CLASS – 10

SOCIAL SCIENCE

Contemporary India–II

CH-5 : Minerals and Energy Resources

Part – 3

Ferrous & Non-Ferrous Minerals

Pankaj Vaishnav

OVERVIEW

1. Minerals
2. Classification of Minerals
3. Forms of Mineral Occurrence
4. Ferrous and Non-Ferrous Minerals
5. Conservation of Minerals
6. Energy Resources
7. Conservation of Energy Resources

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COMPETENCY BASED LEARNING

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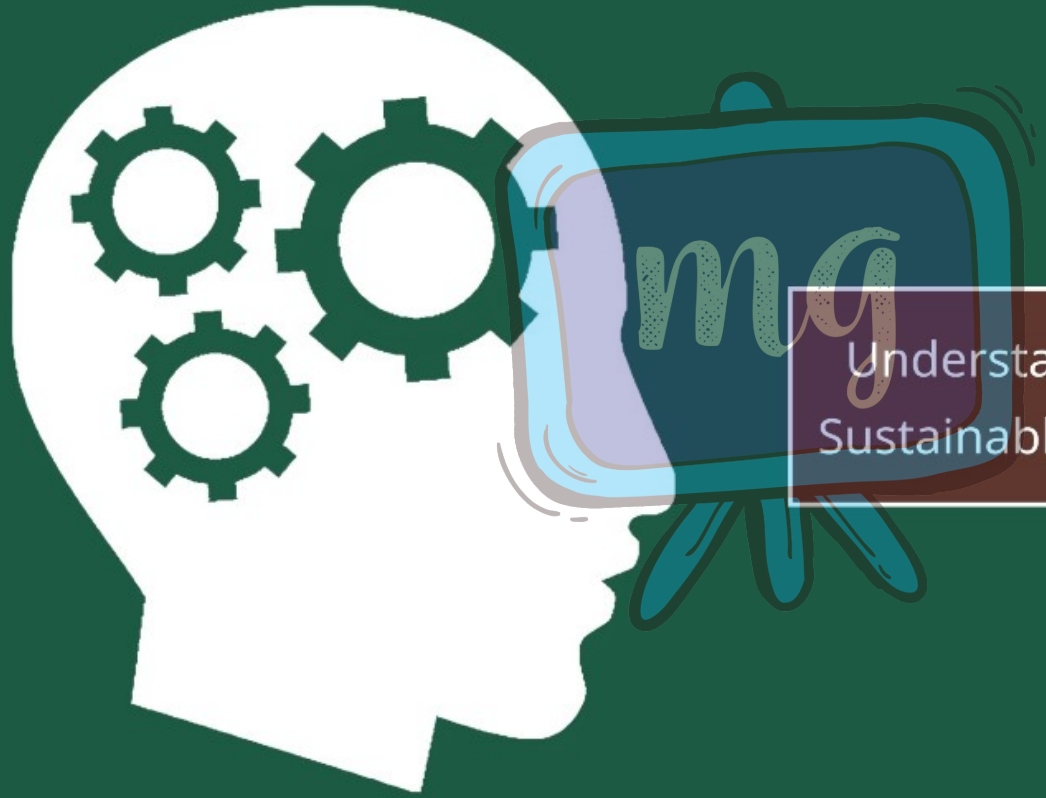
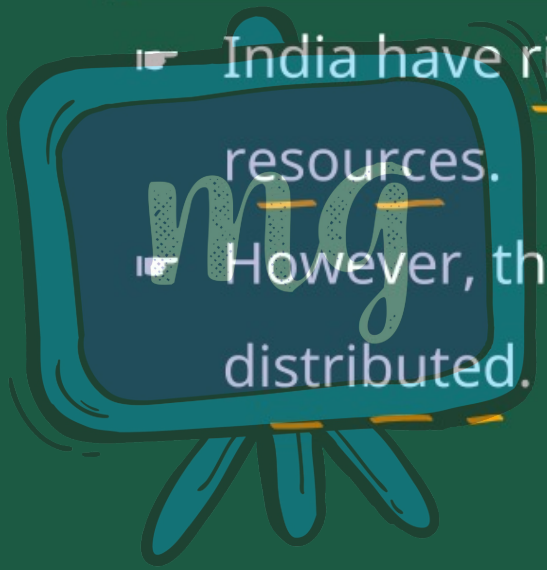


Understanding the Requirement of Sustainable Use of Mineral Resources

MINERAL RESOURCES IN INDIA



- India have rich and varied mineral resources.
- However, these are unevenly distributed.

- **Peninsular Rocks**
  - Coal
  - Metallic Minerals
  - Non-Metallic Minerals (Mica etc.)
- **Sedimentary Rocks of Western & Eastern Flanks of Peninsula (Gujarat & Assam)**
  - Petroleum Deposits

- **Rajasthan**
  - Rock systems of the Peninsula
  - Reserves of many Non-Ferrous Minerals
- **Alluvial Plains of North-India**
  - Almost devoid of economic minerals

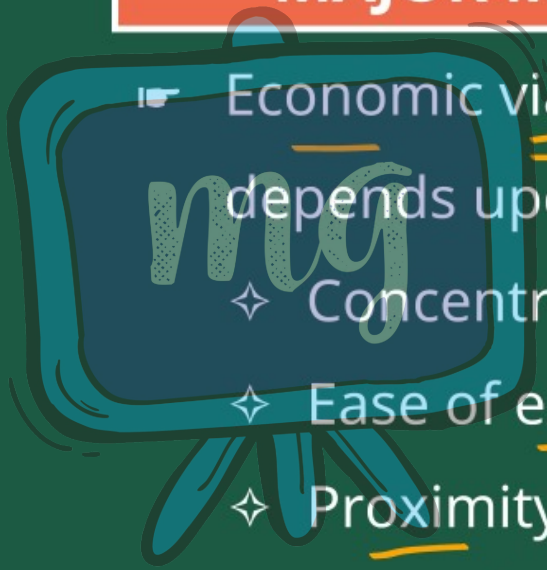
- Variations in mineral distribution exist
- **Reason**

Differences in-

- Geological structure
- Processes
- Time involved

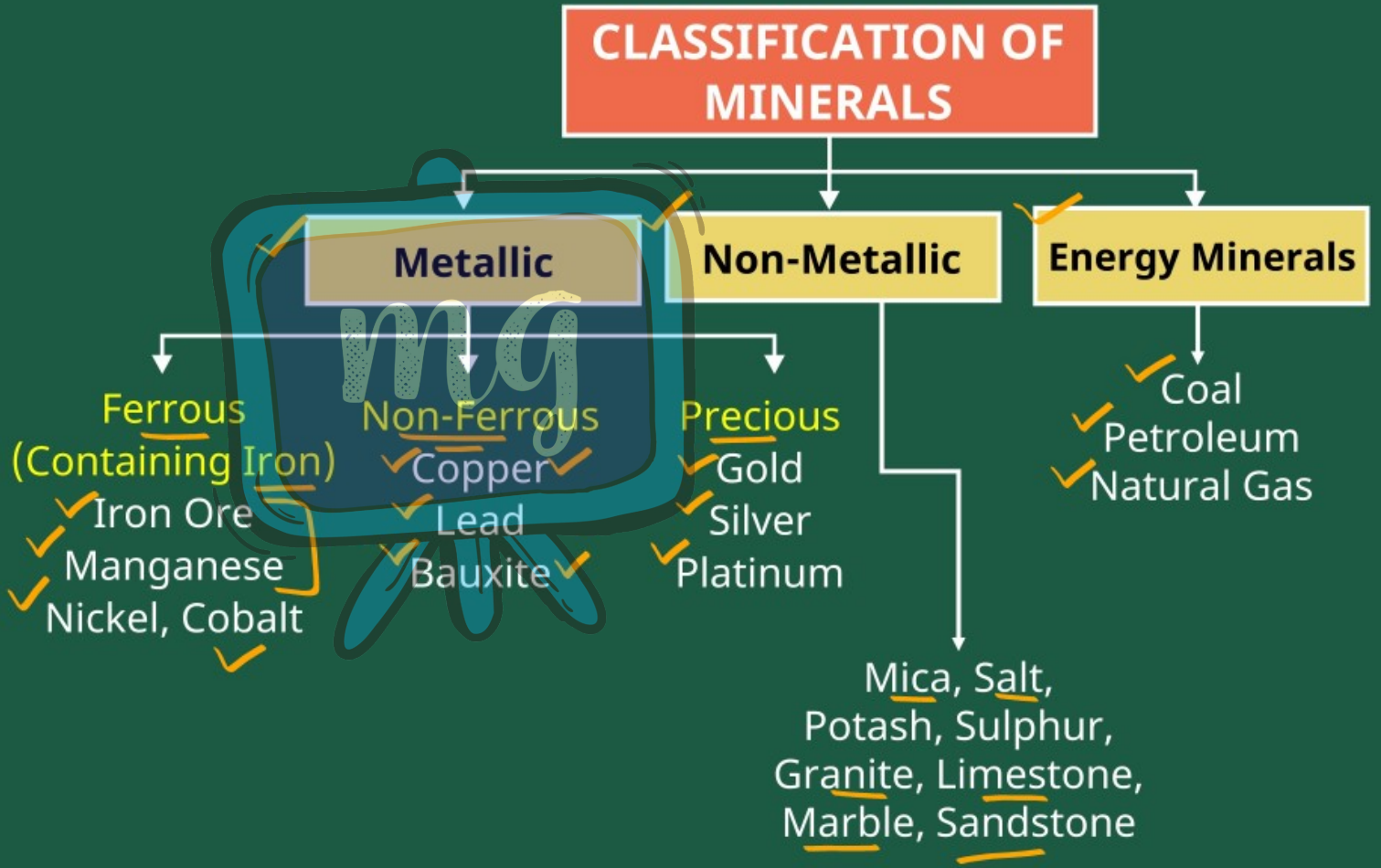
in the formation of minerals.

DISTRIBUTION OF MAJOR MINERALS IN INDIA

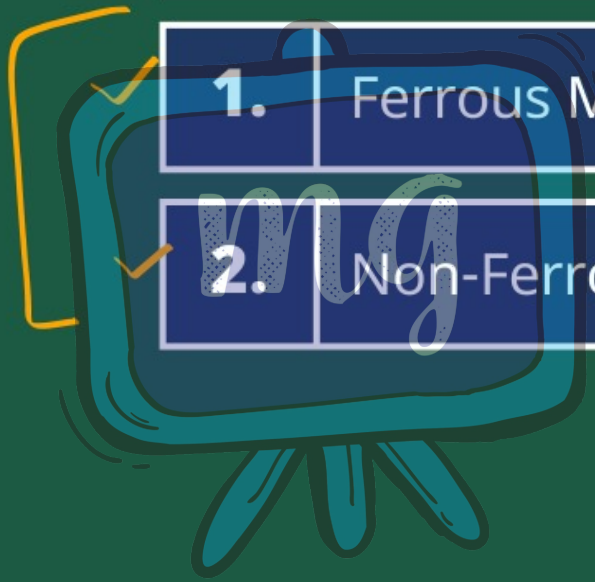


- Economic viability of a reserve depends upon: -
  - Concentration of minerals in ore
  - Ease of extraction
  - Proximity to market
- To meet the demand, choices must be made between several options.

- When a viable option is selected, a mineral ‘Deposit’ or ‘Reserve’ turns into a ‘Mine’.



METALLIC MINERALS



1. Ferrous Minerals
2. Non-Ferrous Minerals

1. FERROUS MINERALS

- Account for $\frac{3}{4}^{th}$ of total value of metallic mineral production.
- Support metallurgical industry development.
- India exports significant ferrous minerals.

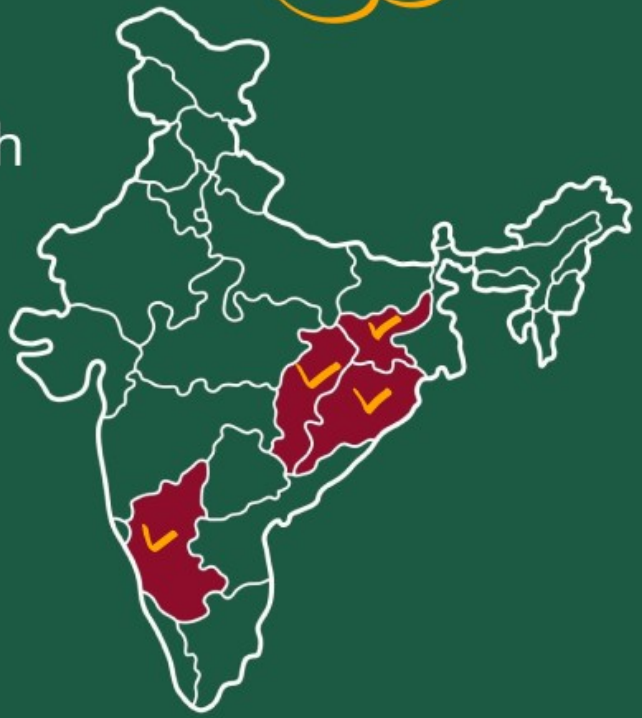
1 IRON ORE

- Foundation of industrial development.
- India has abundant Iron ore resources.
- **Types of Iron ores**
  - Magnetite
  - Haematite
  - Limonite
  - Siderite

- **Magnetite**
  - Finest Iron ore
  - Very high Iron content (up to 70%)
  - Excellent magnetic qualities (Valuable in electrical industry)
- **Haematite**
  - Most important industrial Iron ore. (In terms of quantity used)
  - Slightly lower Iron content (50-60%)

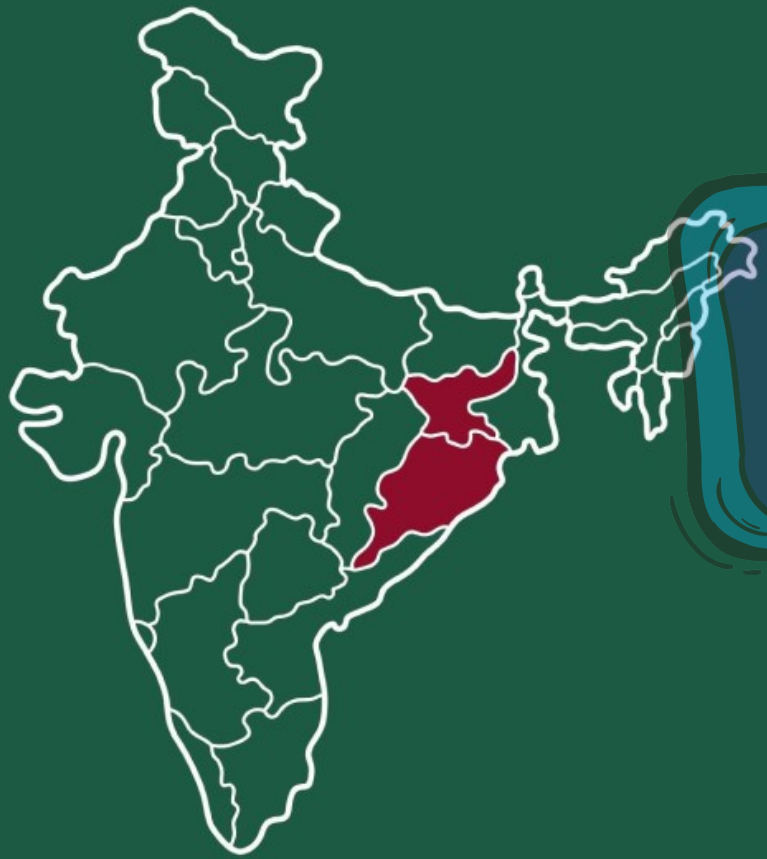
Production in India (2018–19)

- Almost entire production (97%)
  - Odisha
  - Chhattisgarh
  - Karnataka
  - Jharkhand



MAJOR IRON ORE BELTS IN INDIA

1. Odisha-Jharkhand Belt
2. Durg-Bastar-Chandrapur Belt
3. Ballari-Chitradurga-Chikkamagaluru-Tumakuru Belt
4. Maharashtra-Goa Belt



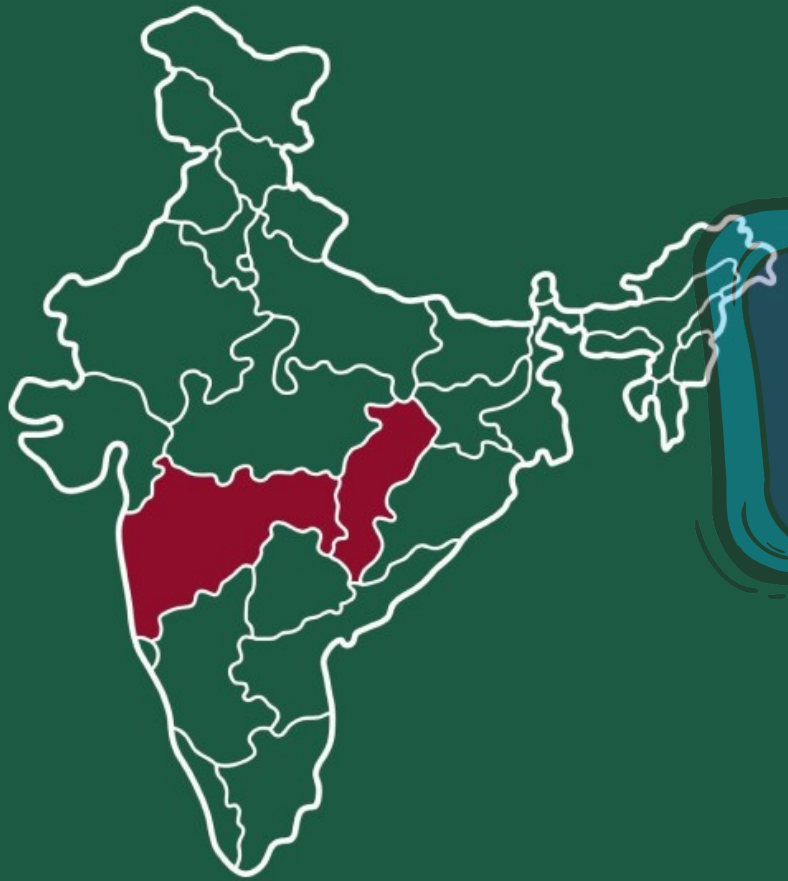
1. ODISHA – JHARKHAND BELT

☛ **Odisha**

High-grade Haematite ore found in Badampahar mines (Mayurbhanj and Kendujhar districts).

☛ **Jharkhand**

Haematite iron ore mined in Gua and Noamundi (Singbhum district).



2. DURG–BASTAR–CHANDRAPUR BELT

- Chhattisgarh & Maharashtra.
- **Bailadila Range (Bastar, Chhattisgarh)**
  Very high-grade Haematite ore
- The ore has the best physical properties needed for steel making.
- Exported to Japan and South Korea. (Via Vishakhapatnam Port)

BAILADILA HILLS

Look like the hump of an ox.
That's why its name is
"Baildila".

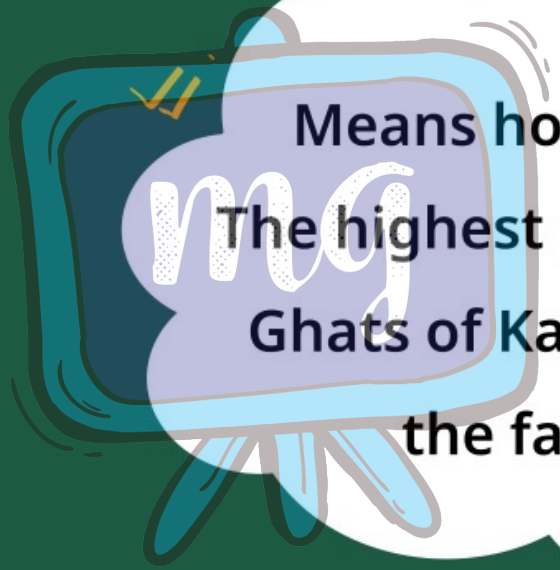
3. BALLARI–CHITRADURGA–CHIKKAMAGALURU–TUMAKURU BELT

- Karnataka
- Large reserves of Iron ore.

☛ Kudremukh Mines

- ✧ Western Ghats of Karnataka
- ✧ One of the largest deposits in the world.
- ✧ 100% export unit
- ✧ The ore is transported as slurry to a port near Mangaluru.

(Through a pipeline)



KUDRE

Means horse (In Kannada).

The highest peak in the Western Ghats of Karnataka resembles the face of a horse.

4. MAHARASHTRA–GOA BELT

- Goa & Maharashtra (Ratnagiri)
- Iron ores are not of very high quality.
  (But, efficiently exploited)
- Exported through Marmagao Port.

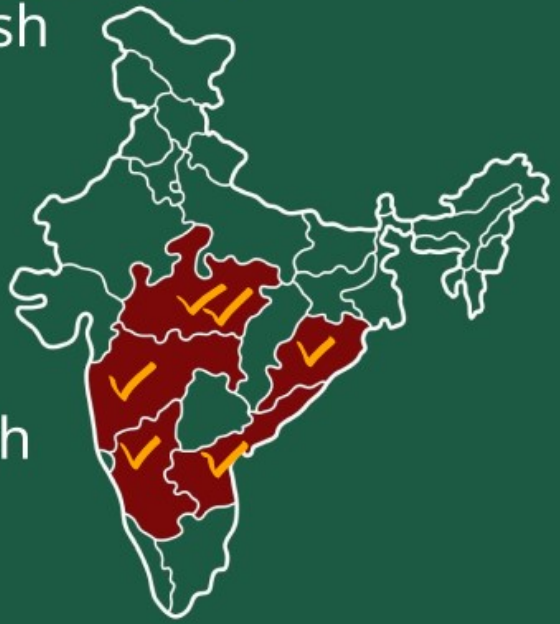
MANGANESE

- Mainly used in the manufacturing of: -
  - Steel
  - Ferro-Manganese Alloy
- To manufacture 1 Tonne of Steel: - 10 kg. Manganese is required
- **Other Use**
  - Bleaching powder
  - Insecticides
  - Paints

1 Tonne
↳ 1000 kg

Production in India (2018–19)

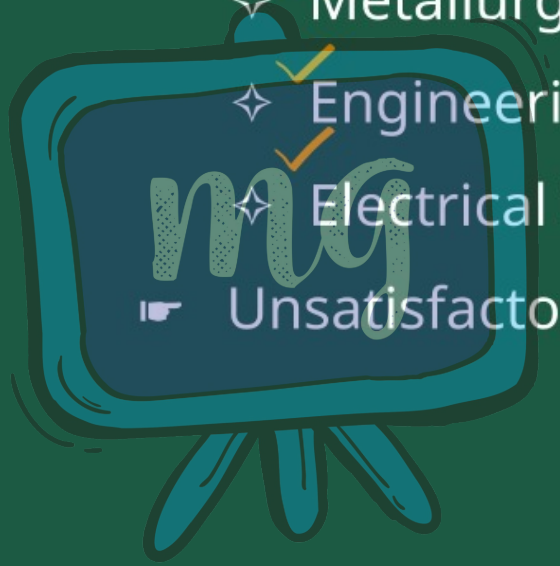
- Madhya Pradesh
- Maharashtra
- Odisha
- Karnataka
- Andhra Pradesh



2. NON–FERROUS MINERALS

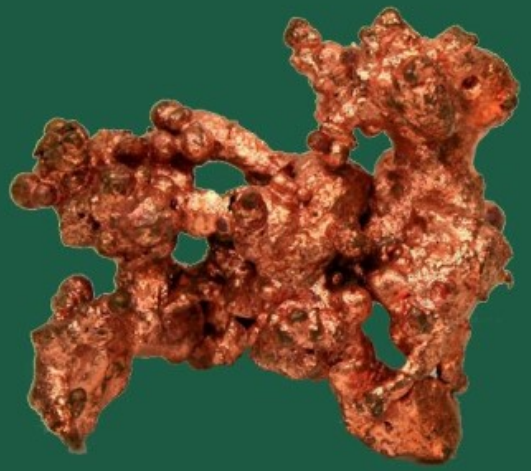
- Non–Ferrous Minerals
  - Copper
  - Bauxite
  - Lead
  - Zinc
  - Gold

- **Importance**
  - Metallurgical Industries
  - Engineering Industries
  - Electrical Industries
- Unsatisfactory reserves & production.



COPPER

- Copper
  - Malleable
  - Ductile
  - Good Conductor
- Use
  - Electrical Cables
  - Electronics
  - Chemical Industries

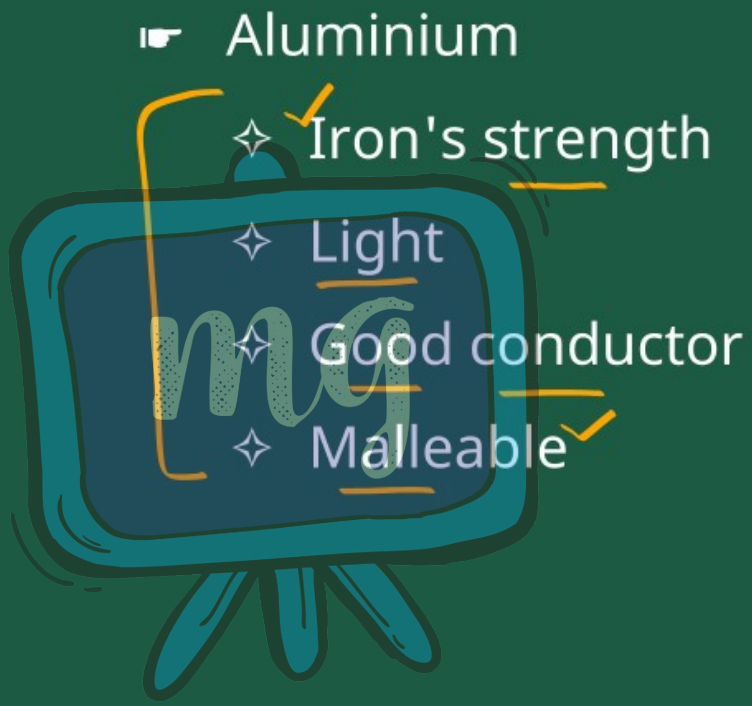


☛ Major Producers

- ✧ Madhya Pradesh (Balaghat Mines)
- ✧ Rajasthan (Khetri Mines)
- ✧ Jharkhand (Singhbhum District)

BAUXITE

- A clay-like substance.
- Aluminium is derived from it.
- Deposits form from decomposition of rocks rich in aluminium silicates.



Deposits

- Mainly found in-
  - Amarkantak Plateau
  - Maikal Hills
  - Plateau region of Bilaspur-Katni
  - Panchpatmali Deposits (Koraput, Odisha)

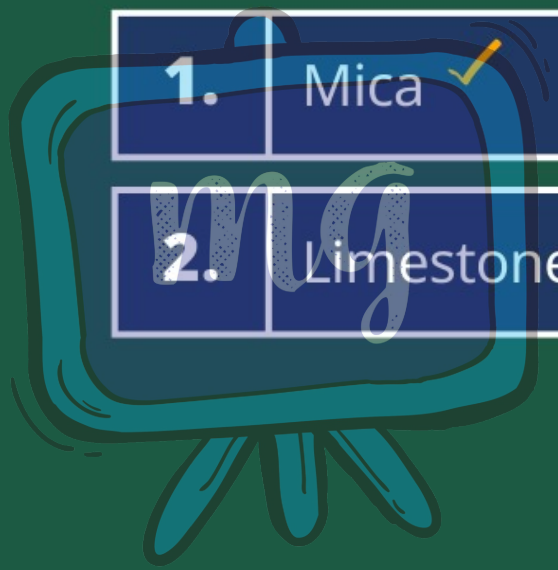
Production in India (2018–19)

- Odisha
- Jharkhand
- Gujarat
- Chhattisgarh
- Maharashtra
- Madhya Pradesh

2016-17

NON-METALLIC MINERALS

1. Mica ✓
2. Limestone ✓

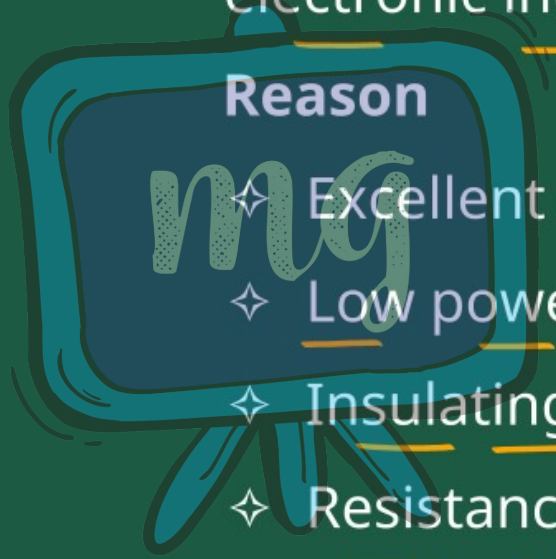


1. MICA

- A mineral made up of a series of plates or leaves.
- Splits easily into thin sheets.
- Colors
  - ✧ Clear
  - ✧ Red
  - ✧ Black
  - ✧ Yellow
  - ✧ Green
  - ✧ Brown

☛ Mica is indispensable in electric & electronic industries.

Reason



- ✧ Excellent dielectric strength
- ✧ Low power-loss factor
- ✧ Insulating properties
- ✧ Resistance to high voltage

Deposits

- Chota Nagpur plateau (Northern edge)

Important Producer

- Jharkhand
  (Koderma, Gaya & Hazaribagh Belt)
- Rajasthan (Around Ajmer)
- Andhra Pradesh (Nellore Belt)

2. LIMESTONE

- Rock Mineral
- Found in association with rocks composed of calcium carbonates or calcium and magnesium carbonates.
- Found in sedimentary rocks of most geological formations.

- Limestone is the basic raw material for: -
  - Cement industry
  - Essential for smelting Iron ore in the blast furnace.

Production in India (2018–19)

- Rajasthan
- Madhya Pradesh
- Andhra Pradesh
- Chhattisgarh
- Karnataka
- Telangana
- Gujarat
- Tamil Nadu
- Maharashtra

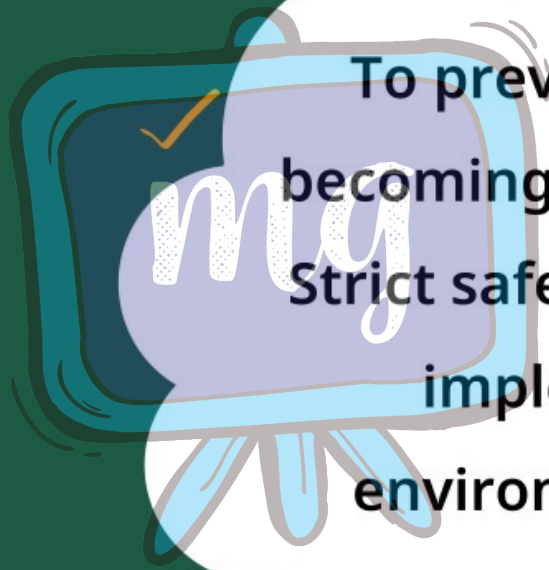
HAZARDS OF MINING

1. Dust and noxious fumes inhaled by miners make them vulnerable to pulmonary diseases.

2. Risk of collapsing mine roofs, inundation and fires in coal mines are constant threats to miners.

3. Water sources in the region get contaminated due to mining.

4. Dumping of waste and slurry leads to land degradation, soil erosion and increased river pollution.



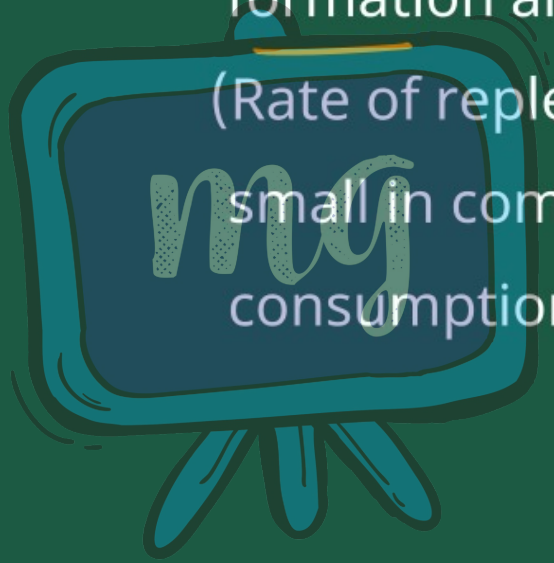
To prevent mining from becoming a “killer industry”, Strict safety regulations and implementation of environmental laws are essential

CONSERVATION OF MINERALS

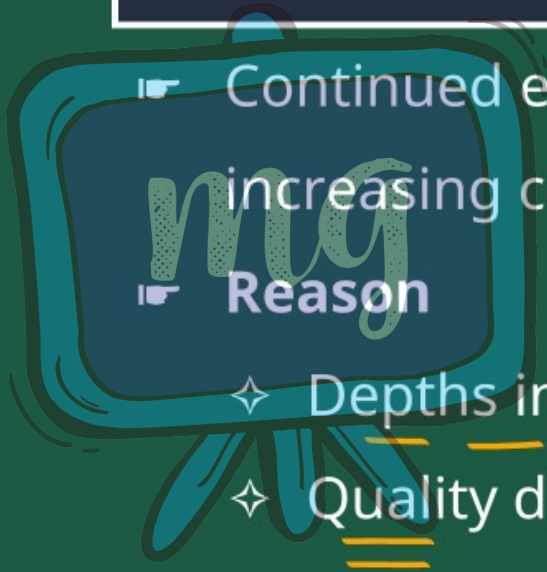
- Mineral resources are finite and non-renewable.
- Total volume of workable mineral deposits is only 1% of the earth's crust.
- They required millions of years to be created and concentrated.

- We are rapidly consuming mineral resources.
- Industry and agriculture strongly depend on: -
  - Mineral deposits
  - Substances manufactured from minerals.

- Geological processes of mineral formation are very slow.
(Rate of replenishment is infinitely small in comparison to the rate of consumption)

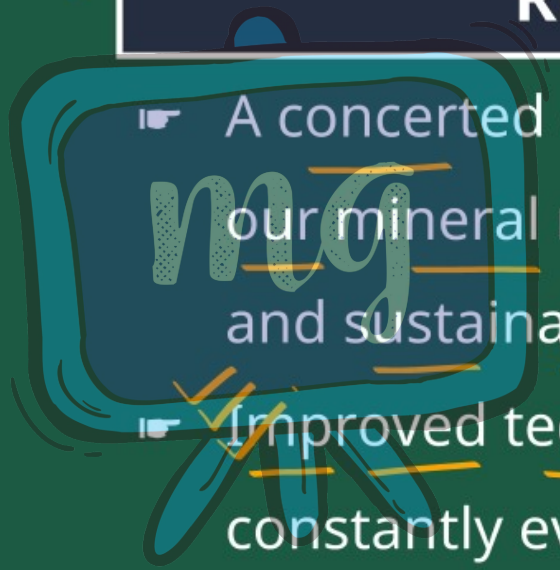


CHALLENGES OF CONTINUED EXTRACTION



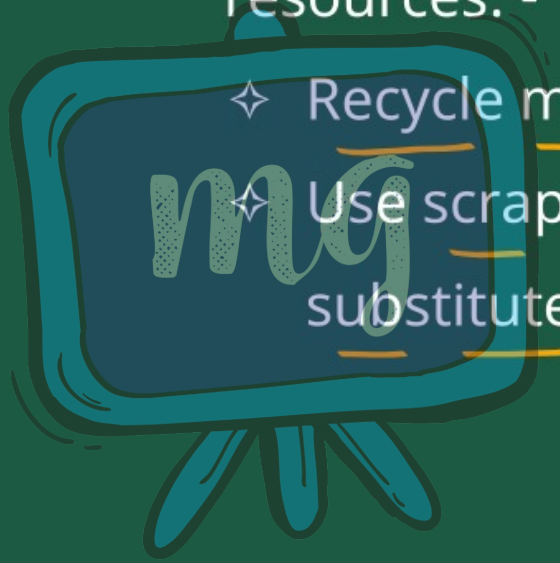
- Continued extraction of ores leads to increasing costs.
- **Reason**
  - Depths increases
  - Quality decreases

SUSTAINABLE USE OF MINERAL RESOURCES



- A concerted effort is needed to use our mineral resources in a planned and sustainable manner.
- Improved technologies need to be constantly evolved to allow the use of low-grade ores at low costs.

- Other steps in conserving mineral resources: -
  - Recycle metals
  - Use scrap metals and other substitutes



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LEARNING OUTCOMES

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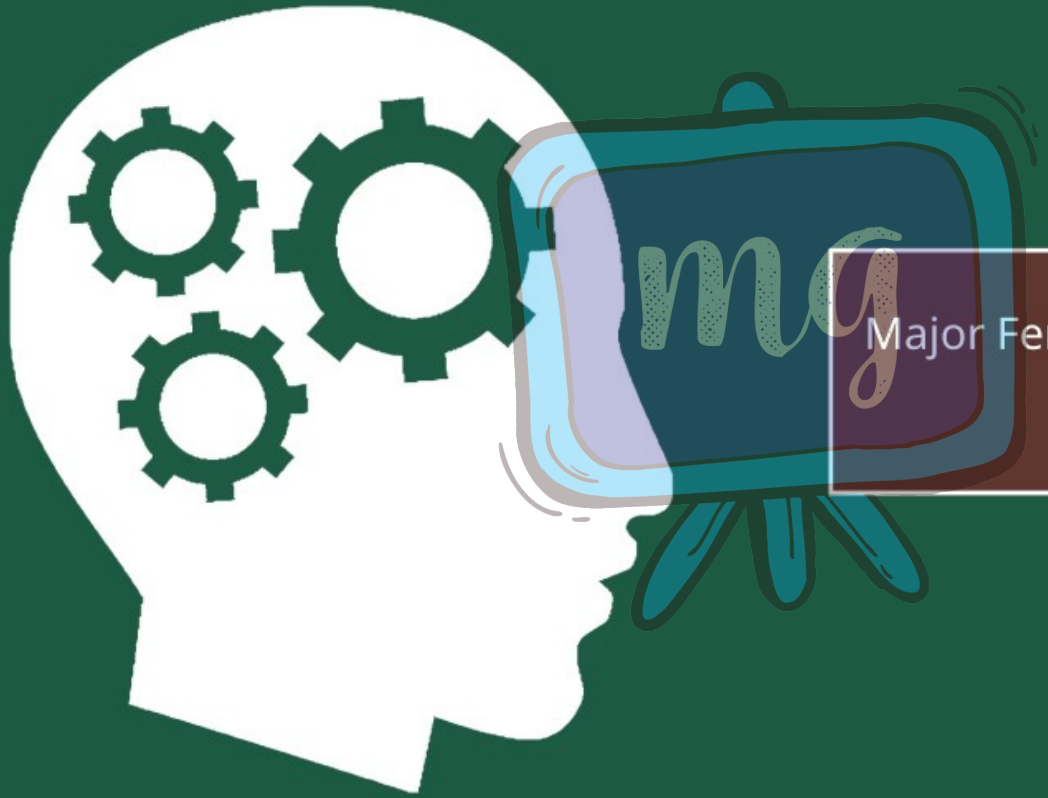

Major Ferrous and Non-Ferrous Minerals in India

ASSESSMENT

1 What is the primary use of Manganese in industry?

A Manufacturing cement

B Manufacturing steel

C Making electrical cables

D Producing alumina

ASSESSMENT

2 What is a significant environmental impact of mining activities?

A Increase in forest cover

B Contamination of water sources

C Decrease in atmospheric pollution

D Improvement of soil fertility

ASSESSMENT

3 Why is the conservation of minerals important according to the text?

A Minerals are abundant and easily replenished

B Mineral resources are finite and non-renewable

C Mineral extraction is inexpensive

D Minerals do not impact the environment