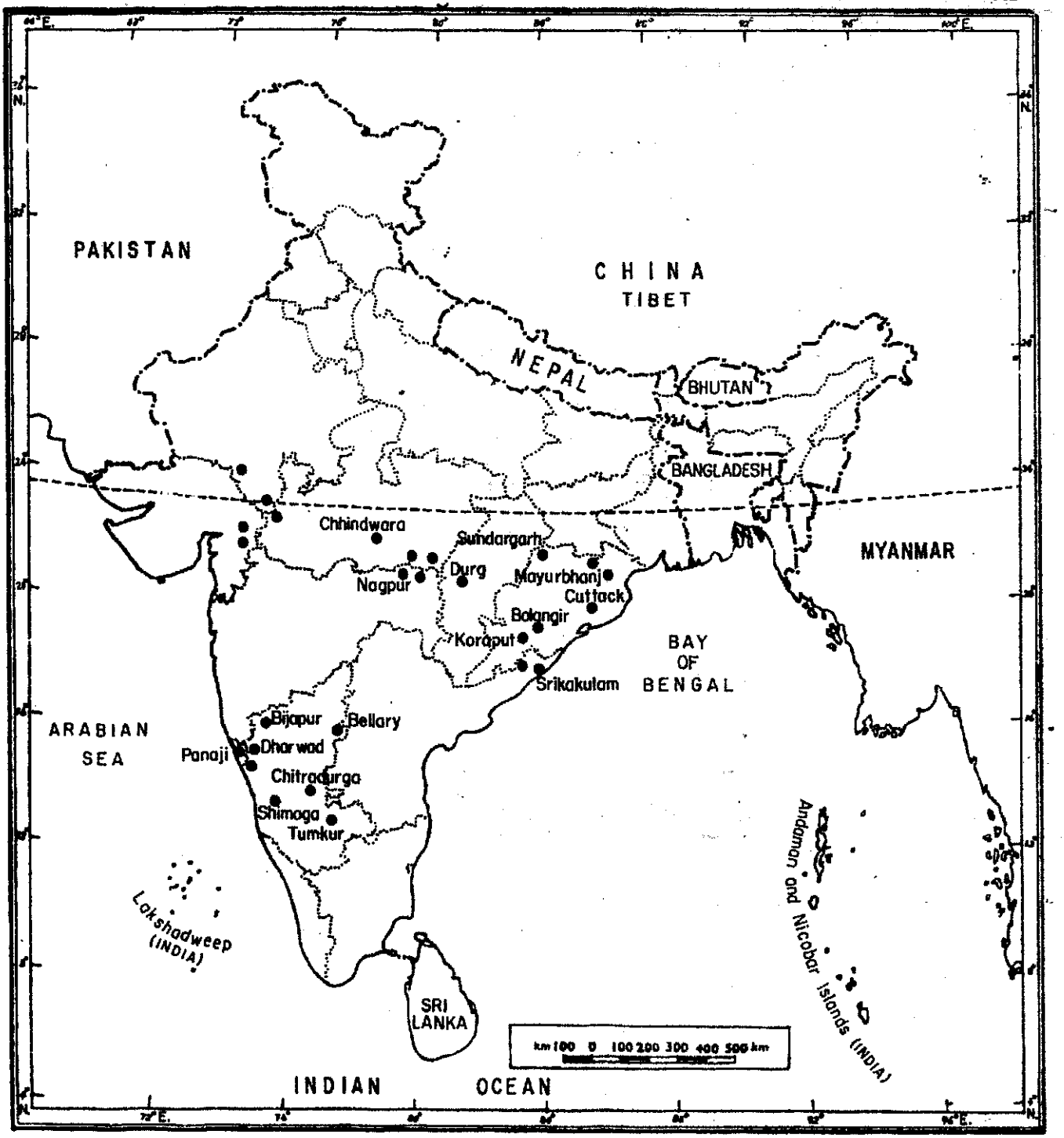
1. Tick (✓) the correct alternative from the choices given for each statement.

(a) Iron ore from Bailadila is exported through
   (i) Paradeep (ii) Kakinada
   (iii) Visakhapatnam (iv) Haldia

(b) Iron ore with highest iron content is
   (i) Magnetite (ii) Haematite
   (iii) Limonite (iv) Saderite

(c) Which is the leading state in the production of Manganese ?
   (i) Bihar (ii) Orissa
   (iii) Madhya Pradesh (iv) Karnataka

(d) Which is the iron ore field especially worked for export ?
   (i) Bailadila (ii) Hazaribagh
   (iii) Durg (iv) Singhbhoom



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(b) NON-FERROUS METALLIC MINERALS

Non ferrous minerals are those which do not contain iron. They incclude gold, silver, copper, tin, lead and zinc. These metallic minerals are highly important in day to day life. However, India is very poor and deficient in all of these minerals

(i) Bauxite

Bauxite is a non-ferrous metallic mineral. It is the ore from which aluminium metal is produced. India's reserves of bauxite are sufficient to keep the country self-reliant. Aluminium extracted from the ore is used in making aeroplanes, electrical appliances and goods, household fittings, utensils etc. Bauxite is also used for manufacturing of white colour cement and certain chemicals. India's reserves of bauxite of all grades have been estimated at 3037 million tonnes.

TABLE 21.5 Production of Bauxite in India

Year	Production (in thousand tonnes)
1951	68.1
1961	475.9
1971	1,517.1
1981	1,954.6
1991	4,977.0
1995	5,443.8

Distribution

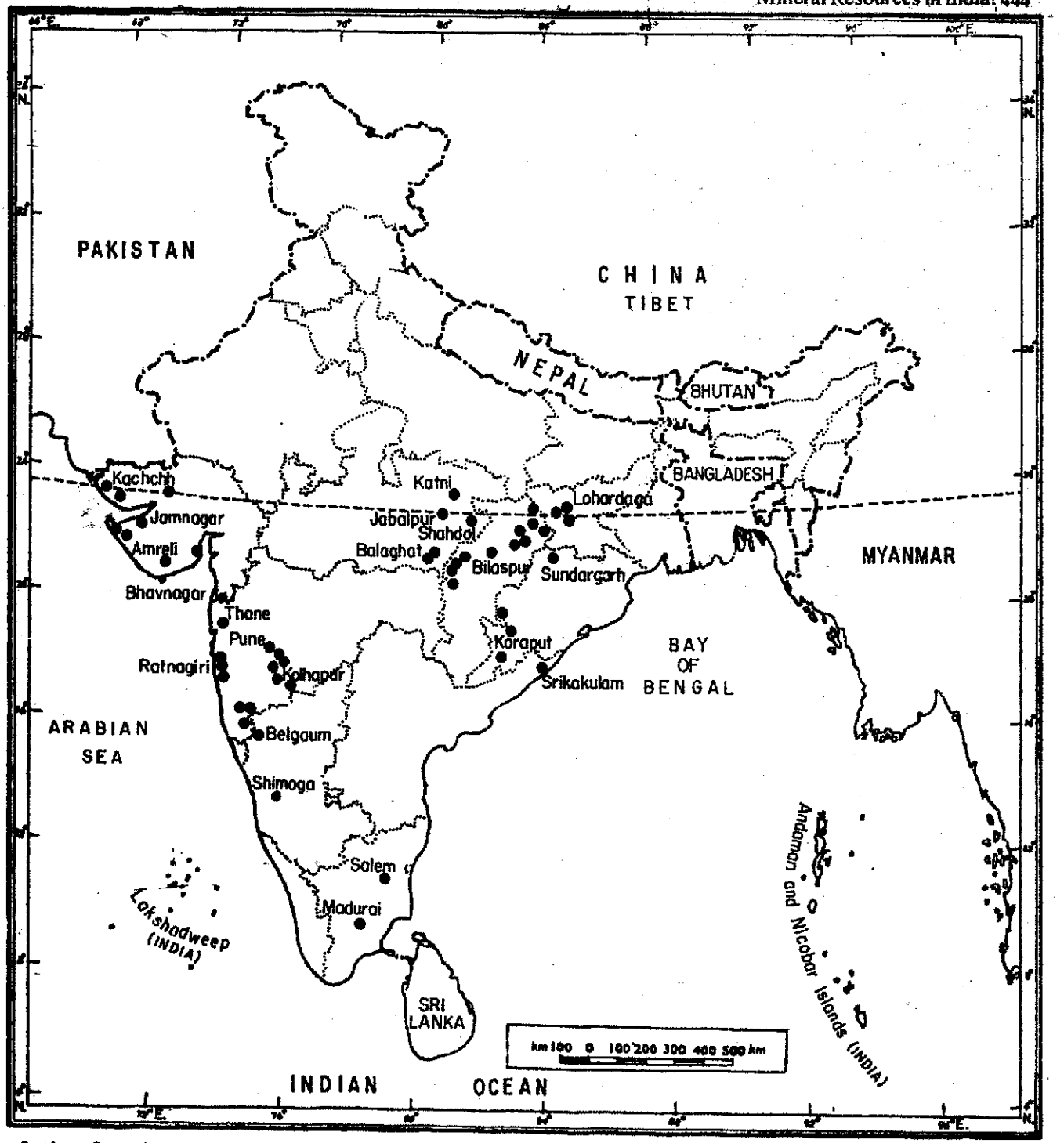
Bauxite has a wide occurrence in the country. Major reserves occur in Bihar, Maharashtra, Madhya Pradesh, Gujarat, Karnataka, Tamil Nadu, Goa and Uttar Pradesh.

Bihar accounts for 13 percent of India's total reserves and 37 percent of the country's total production. The important deposits are located in Palamau, Ranchi, Munger and Lohardaga districts.

Gujarat contributes 12 percent to the total production and equal percentage to the total reserves of the country. The deposits are found in the Bhavnagar, Junagadh and Amreli districts.

Madhya Pradesh accounts for 22 percent of the total reserves of the country and 25 percent of the total production. The three important bauxite ore in the state are Sarguja, Raigarh and Bilaspur districts in the Amarkantak Plateau ; Maikala range in Shahdole, Bilaspur, Durg, Mandla and Balaghat districts ; and the Katni area of Jabalpur district.

Maharashtra accounts for a relatively small production of the country, 18 percent of the total, but possesses the second largest bauxite reserves consisting of 22 percent of the country's total reserves. Bauxite occurs in Kolhapur, Raigarh, Thana, Satara and Ratnagiri districts.



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In Karnataka the reserves of bauxite occur in the north-western parts of Belgaum district. Huge deposits of bauxite have been discovered in the eastern ghats in Orissa and Andhra Pradesh. Salem, Nilgiri and Madurai district of Tamil Nadu, and Banda district of U.P. also have workable deposits of bauxite.

India exports bauxite to a number of countries. The leading importer of Indian bauxite is Italy, followed by the U.K., West Germany and Japan.

* Bauxite is the ore from which aluminium metal is extracted.
* Bauxite is used for manufacturing white colour cement and certain chemicals.
* Major reserves occur in Bihar, Maharashtra, Madhya Pradesh, Gujarat, Karnataka, Tamil Nadu, Goa and Uttar Pradesh.

(B) Non-metallic Minerals

A large number of non-metallic minerals are found in India but only a few of these are commercially important. They are limestone, dolomite, mica, kyanite, sillimanite, gypsum and phosphate. These minerals are used in a variety of industries such as cement, fertilizers, refractories and electrical goods. In this lesson we will be stydying about mica and limestone.

(i) Mica

India is the Leading producer in mica. It was one of the indispensable minerals used in electrical and electronic industries till recently. However its synthetic substitute has reduced our exports as well as production considerably.

Distribution

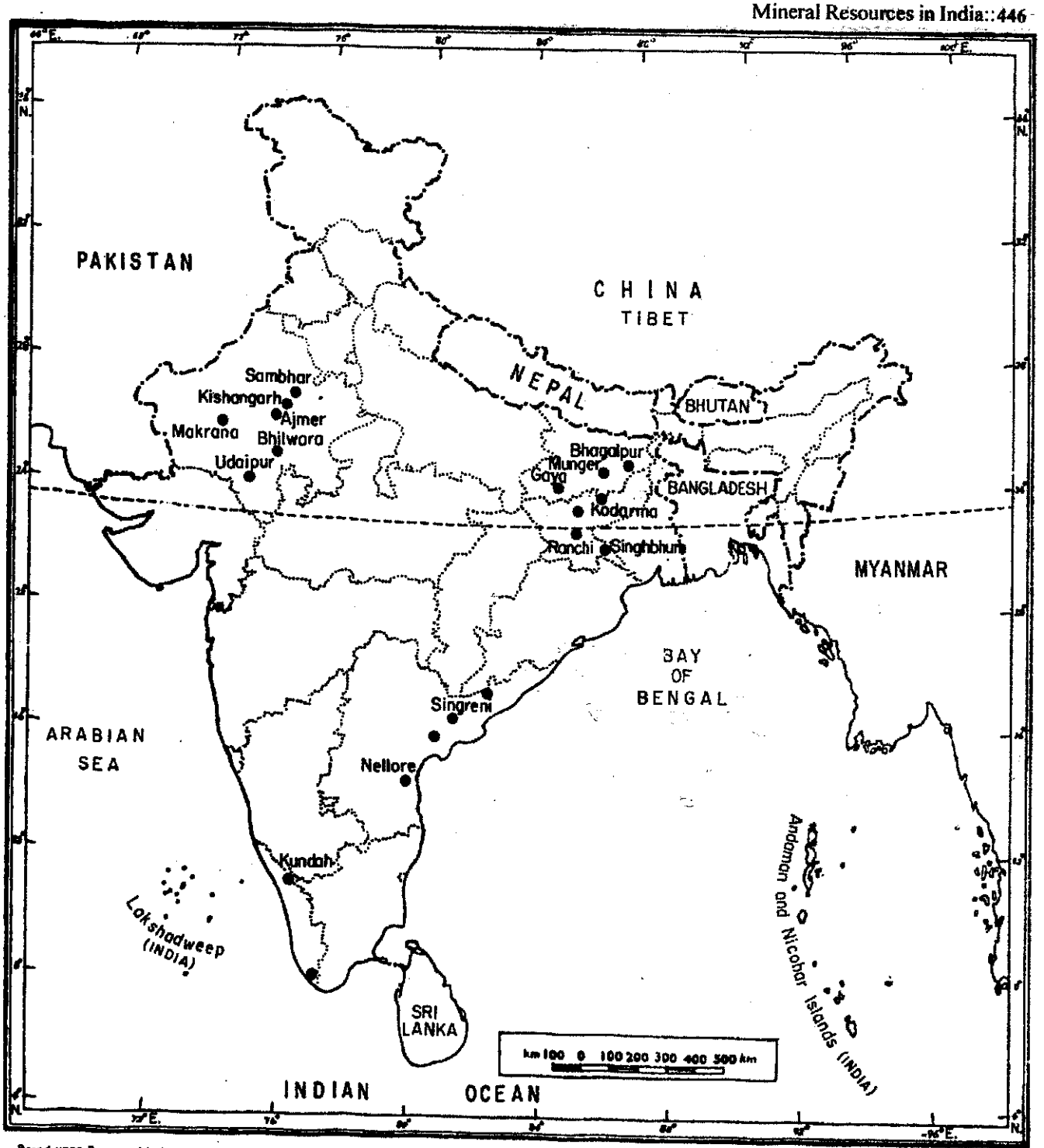
Although mica is widely distributed but workable deposits occur in three principle belts. They are in the states of Bihar, Andhra Pradesh and Rajasthan.

Bihar produces the high-quality ruby mica. The mica belt in Bihar extends from Gaya district in the west through Hazaribagh and Munger district Bhagalpur district in the east. Outside this main belt, mica occurs in Dhanbad, Palamau, Ranchi and Singhbhum district. The state supplies more than 80% of the india's output. In Andhra Pradesh mica is found in a belt in Nellore district. Rajasthan is the third largest mica producing state. The mica bearing zone, covers the districts of Jaipur, Udaipur, Bhilwara, Ajmer and Kishangarh. The quality of mica is inferior. Besides these three belts, some deposits occur in Kerala, Tamil Nadu and Madhya Pradesh.

Mica mining in India was mainly done for export. The principal importing country was the U.S.A. which took about 50 percent of the exports.

(ii) Limestone

Limestone is used in a wide range of industries. Seventy six percent of the country's total consumption is used in cement industry, 16 percent in iron and steel industry and 4 percent in chemical industries. The remaining 4 percent is used by sugar, paper, fertilisers and ferro-manganese industries. Limestone with high silica content is preferred in cement industry.



Based upon Survey of India outline map printed in 1979.

The territorial waters of India extend into the sea to a distance of twelve nautical miles measured from the appropriate base line.

The boundary of Meghalaya shown on this Map is as interpreted from the North-Eastern Areas (Reorganisation) Act, 1971, but has yet to be verified.

*Reg. No. 7340 HD'79-2000.

*Printed at the 101 (H.I.O.) Printing Group of Survey of India.

*Price: Twentyfive Paise.

* These may be deleted when printing a map based on this outline map.

Distribution

Madhya Pradesh possesses 36 percent of the total reserves. The deposits are also found in Khasi and Jainti hills of Meghalaya. Karnataka contributes about 10 percent of the total reserves. They are found in Bijapur, Belgaum and Shimoga districts. In Andhra Pradesh the deposits are found in Vishakhapatnam, Guntur, Krishna, Karimnagar and Adilabad districts. Sundargarh district of Orissa ; and Shahbad and Palamau districts of Bihar also have limestone deposits.

INTEXT QUESTIONS 21.3

Tick(✓) the correct alternative from the given with each statement.

(a) Bauxite is a
- (i) Metallic mineral of ferrous group
- (ii) Metallic mineral of non-ferrous group
- (iii) Non-metallic mineral
- (iv) Mineral fuel

(b) The ore of aluminium is
- (i) Hematie
- (ii) Magnetite
- (iii) Bauxite
- (iv) Limonite

(c) India is the leading producer of
- (i) Lime stone
- (ii) Copper
- (iii) Mica
- (iv) Phosphate

21.6 SPATIAL DISTRIBUTION OF MINERALS IN INDIA

The distribution of mineral resources is very uneven. The Damodar Valley has the largest concentration of mineral wealth (except petroleum). Whereas much of peninsular region west of a line from Mangalore to Kanpur has very little mineral wealth. East of the line are the major reserves of iron ore, coal, mica and many other non metallic minerals. The valleys of Damodar, Sone, Mahanadi and Godavari have 97 percent of the country's total reserves of coal. Most of the deposits of iron ore located in Bihar. Orissa, Madhya Pradesh, Karnataka and Tamil Nadu. Sedimentary rocks on the western and eastern flanks of the peninsula i.e. on the continental shelves off the coast of Maharashtra, and in the east in Assam have substantial reserves of petroleum. Also west of the line is Rajasthan with its reserves of non-ferrous minerals. Aravallis, the old fold mountain is highly mineralised. Outside this area, most of the states, including Jammu and Kashmir, Punjab, Haryana, Uttar Pradesh, Himachal Pradesh, Tripura, Nagaland and Gangetic West Bengal are poor in mineral resources.

- India is the leading producers in mica.
- Mica is used in electrical and electronic industries.
- Mica is widely distributed but workable deposits occur in the states of Bihar, Andhra Pradesh, Rajasthan.
- Limestone is mostly used in cement, iron and steel, and chemical industries.
- Limestone is mostly found in Madhya Pradesh, Karnataka, Andhra Pradesh, Orissa, Bihar and Meghalaya.

21.7 PROBLEMS

There are various problems posed by mineral resources. The major problems are as follows:

(a) Depletion of Mineral resources :
Due to the excessive exploitation, many minerals are going to be depleted in near future. So it calls for conservation and judicious utilisation.

(b) Ecological Problems :
Mineral extraction has led to serious environmental problems. Rapidly growing mining activity has rendered large agricultural tracts almost useless. Natural vegetation has been removed from vast tracts. Such areas suffer from frequent floods and for want of proper drainage, they have become breeding grounds for mosquitoes spreading malaria with vengenance. In hilly mining areas landslide are a common phenomenon taking toll of life, cattle and property. In many mines, miners have to work under most hazardous conditions. Hundreds of lives are lost each year by fire in coal mines and due to occasional flooding etc. Occurrance of poisonous gas in pockets of mines is a great enemy of miners.

(c) Pollution :
Many mineral producing areas lead to air and water pollution in the surrounding region which in turn lead to various health hazards.

(d) Social Problems :
New discoveries of minerals often lead to displacement of people. As many tribal areas are rich in minerals, the tribal people are most affected. Industrialisation of such areas has badly shattered their economy, values and life style.

21.8 CONSERVATION OF RESOURCES

In world of diminishing resources, it becomes essential that the mineral resources should be judiciously used by the present generation to ensure a resource base for future generations. The strategies for resource conservation include :

1. Reclamation
Efforts should be made to reclaim various minerals as much as possible. This can be done by using latest technology. Remote sensing satellite has rendered a great help in identifying mineral resources.

2. Recycling
It means reuse of waste in a production process e.g. (a) The waste papers, rags, used bottles, tins, plastic waste material can all be recycled to produce paper, newsprint, plastics glass wares, packing tin materials etc. This process saves consumption of water and electricity considerably. Such steps can help to prolong the life of our depleted forest wealth. (b) Post consumption recyling - scrap iron from old machinery, automobiles, industrial equipment which is added to the charge and becomes cast iron or steel which is then shaped into a new consumer product.

3. Substitution
Due to advancement of technology and new needs have lead to many changes in the use of minerals. Products of petro-chemical industry have replaced traditional brass or clay jars. Plastics now compete with copper for uses such as piping and with steel in car bodies.

4. More efficient use

It also helps in conserving mineral resources for long. Today mineral resources are used more efficiently. For example engineering or construction processes which make automobiles more energy efficient and aerodynamic.

* The major problems associated with mineral resources are depletion of minerals, ecological problems, pollution and social problems.
* The strategies for resource conservation include reclamation, recycling, substitution and social problems.

WHAT YOU HAVE LEARNT

Mineral and power resources play an important role in the industrial development of a nation. They provide the industrial raw materials and fuel. Minerals are classified into metallic and non-metallic minerals. Metallic minerals can be further grouped into ferrous and non-ferrous. Mineral fuels are coal, petroleum, and natural gas. India's position is particularly good in the metallic minerals of ferrous group. It is well endowed with iron ore of high quality. India has rich deposits of mica and bauxite. It is also one of the leading producers of mica in the world. Coal is the primary source of power in India, It occurs in the rock formations of Gondwana and Tertiary age. Gondwana coal fields account for 96% of the total reserves and production in India. India's position is not satisfactory in the reserves as well as production of petroleum. Assam belt and Gujarat-Cambay and Bombay High belt are the two important petroleum producing regions in India. Uranium and thorium are the two important atomic minerals in India. The major problems faced by mineral resources are depletion of mineral resources, ecological problems, pollution and social problems. Various methods are adopted for conservation of mineral resources. The measures are reclamation, recycling, substitution and more efficient uses.

TERMINAL QUESTIONS

1. Describe the position of India in mineral resources.
2. Describe the distribution and production of the following minerals and minerals fuels in India :
   (a) Iron Ore
   (b) Coal and
   (c) Petroleum
3. On an outline map of India show the following
   (i) Coal of Gondwana Age
   (ii) Major iron-ore mines being worked mainly for export
   (iii) Off-shore oil fields
   (iv) Inland oil refineries
4. What are the problems associated with exploitation of mineral resources ?
5. Describe various methods of conservation of mineral resources.

CHECK YOUR ANSWER

INTEXT QUESTIONS

21.1

1. (a) Barauni
   (b) Assam and Gujarat
   (c) Damodar Valley
   (d) Jammu & Kashmir
   (e) Jharia

21.2

1. (a) Vishakhapatnam
   (b) Haematite
   (c) Orissa
   (d) Bailadila

21.3

1. (a) Metallic mineral of non-ferrous group
   (b) Bauxite
   (c) Mica

TERMINAL QUESTIONS

1. India is rich in mettallic minerals of the ferous groups such as iron ore, manganese, chromium and titanium. It has the world's largest reserve in mica and bauxite. The situation is also satisfactory in coal belspar flourides likestone, dolomite and gypsum. But the reserves of petroleum and non-metallic minerals especially copper, lead, zinc, tin, graphite are inadequate.
2. Refer to sections 21.4 & 21.5 a (i)
3. Refer maps
4. Depletion of Mineral resources, Ecological problems, Pollution (elaborate each point). For detail refer section 21.7
5. Various conservation methods are reclamation, recycling, substitution and more efficient use (elaborate each point). For details refer section 21.8.