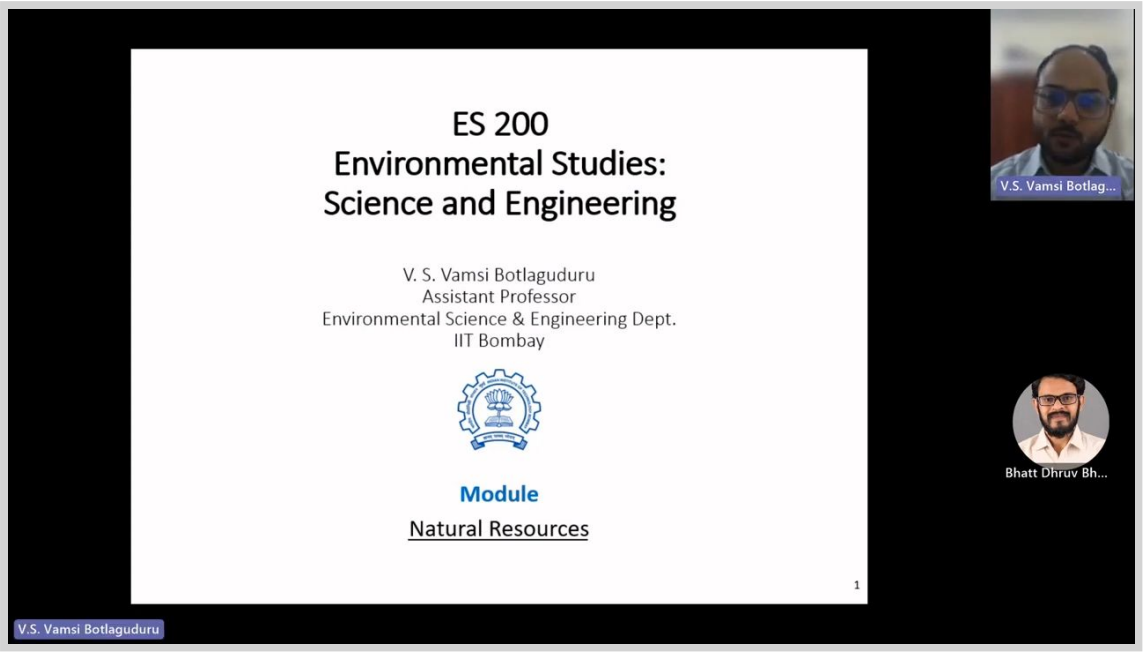
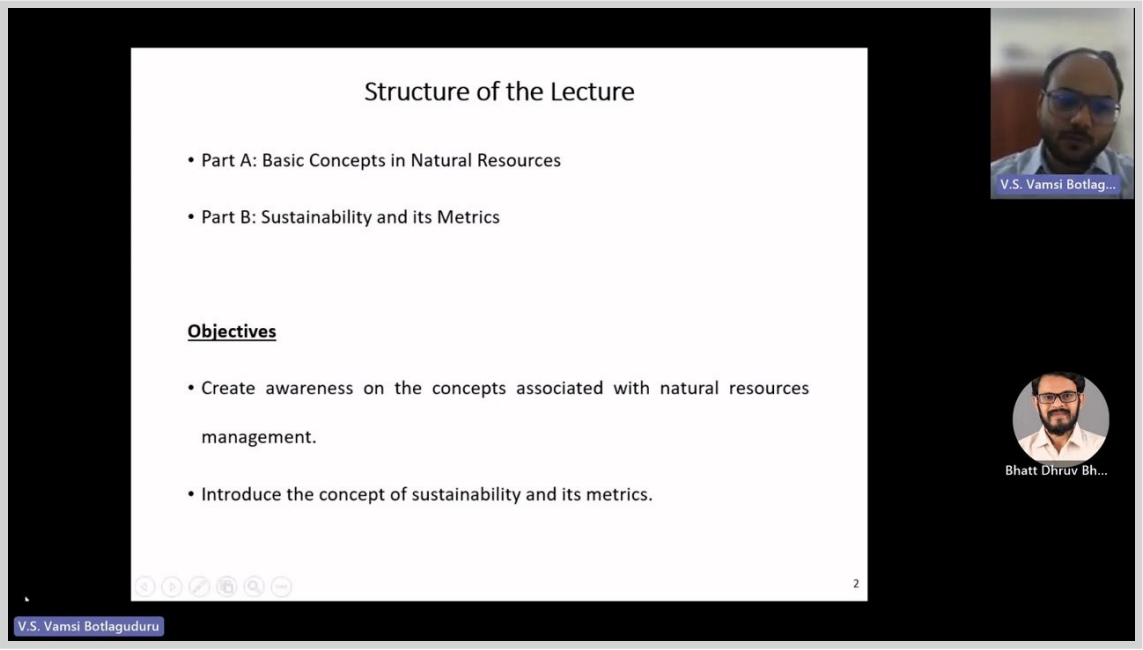
←

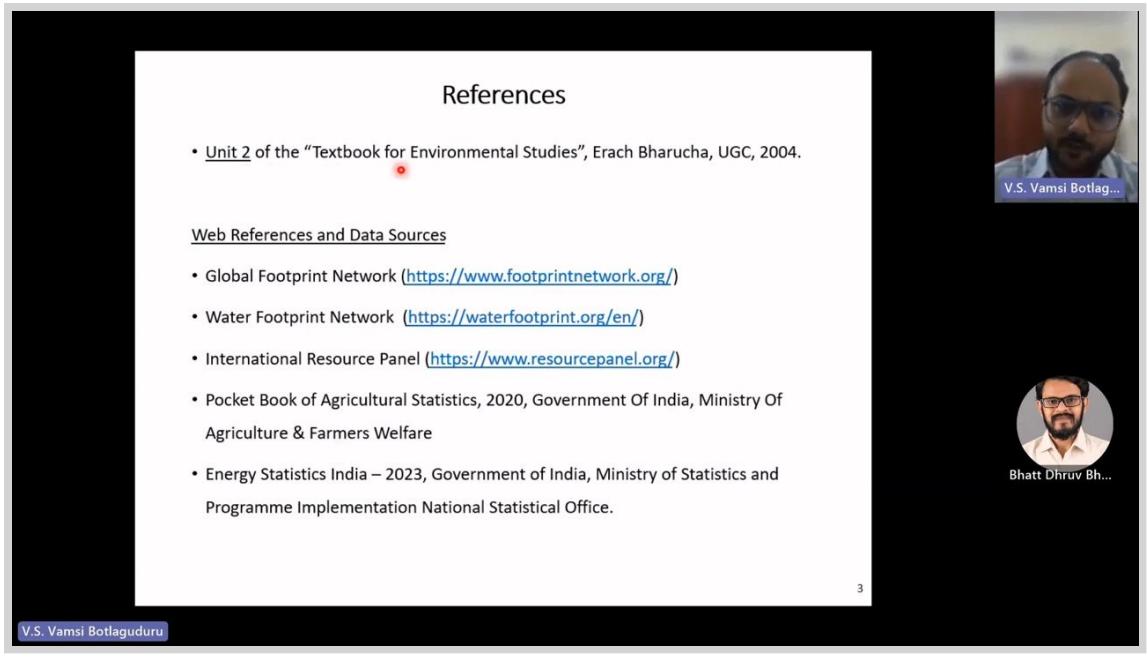
00:12



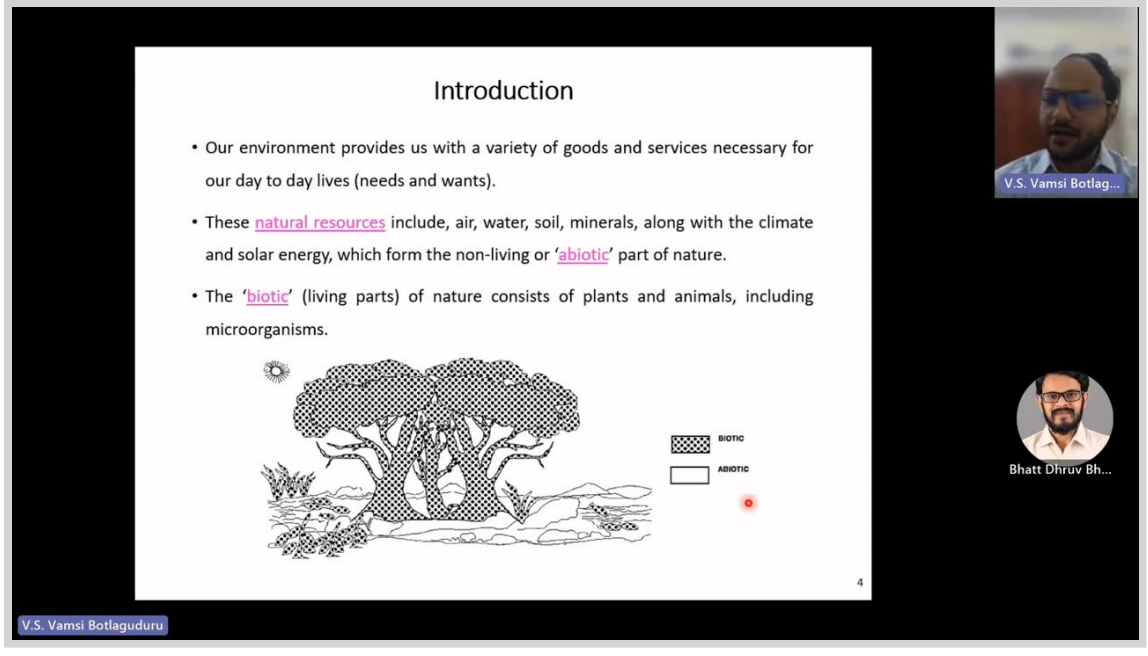
00:24



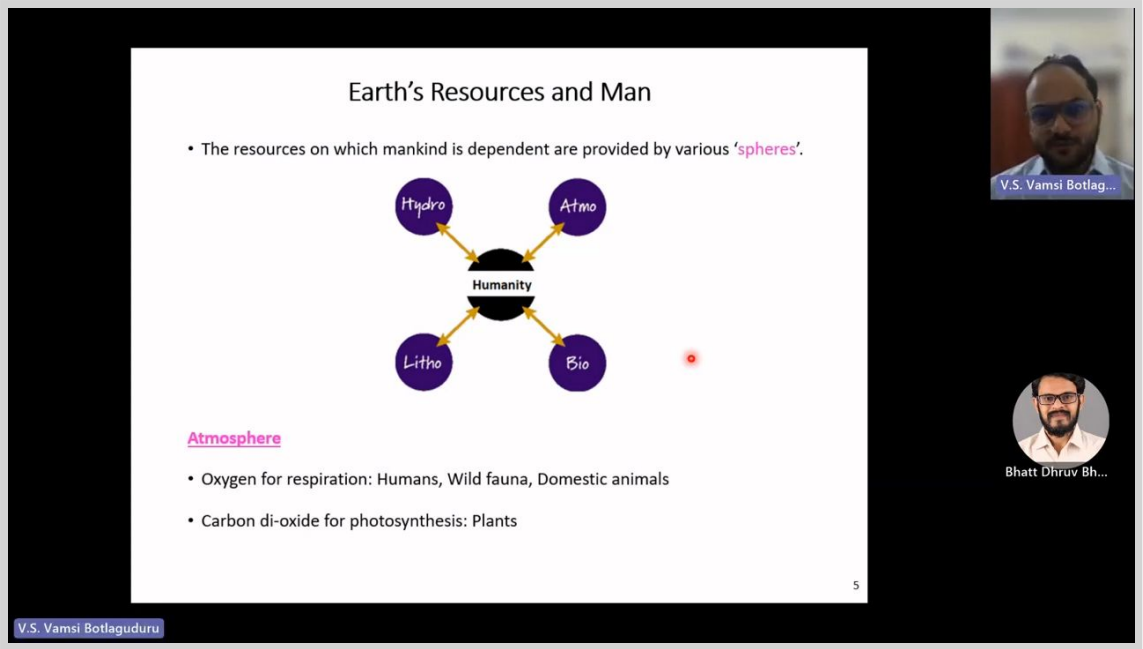
01:28


References
• Unit 2 of the "Textbook for Environmental Studies", Erach Bharucha, UGC, 2004.
Web References and Data Sources
• Global Footprint Network (https://www.footprintnetwork.org/)
• Water Footprint Network (https://waterfootprint.org/en/)
• International Resource Panel (https://www.resourcepanel.org/)
• Pocket Book of Agricultural Statistics, 2020, Government Of India, Ministry Of Agriculture & Farmers Welfare
• Energy Statistics India – 2023, Government of India, Ministry of Statistics and Programme Implementation National Statistical Office.
3
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

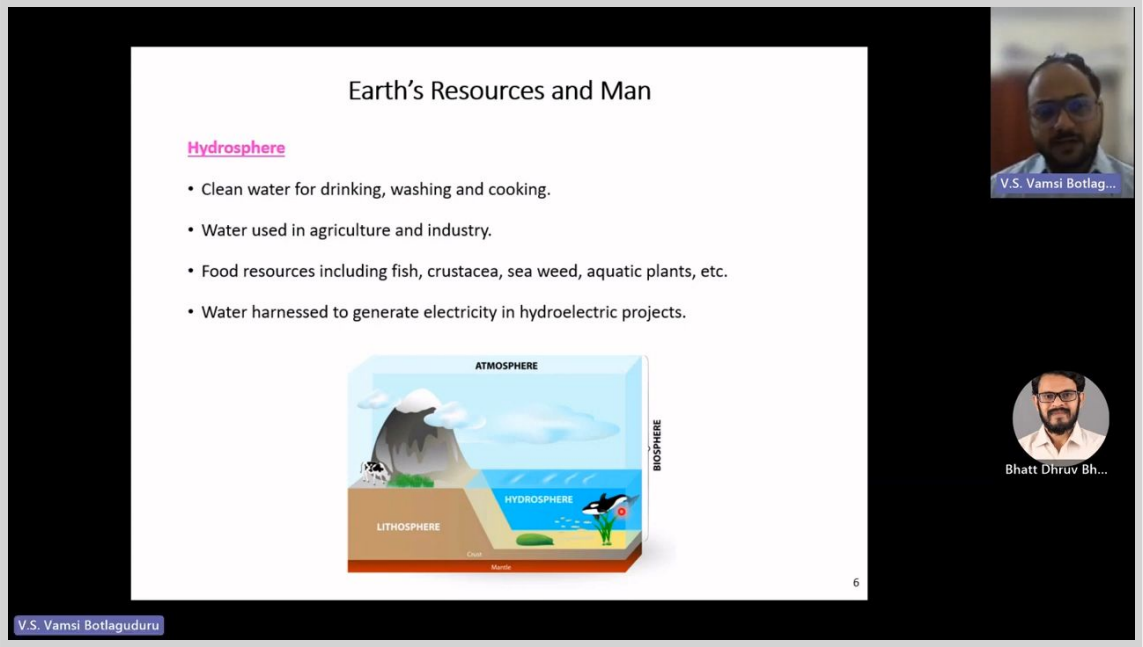
[01:59](#)


Introduction
• Our environment provides us with a variety of goods and services necessary for our day to day lives (needs and wants).
• These natural resources include, air, water, soil, minerals, along with the climate and solar energy, which form the non-living or 'abiotic' part of nature.
• The 'biotic' (living parts) of nature consists of plants and animals, including microorganisms.
BIOTIC
ABIOTIC
4
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

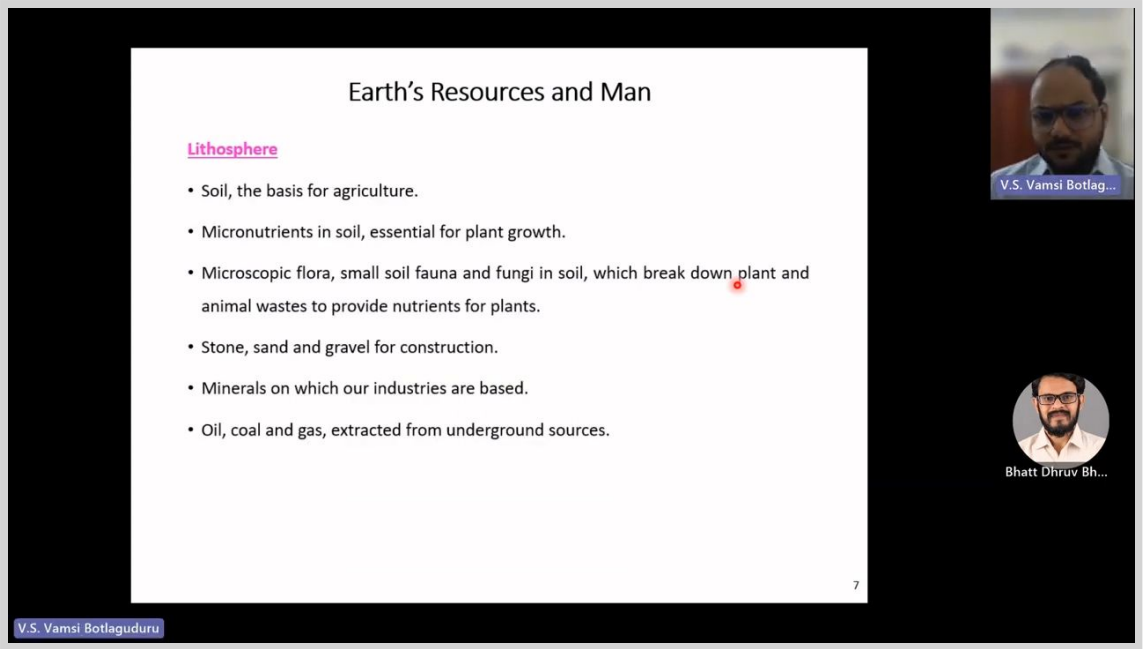
[03:32](#)


Earth's Resources and Man
• The resources on which mankind is dependent are provided by various 'spheres'.
Hydro
Atmo
Humanity
Litho
Bio
Atmosphere
• Oxygen for respiration: Humans, Wild fauna, Domestic animals
• Carbon di-oxide for photosynthesis: Plants
5
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

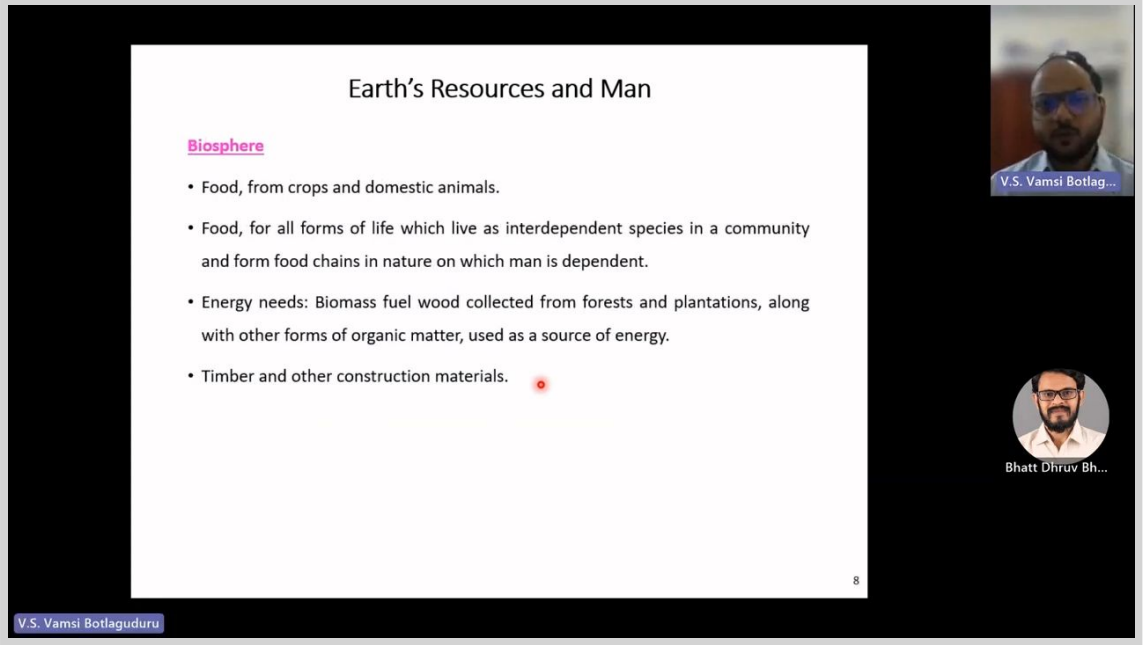
04:14


Earth's Resources and Man
Hydrosphere
• Clean water for drinking, washing and cooking.
• Water used in agriculture and industry.
• Food resources including fish, crustacea, sea weed, aquatic plants, etc.
• Water harnessed to generate electricity in hydroelectric projects.
ATMOSPHERE
BIOSPHERE
HYDROSPHERE
LITHOSPHERE
6
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

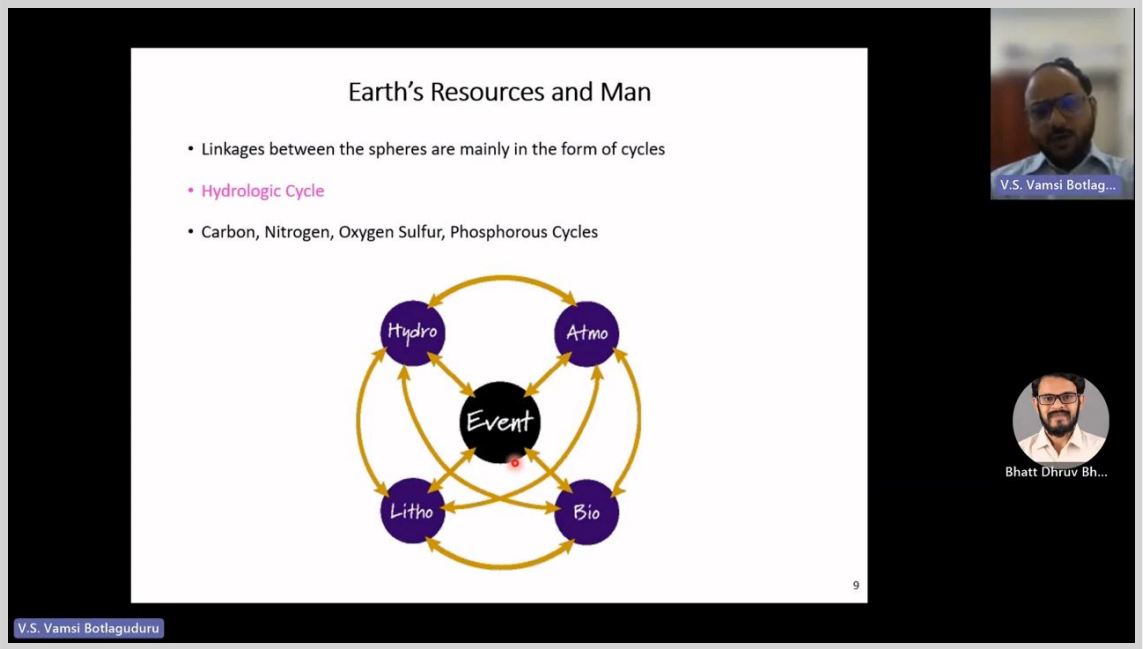
04:50


Earth's Resources and Man
Lithosphere
• Soil, the basis for agriculture.
• Micronutrients in soil, essential for plant growth.
• Microscopic flora, small soil fauna and fungi in soil, which break down plant and animal wastes to provide nutrients for plants.
• Stone, sand and gravel for construction.
• Minerals on which our industries are based.
• Oil, coal and gas, extracted from underground sources.
7
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

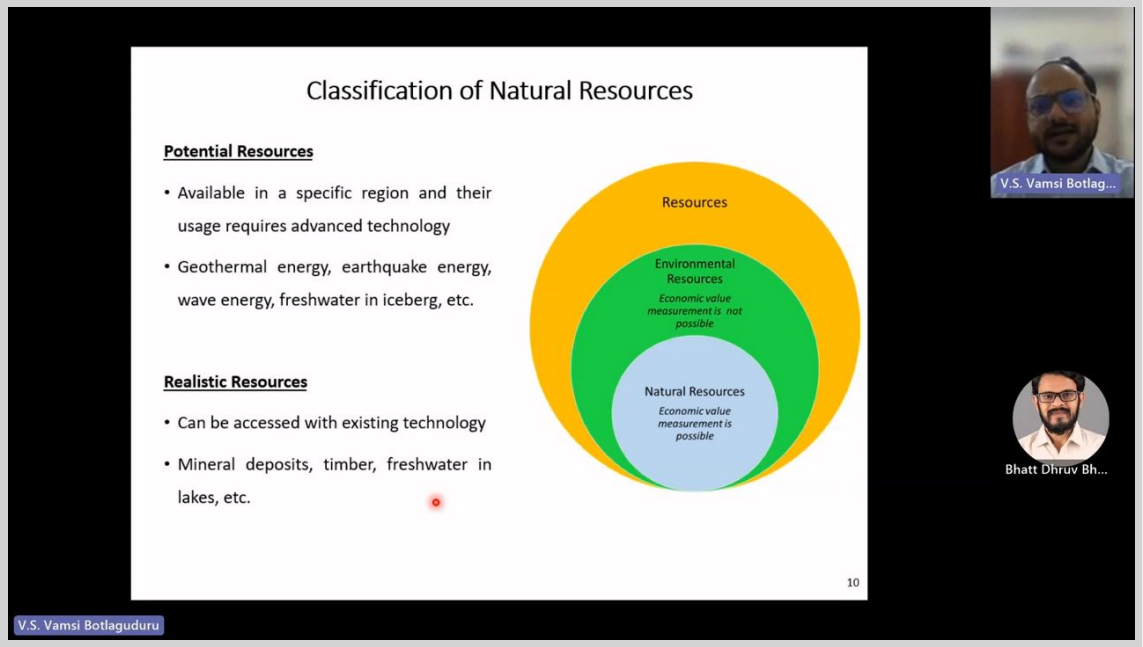
05:54


Earth's Resources and Man
Biosphere
• Food, from crops and domestic animals.
• Food, for all forms of life which live as interdependent species in a community and form food chains in nature on which man is dependent.
• Energy needs: Biomass fuel wood collected from forests and plantations, along with other forms of organic matter, used as a source of energy.
• Timber and other construction materials.
8
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

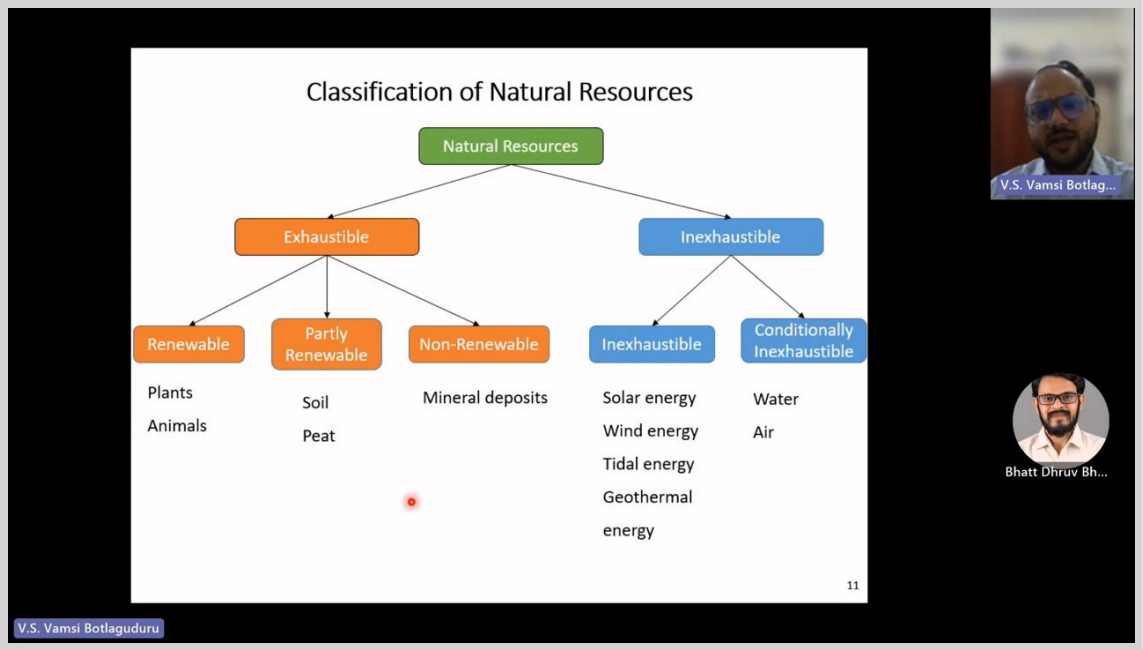
06:40


Earth's Resources and Man
• Linkages between the spheres are mainly in the form of cycles
• Hydrologic Cycle
• Carbon, Nitrogen, Oxygen Sulfur, Phosphorous Cycles
Hydro
Atmo
Event
Litho
Bio
9
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

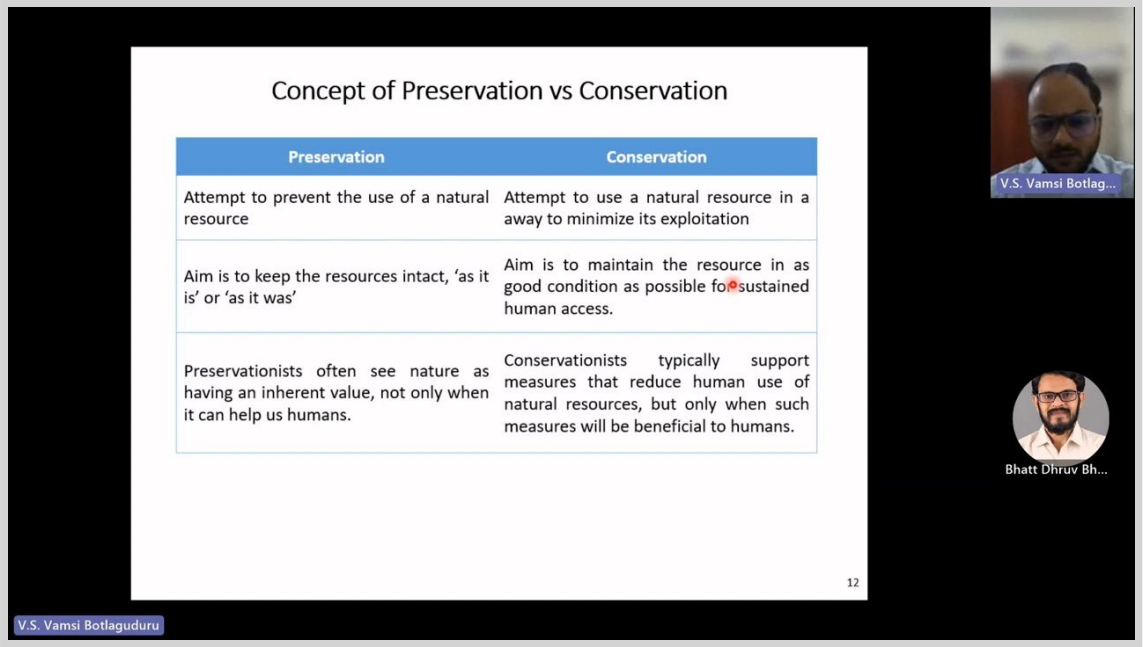
08:16


Classification of Natural Resources
Potential Resources
• Available in a specific region and their usage requires advanced technology
• Geothermal energy, earthquake energy, wave energy, freshwater in iceberg, etc.
Realistic Resources
• Can be accessed with existing technology
• Mineral deposits, timber, freshwater in lakes, etc.
Resources
Environmental Resources
Economic value measurement is not possible
Natural Resources
Economic value measurement is possible
10
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

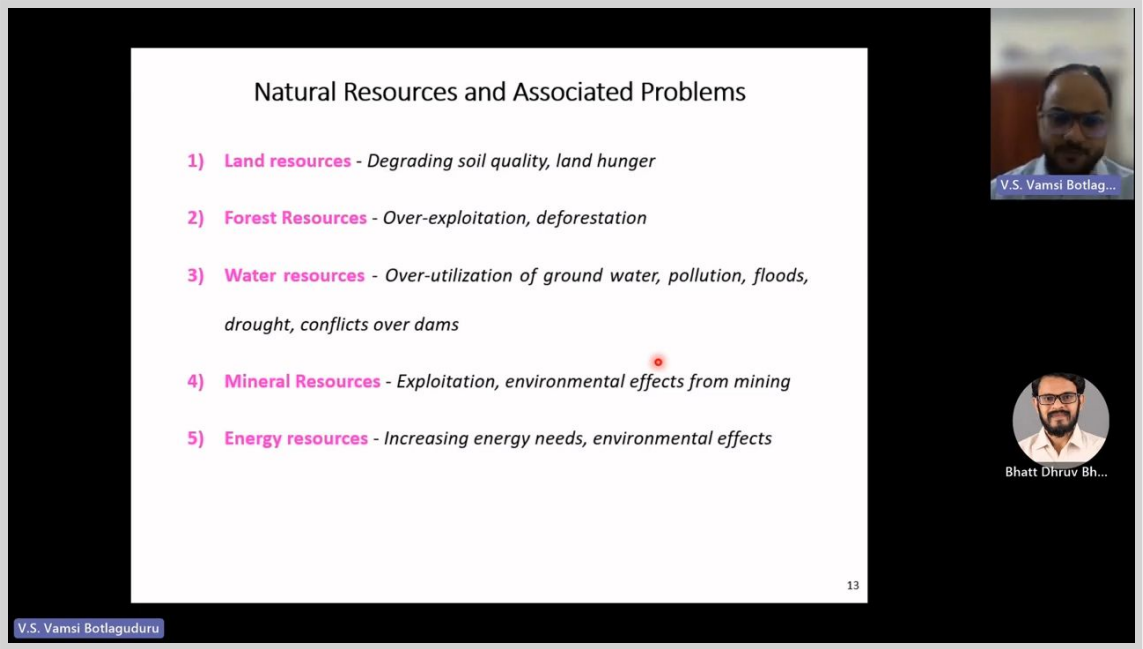
11:33


Classification of Natural Resources
Natural Resources
Exhaustible
Inexhaustible
Renewable
Partly Renewable
Non-Renewable
Inexhaustible
Conditionally Inexhaustible
Plants
Animals
Soil
Peat
Mineral deposits
Solar energy
Wind energy
Tidal energy
Geothermal energy
Water
Air
11
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

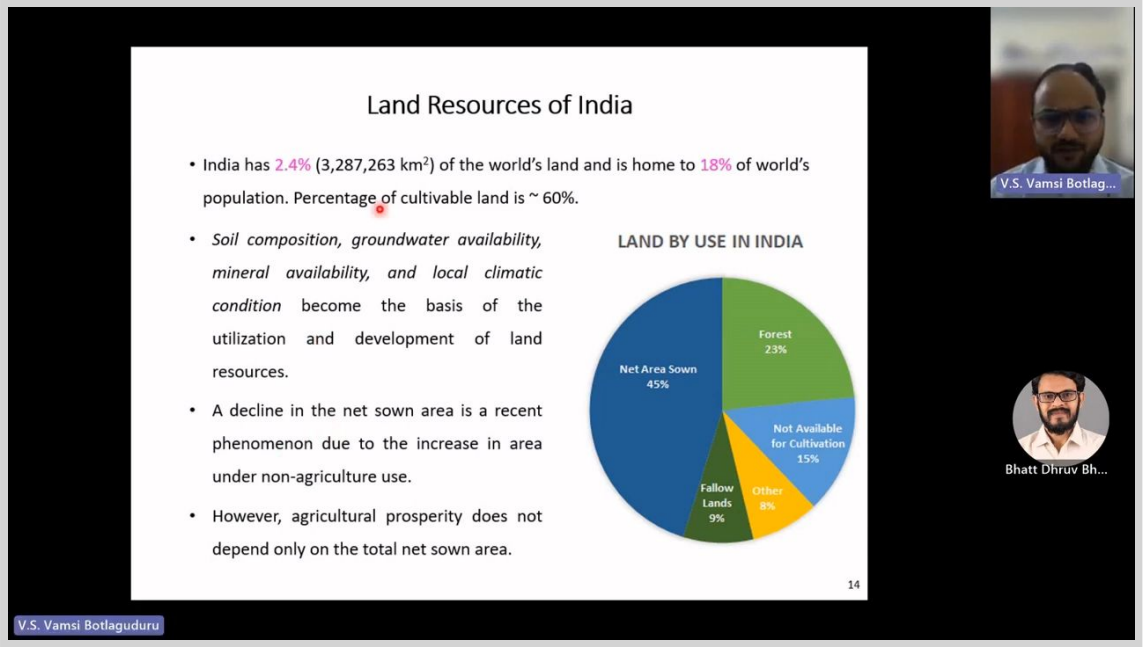
[15:22](#)


Concept of Preservation vs Conservation
Preservation
Conservation
Attempt to prevent the use of a natural resource
Attempt to use a natural resource in a away to minimize its exploitation
Aim is to keep the resources intact, 'as it is' or 'as it was'
Aim is to maintain the resource in as good condition as possible for sustained human access.
Preservationists often see nature as having an inherent value, not only when it can help us humans.
Conservationists typically support measures that reduce human use of natural resources, but only when such measures will be beneficial to humans.
12
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

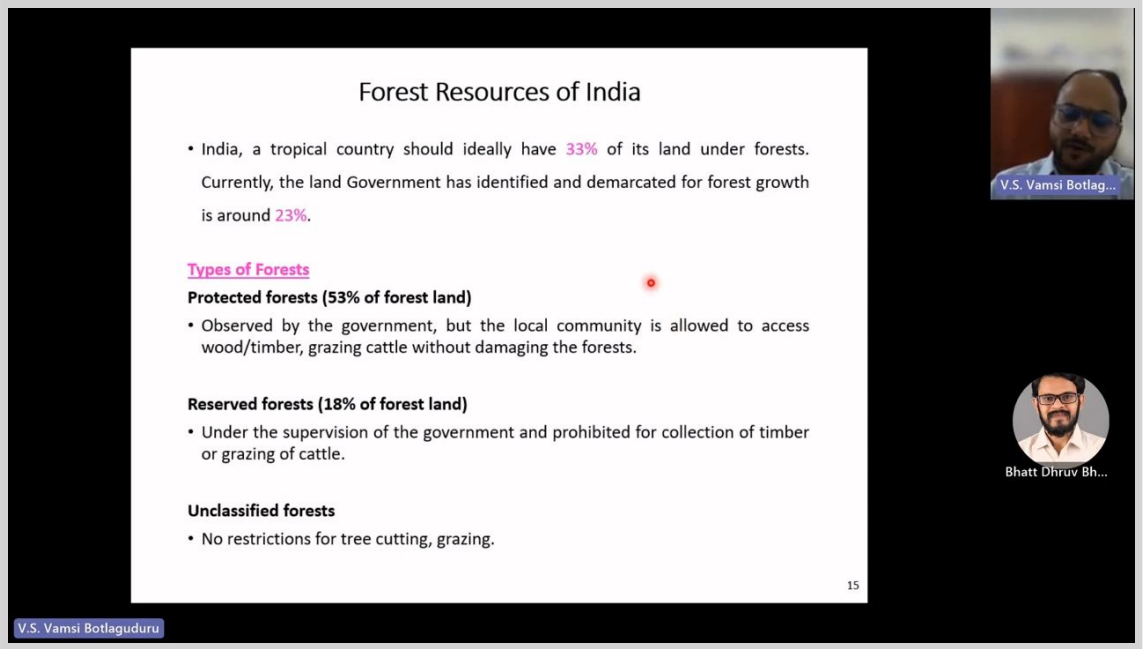
[18:44](#)


Natural Resources and Associated Problems
1) Land resources - Degrading soil quality, land hunger
2) Forest Resources - Over-exploitation, deforestation
3) Water resources - Over-utilization of ground water, pollution, floods, drought, conflicts over dams
4) Mineral Resources - Exploitation, environmental effects from mining
5) Energy resources - Increasing energy needs, environmental effects
13
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

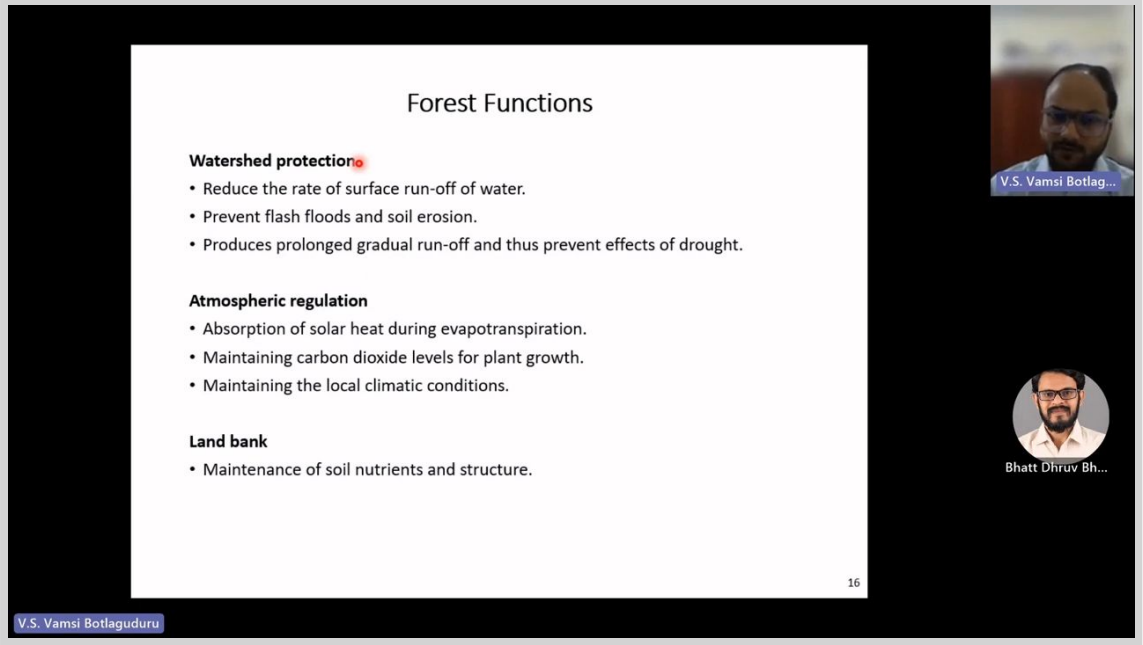
[22:00](#)


Land Resources of India
• India has 2.4% (3,287,263 km²) of the world's land and is home to 18% of world's population. Percentage of cultivable land is ~ 60%.
• Soil composition, groundwater availability, mineral availability, and local climatic condition become the basis of the utilization and development of land resources.
• A decline in the net sown area is a recent phenomenon due to the increase in area under non-agriculture use.
• However, agricultural prosperity does not depend only on the total net sown area.
LAND BY USE IN INDIA
Forest 23%
Net Area Sown 45%
Not Available for Cultivation 15%
Fallow Lands 9%
Other 8%
14
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

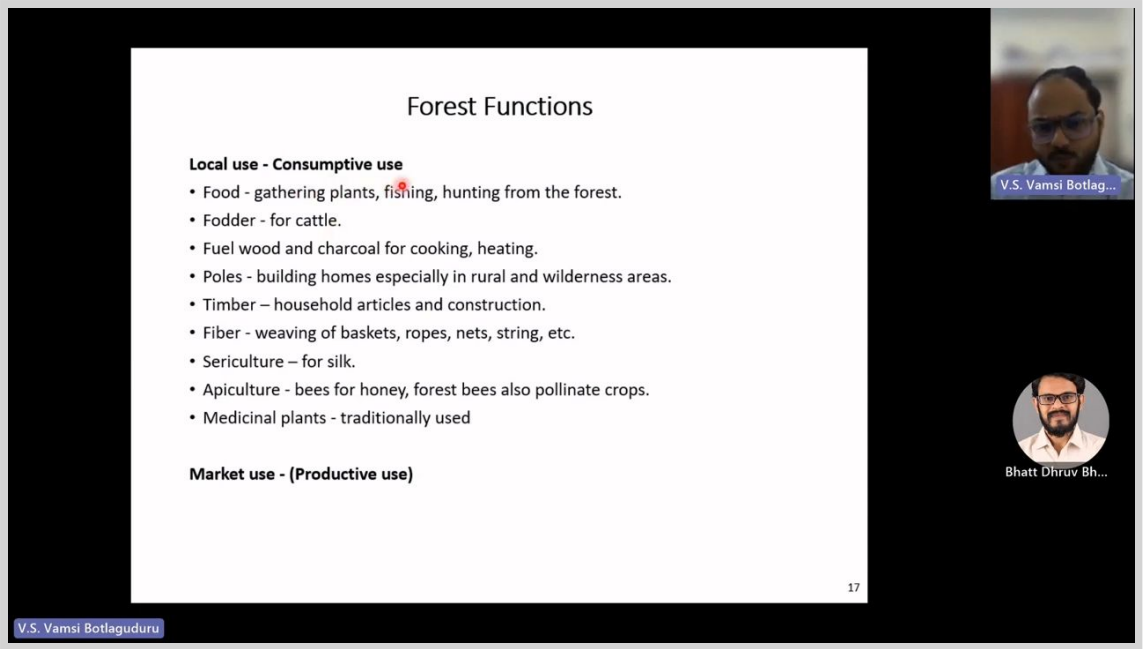
[24:42](#)


Forest Resources of India
• India, a tropical country should ideally have 33% of its land under forests. Currently, the land Government has identified and demarcated for forest growth is around 23%.
Types of Forests
Protected forests (53% of forest land)
• Observed by the government, but the local community is allowed to access wood/timber, grazing cattle without damaging the forests.
Reserved forests (18% of forest land)
• Under the supervision of the government and prohibited for collection of timber or grazing of cattle.
Unclassified forests
• No restrictions for tree cutting, grazing.
15
V.S. Vamsi Botlaguduru
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...

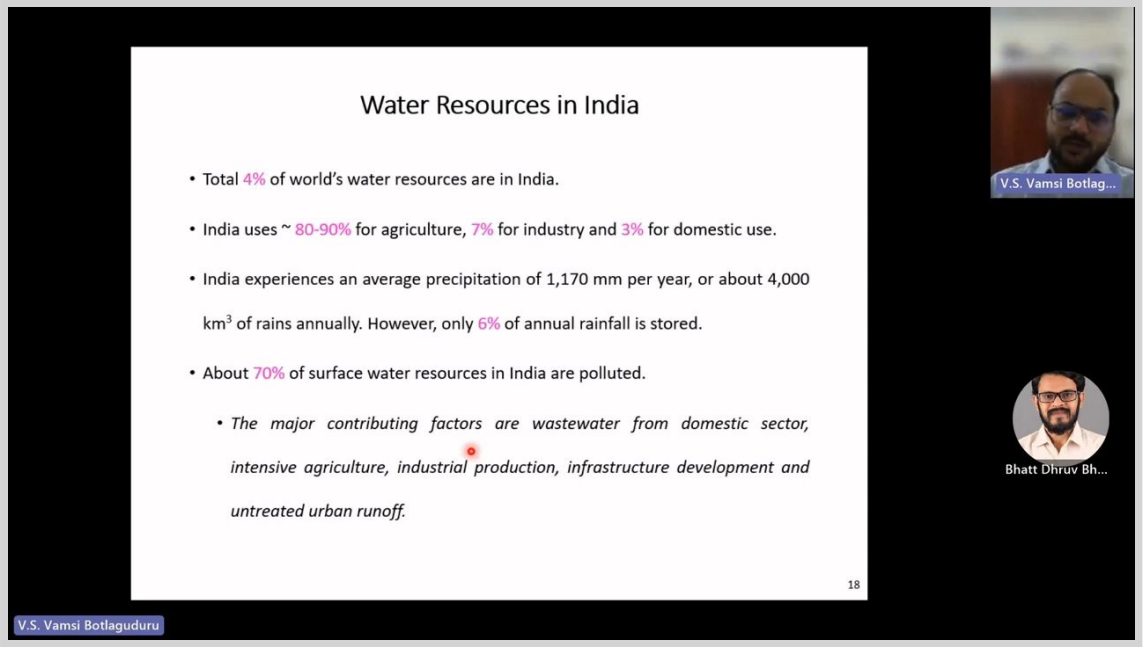
[26:15](#)


Forest Functions
Watershed protection
• Reduce the rate of surface run-off of water.
• Prevent flash floods and soil erosion.
• Produces prolonged gradual run-off and thus prevent effects of drought.
Atmospheric regulation
• Absorption of solar heat during evapotranspiration.
• Maintaining carbon dioxide levels for plant growth.
• Maintaining the local climatic conditions.
Land bank
• Maintenance of soil nutrients and structure.
16
V.S. Vamsi Botlaguduru
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...

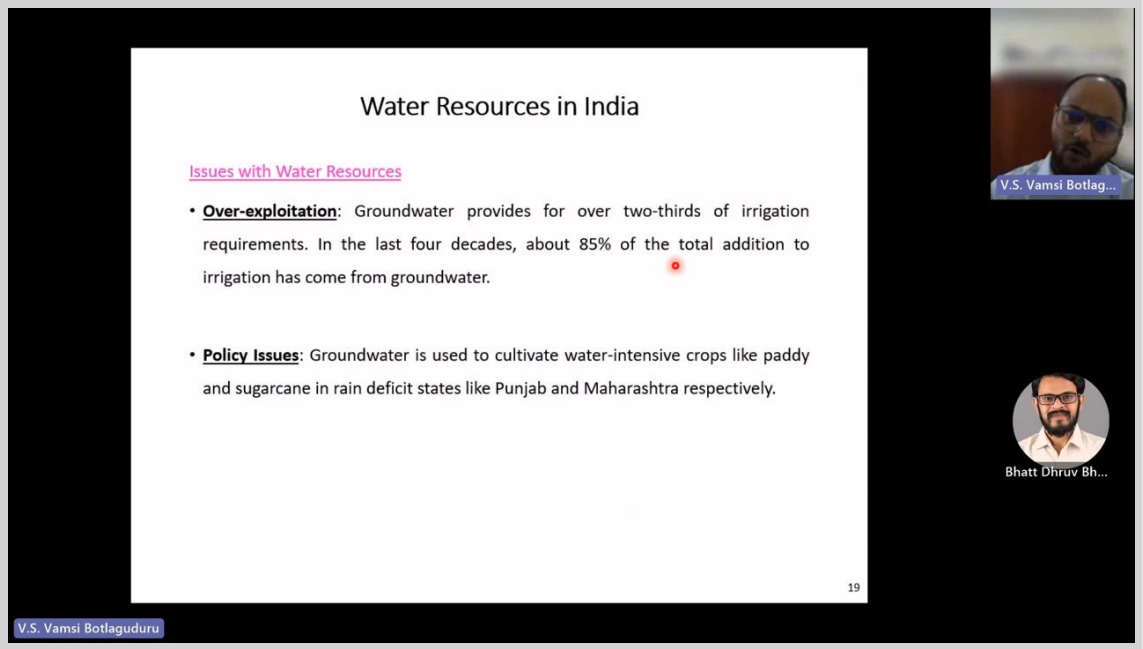
[27:36](#)


Forest Functions
Local use - Consumptive use
• Food - gathering plants, fishing, hunting from the forest.
• Fodder - for cattle.
• Fuel wood and charcoal for cooking, heating.
• Poles - building homes especially in rural and wilderness areas.
• Timber – household articles and construction.
• Fiber - weaving of baskets, ropes, nets, string, etc.
• Sericulture – for silk.
• Apiculture - bees for honey, forest bees also pollinate crops.
• Medicinal plants - traditionally used
Market use - (Productive use)
17
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

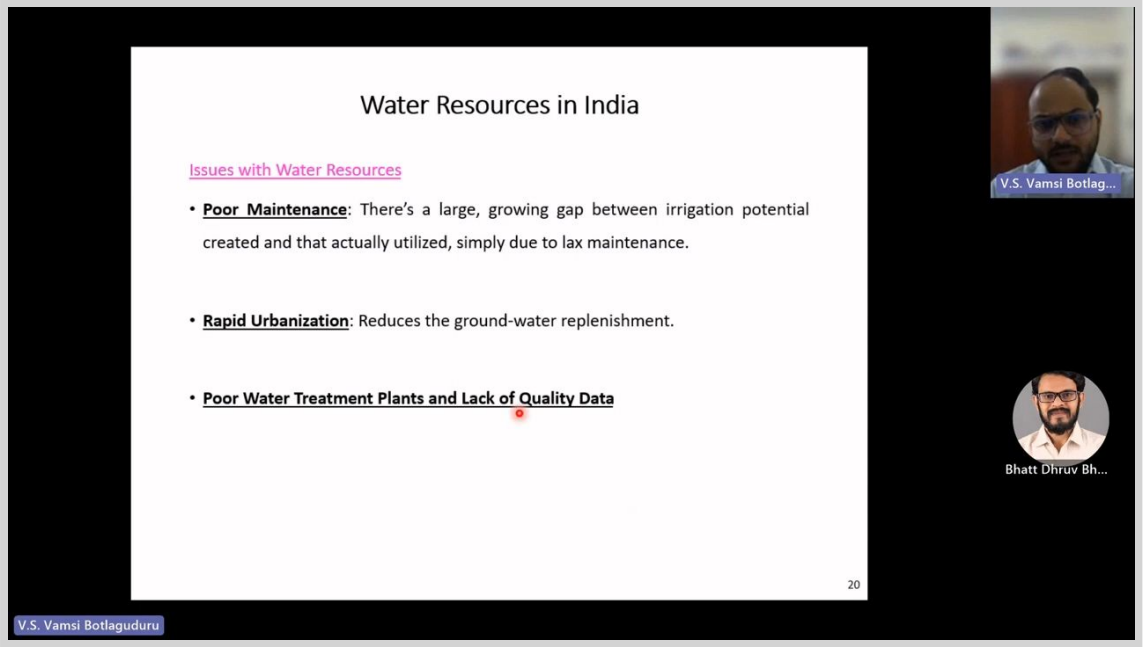
[28:34]


Water Resources in India
• Total 4% of world's water resources are in India.
• India uses ~ 80-90% for agriculture, 7% for industry and 3% for domestic use.
• India experiences an average precipitation of 1,170 mm per year, or about 4,000 km^3 of rains annually. However, only 6% of annual rainfall is stored.
• About 70% of surface water resources in India are polluted.
• The major contributing factors are wastewater from domestic sector, intensive agriculture, industrial production, infrastructure development and untreated urban runoff.
18
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

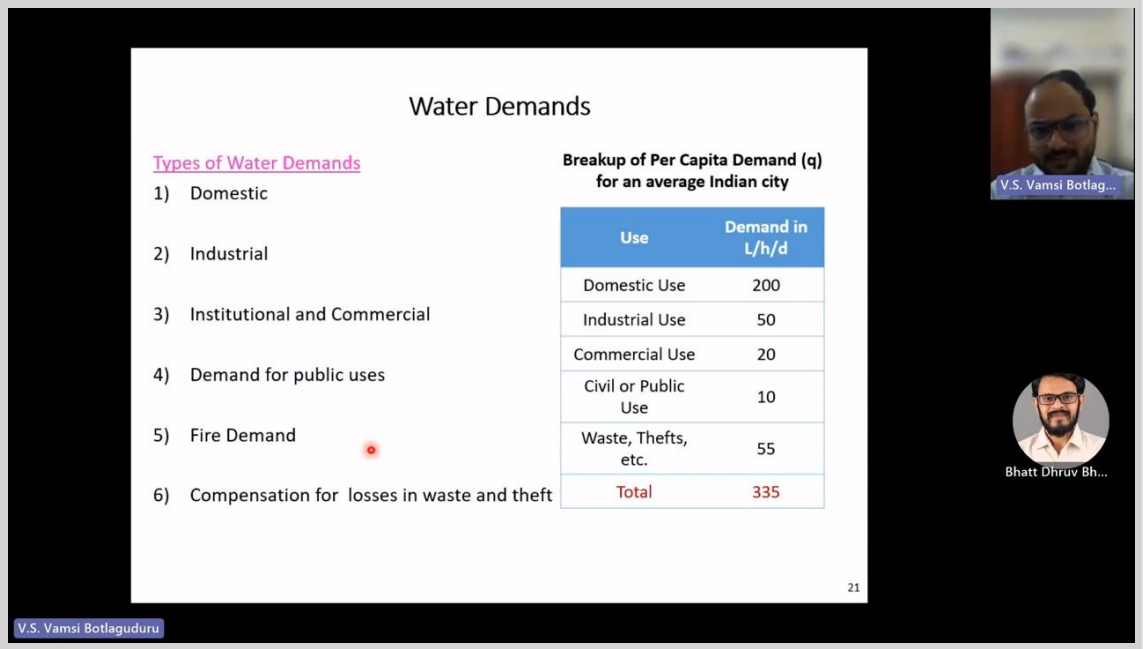
[30:56]


Water Resources in India
Issues with Water Resources
• Over-exploitation: Groundwater provides for over two-thirds of irrigation requirements. In the last four decades, about 85% of the total addition to irrigation has come from groundwater.
• Policy Issues: Groundwater is used to cultivate water-intensive crops like paddy and sugarcane in rain deficit states like Punjab and Maharashtra respectively.
19
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

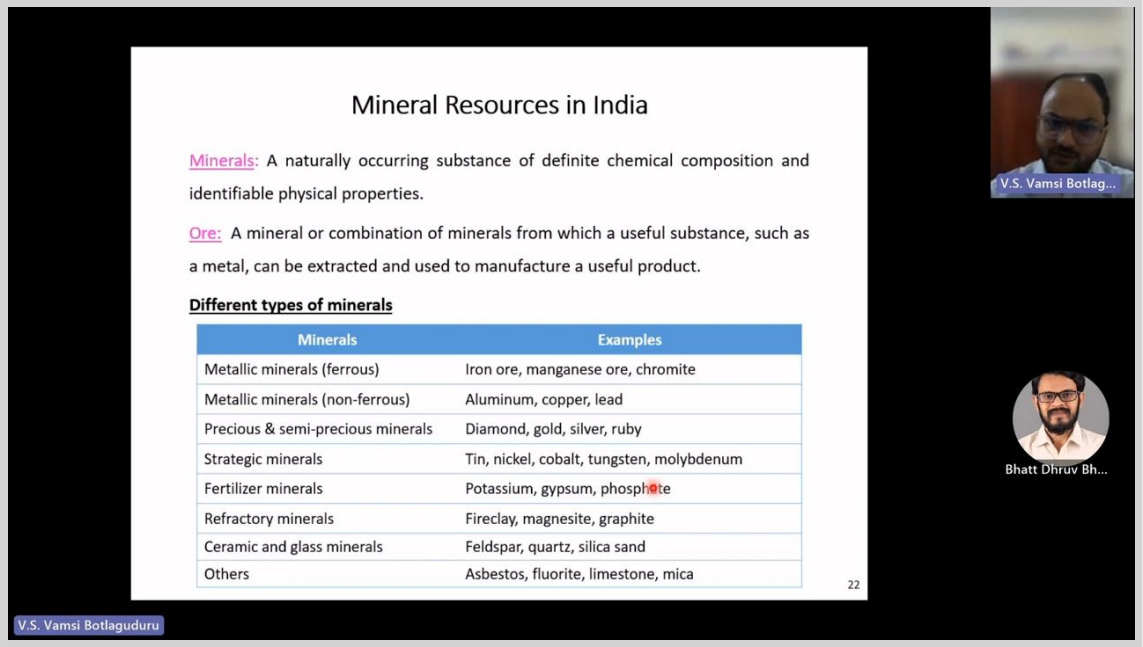
31:33


Water Resources in India
Issues with Water Resources
• Poor Maintenance: There's a large, growing gap between irrigation potential created and that actually utilized, simply due to lax maintenance.
• Rapid Urbanization: Reduces the ground-water replenishment.
• Poor Water Treatment Plants and Lack of Quality Data
20
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

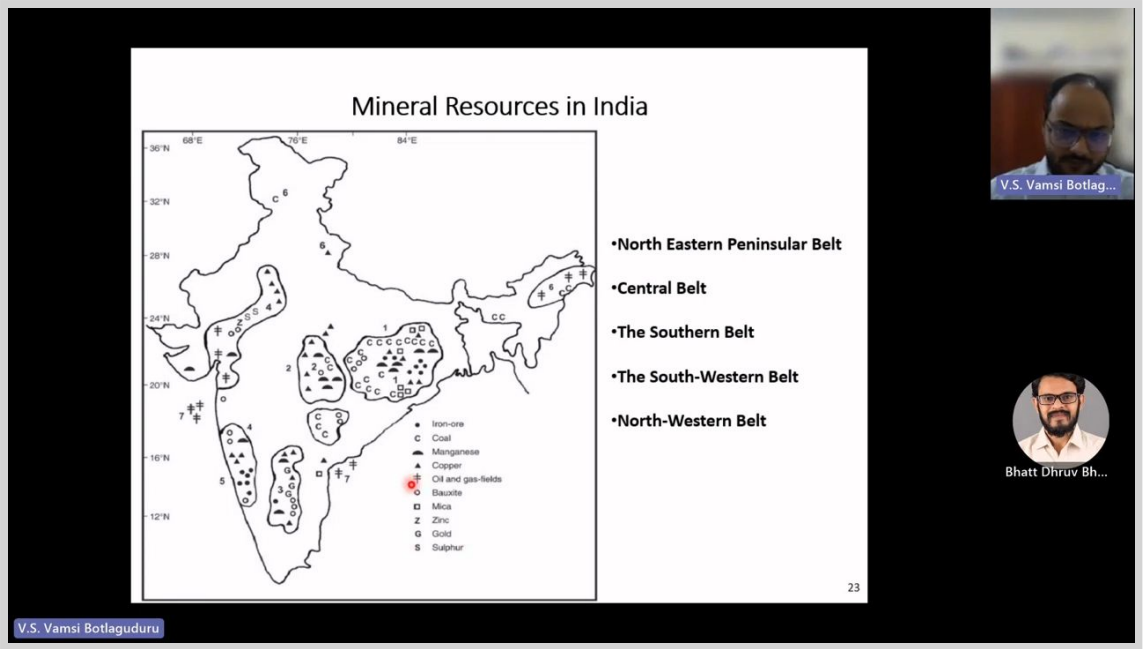
32:40


Water Demands
Types of Water Demands
1) Domestic
2) Industrial
3) Institutional and Commercial
4) Demand for public uses
5) Fire Demand
6) Compensation for losses in waste and theft
Breakup of Per Capita Demand (q) for an average Indian city
Use | Demand in L/h/d
Domestic Use | 200
Industrial Use | 50
Commercial Use | 20
Civil or Public Use | 10
Waste, Thefts, etc. | 55
Total | 335
21
V.S. Vamsi Botlaguduru
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...

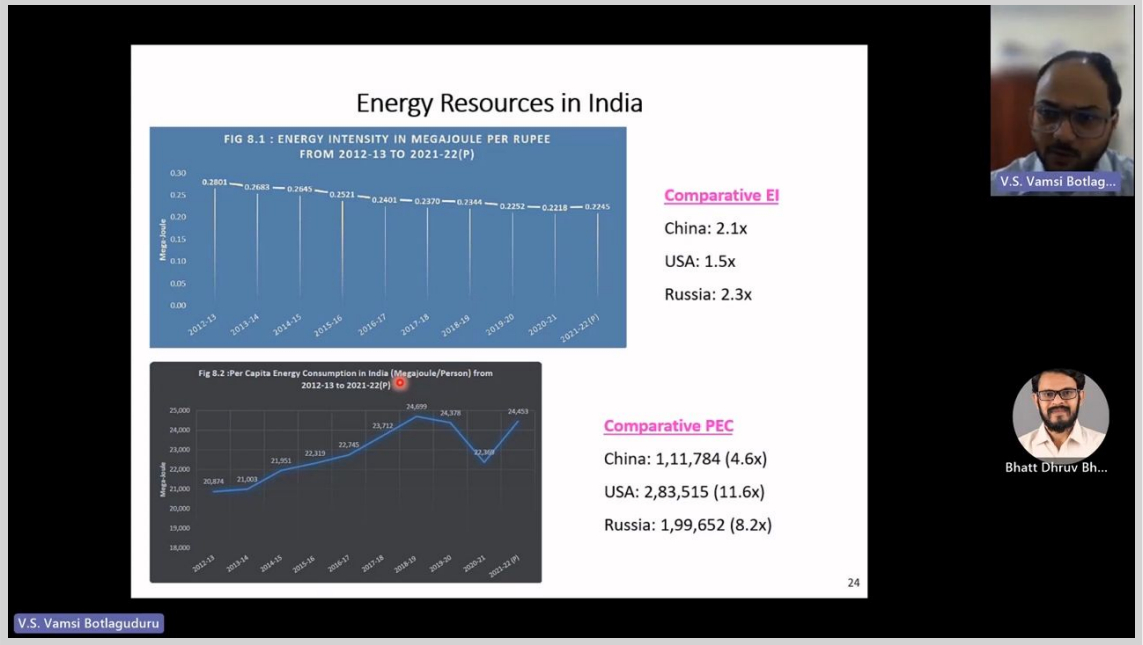
[33:54](#)


Mineral Resources in India
Minerals: A naturally occurring substance of definite chemical composition and identifiable physical properties.
Ore: A mineral or combination of minerals from which a useful substance, such as a metal, can be extracted and used to manufacture a useful product.
Different types of minerals
Minerals | Examples
Metallic minerals (ferrous) | Iron ore, manganese ore, chromite
Metallic minerals (non-ferrous) | Aluminum, copper, lead
Precious & semi-precious minerals | Diamond, gold, silver, ruby
Strategic minerals | Tin, nickel, cobalt, tungsten, molybdenum
Fertilizer minerals | Potassium, gypsum, phosphate
Refractory minerals | Fireclay, magnesite, graphite
Ceramic and glass minerals | Feldspar, quartz, silica sand
Others | Asbestos, fluorite, limestone, mica
22
V.S. Vamsi Botlaguduru
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...

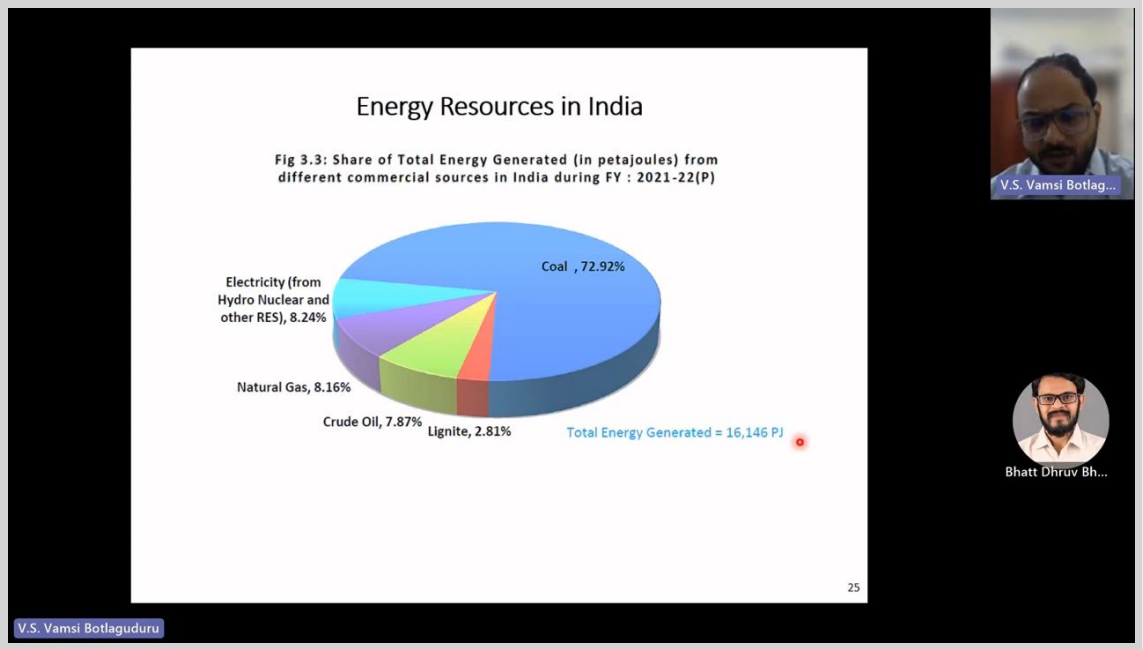
[35:51](#)


Mineral Resources in India
68°E
76°E
84°E
36°N
32°N
28°N
24°N
20°N
16°N
12°N
Iron-ore
Coal
Manganese
Copper
Oil and gas-fields
Bauxite
Mica
Zinc
Gold
Sulphur
•North Eastern Peninsular Belt
•Central Belt
•The Southern Belt
•The South-Western Belt
•North-Western Belt
23
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

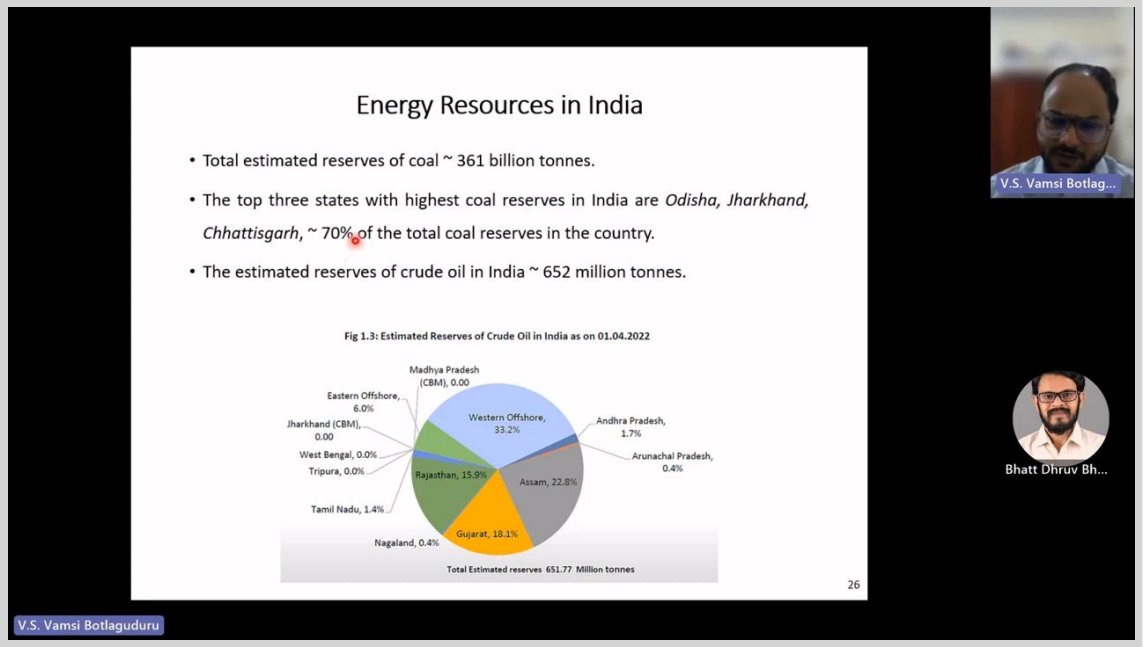
[37:51](#)


Energy Resources in India
FIG 8.1 : ENERGY INTENSITY IN MEGAJOULE PER RUPEE FROM 2012-13 TO 2021-22(P)
Mega-Joule
0.2801
0.2683
0.2645
0.2521
0.2401
0.2370
0.2344
0.2252
0.2218
0.2245
2012-13
2013-14
2014-15
2015-16
2016-17
2017-18
2018-19
2019-20
2020-21
2021-22(P)
Comparative EI
China: 2.1x
USA: 1.5x
Russia: 2.3x
Fig 8.2 :Per Capita Energy Consumption in India (Megajoule/Person) from 2012-13 to 2021-22(P)
Mega-Joule
20,874
21,003
21,951
22,319
22,745
23,712
24,899
24,378
22,369
24,453
Comparative PEC
China: 1,11,784 (4.6x)
USA: 2,83,515 (11.6x)
Russia: 1,99,652 (8.2x)
24
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

[41:42](#)


Energy Resources in India
Fig 3.3: Share of Total Energy Generated (in petajoules) from different commercial sources in India during FY : 2021-22(P)
Coal , 72.92%
Electricity (from Hydro Nuclear and other RES), 8.24%
Natural Gas, 8.16%
Crude Oil, 7.87%
Lignite, 2.81%
Total Energy Generated = 16,146 PJ
25
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

42:40


Energy Resources in India
• Total estimated reserves of coal ~ 361 billion tonnes.
• The top three states with highest coal reserves in India are *Odisha, Jharkhand, Chhattisgarh*, ~ 70% of the total coal reserves in the country.
• The estimated reserves of crude oil in India ~ 652 million tonnes.
Fig 1.3: Estimated Reserves of Crude Oil in India as on 01.04.2022
Madhya Pradesh (CBM), 0.00
Eastern Offshore, 6.0%
Jharkhand (CBM), 0.00
West Bengal, 0.0%
Tripura, 0.0%
Tamil Nadu, 1.4%
Nagaland, 0.4%
Western Offshore, 33.2%
Andhra Pradesh, 1.7%
Arunachal Pradesh, 0.4%
Rajasthan, 15.9%
Assam, 22.8%
Gujarat, 18.1%
Total Estimated reserves 651.77 Million tonnes
26
V.S. Vamsi Botlag...
Bhatt Dhruv Bh...
V.S. Vamsi Botlaguduru

43:37