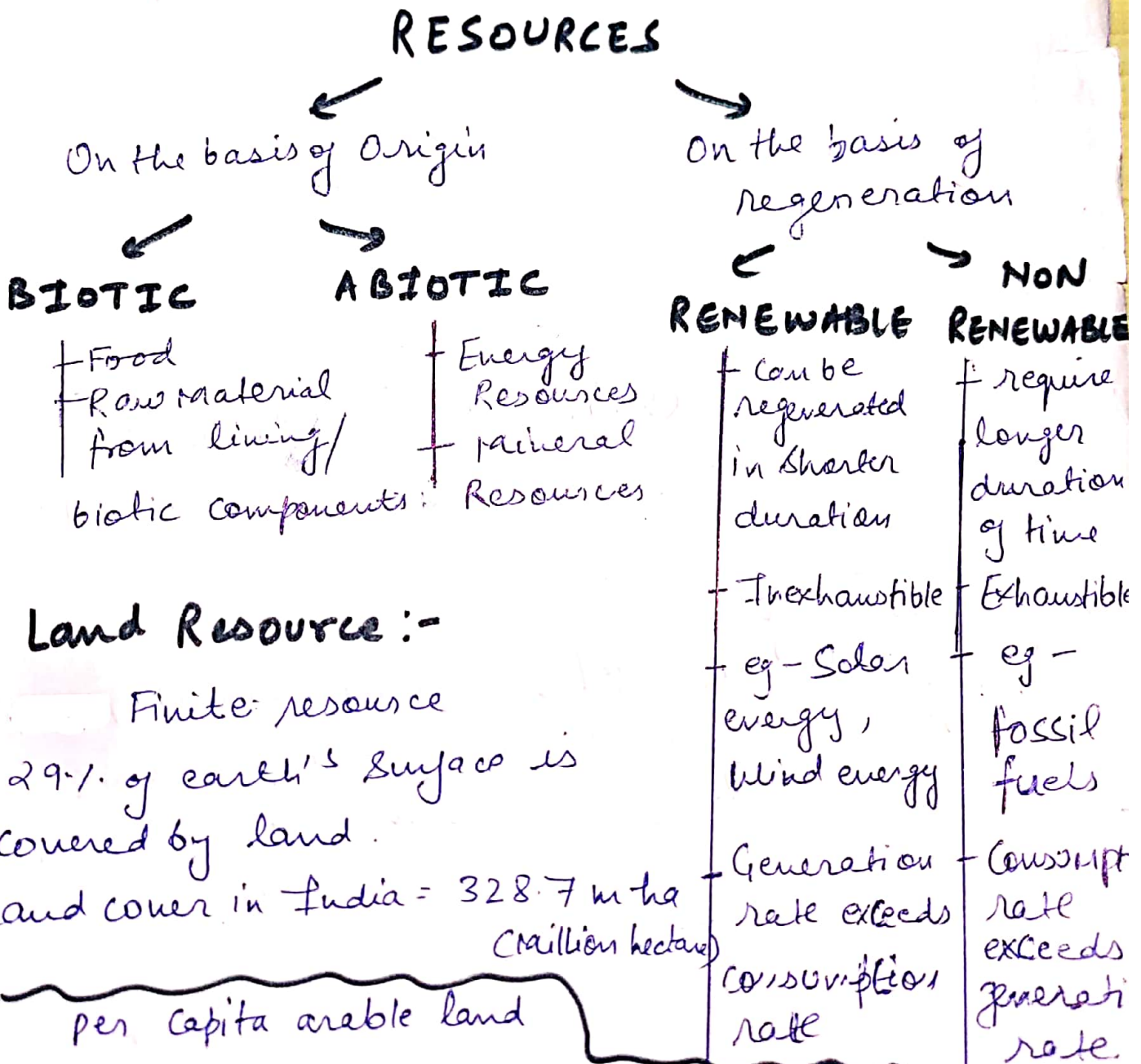


UNIT-III

NATURAL RESOURCES

* Natural Resources :-

Everything available in our environment or means of satisfying human and social needs provided they are technologically accessible, economically feasible and culturally acceptable.



1) Land Resource :-

- Finite resource
- 29% of earth's surface is covered by land.
- Land cover in India = 328.7 m ha (million hectares)

per capita arable land

0.45 ha/person (1950) → 0.2 ha/person (2000) → 0.15 ha/person (2025)

ha = hectare

Land Use pattern in India

① Net Sown Area ————— 46.05%
(Total absolute value of area cropped)

② Forest Area — 21.54% (23%)

③ Not available for Cultivation — 14%

Land put to non agricultural use

Barren
Unculturable
wasteland

④ Permanent Pastures — 3.5%

⑤ Fallow lands — 8%

Current Fallow (upto 1 year)

Fallow other than current fallow (1-5 years)

⑥ Tree & grasses — 1%

Land Degradation:-

* 130 mHa of degraded land in India

├ 28% → forest degraded area

├ 56% → water eroded

└ Rest of saline and alkaline deposit.

Causes :- human activities such as deforestation, overgrazing and mining.

→ Mining sites abandoned after excavation cause degradation in states like MP, Jharkhand & Chhattisgarh. Also these states also witnessing a trend of ↑ deforestation.

→ In states like Gujarat, Rajasthan, MP & Maharashtra overgrazing is the main cause of land degradation.

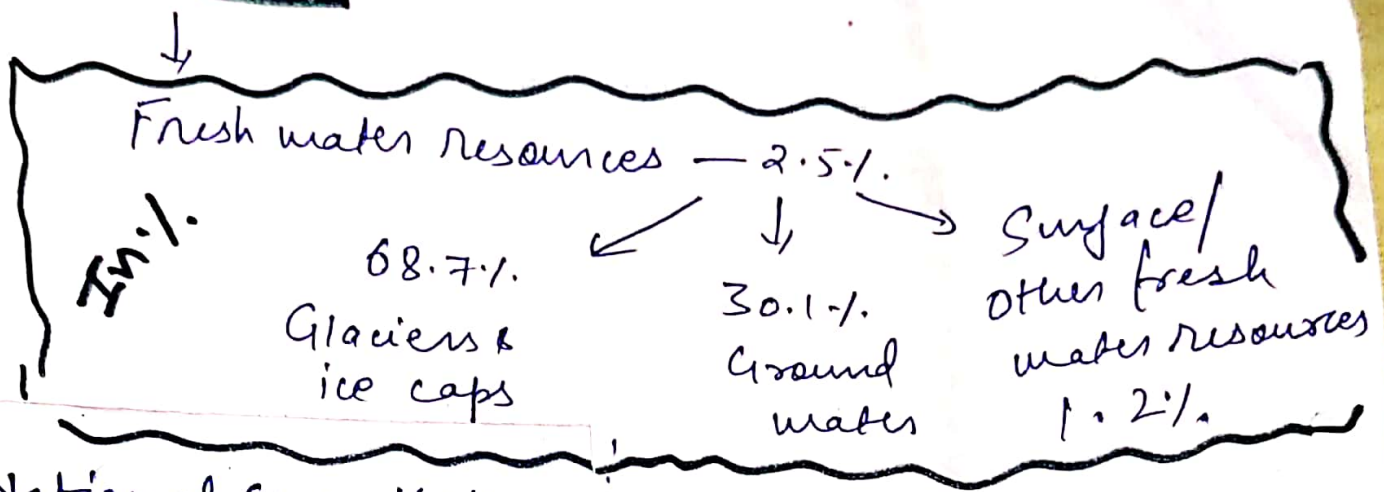
→ In states of Punjab, Haryana & Western UP overirrigation is responsible for land degradation as

Over irrigation → Water logging → ↑ in Salinity & Alkalinity

→ Also, industrial effluents as waste have become a major source of land pollution.

→ The mineral processing like grinding of limestone for cement industry generates huge quantity of dust in atmosphere. Once settling over the land it prevents the infiltration process of water.

Water Resources



* National Commission for Integrated Water Resource Development → NCIWRDP

↳ 1952.87 BCM
(Total Water Resource in India)

(SURFACE RUNOFF)

BCM — Billion Cubic Meters

1869 BCM → 690 BCM **(USABLE SURFACE WATER)**

* Groundwater available = 361 km³

↓
325 km³ (usable)

CGWB

Share

2.6% fresh water

- 0.592 (Groundwater)
- 1.984% (ice caps & glaciers)
- 0.014% (Surface & other)

* Criteria for water stress & scarcity countries

water scarcity - lack of fresh water resources

Imp. water availability is less than

- 1,700 cubic metre per person → water stress
- 1,000 cubic meters/person → water scarcity

→ CGWBR Report (2017) [Central Groundwater Board Report]

↓
Groundwater

usage in India

→ 90% → irrigation

10% → domestic & industrial

67% - groundwater replenished by rainwater

National Commission for Integrated Water Resource Development Plans
(NCIWRDP)

→ Water Resource availability India.

2309 m³/person - 1991

1902 m³/person - 2001

1588 m³/person - 2010

1401 m³ - 2025

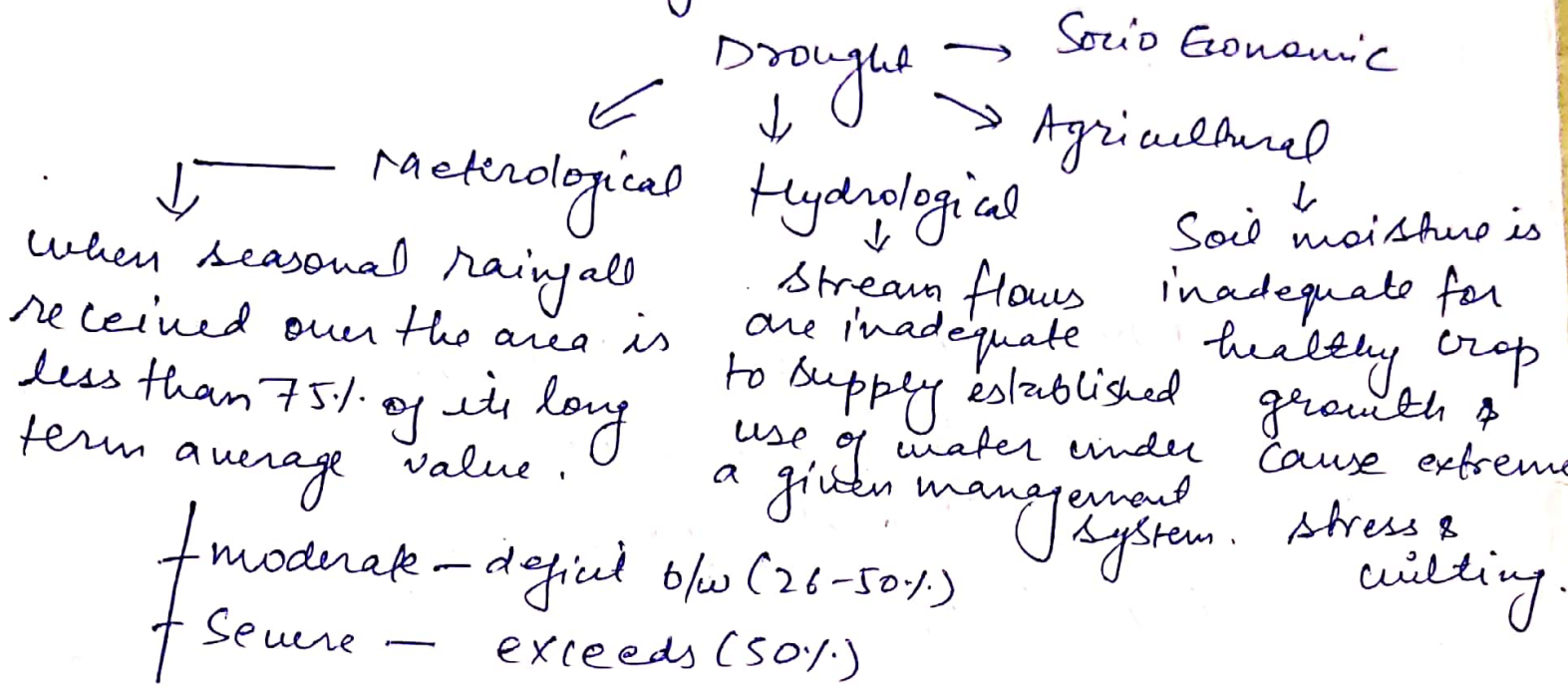
1191 m³ - 2050

Water Resource
Info. System,
India.

Imp. Source

Drought (definition by IMD)

→ Drought is the consequence of natural reduction in the amount of ppt. over an extended period of time, usually a season or more in length, often associated with other climatic factors (high temp., high winds & low relative humidity)



Drought year in India — area affected by moderate & severe drought, either individually or together is (20-40%) of the total area of the country & seasonal rainfall deficiency during South west monsoon season for the country as a whole is at least 10% or more.

Simple definition:-

When the spatial coverage of drought is more than 40% it is called All India Severe Drought year.

Environmental impacts of Drought

- ① Moisture stress
- ② Drinking water Shortage
- ③ Damage to Natural vegetation & Various Ecosystems
- ④ Increased Air & Water Pollution.

* Social impacts :-

- ① Malnutrition
- ② Poor Hygiene
- ③ Ill health

Drought Management in India Report, Nov 2017

(Ministry of Agriculture)

About 68% of cropped area in India is vulnerable to drought, of which 33% receives less than 750 mm of mean annual rainfall & is classified as 'Chronically Drought Prone'

- 35% → receive mean annual rainfall of 750-1125 mm is classified as 'drought prone'
- Drought prone regions Saurashtra, Kutch & Rajasthan

Energy Resources :-

→ resources that provide energy ← Electricity
Transportation

Energy Resources

Conventional

- Resources which are in use for longer period of time
- Also called as Traditional Energy Resources.
- Example → Fossil fuels (Coal, Oil, Natural Gas)

Non Conventional

- Energy resources which are recently developed / discovered
- Also called as Modern or Alternate Energy Resources
- Example - Solar, Nuclear, wind energy

→ Generally Non Renewable in nature.

→ Generally Renewable in nature.

→ Polluting sources of energy

→ Eco-friendly source of energy

Energy Sector in India :-

| | | | | | |
|------------------|---|-------|----------------------------|---|-------|
| 1) Total Thermal | — | 63% | 2.) Hydro | — | 13.0% |
| (a) Coal | — | 54.7% | electricity | | |
| (b) Gas | — | 7.2% | 3.) Nuclear | — | 1.9% |
| (c) Oil | — | 0.2% | 4.) RES | — | 21.2 |
| (d) Lignite | — | 1.8% | (Renewable Energy Sources) | | |

Imp facts :-

- * 40% of total installed power capacity from non-fossil fuels by 2030.
- * Wind Energy capacity, 80 GW - 2022

New Targets

100 → Solar
66.65 GW - Wind
5.98 GW - Small hydro
10.5 GW - Biomass segments
31 MW - offshore wind & floating solar.

(4) Geothermal India = about 10,000 MW

World
↓
6.5% electricity
Fumaroles = Steam vents
Hot Springs - Steam coming when water coming in contact with hot rocks.

Direct use → Hot water from hot springs well is drilled in Geothermal reserve

Ground Source heat pump :-

Ideal sites =
geothermal
provinces

Parnati valley
Puga valley Ladakh
Son Narmada Tapi
Cohana

340 geothermal hot
springs in country

175
52

227

* BIOGAS :-

National Biogas and Manure Management Programme.

- Family type biogas plant.

* advantages

- (i) clean gaseous fuel for cooking & lighting
- (ii) Digested slurry used as enriched bio-manure to supplement the use of chemical fertilizers
- (iii) improvement in Sanitation as linking of sanitary toilets with biogas plants.

47.5 lakh biogas plants upto 31st March 2014.

composition of Biogas :-

Methane = 50-85%.

CO₂ = 20-35%.

Potential: 10% of total electricity installed.

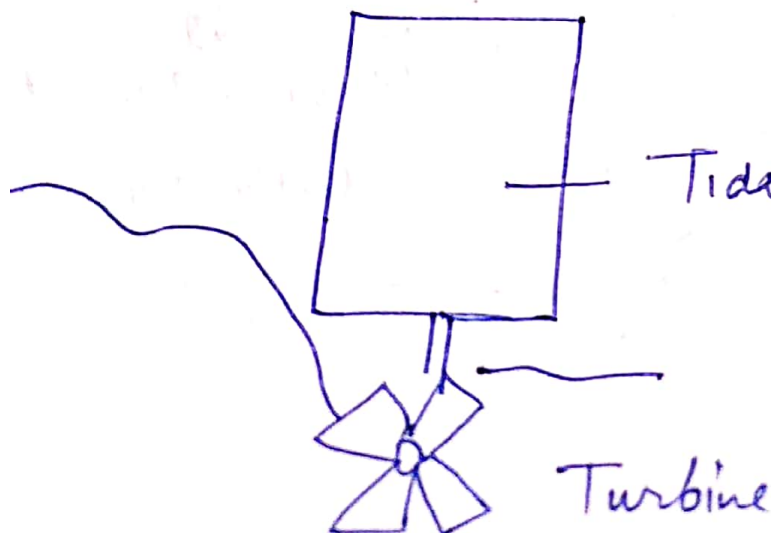
Major ~~area~~ biogas producing States = Maharashtra, AP, Karnataka.

2) Tidal Energy

Gulf of Cambay, Gulf of Kutch

with the help of Tidal Barrages

at the mouth of Bay Estuaries



- * Imp. Disadvantages
- (i) High Capital cost
 - (ii) Environmental is

* Tidal Current Turbines :-

→ vertical axis tidal stream turbines are directly placed in stream.

Global Scenario

South Korea, Canada, France, UK, USA.

* Indian Scenario around

Total potential = 8000 MW

Gulf of Cambay^{Khambhat} = 7000 MW

Gulf of Kutch = 1200 MW

Sunder Bans = 100 MW

→ 50 MW Tidal Power project Gujarat.

* Wind Energy in India :-

→ India 4th largest installed capacity after China, USA & Germany.

→ National Wind Resource Assessment Programme potential = 1,02,788 MW.

→ Deployment = Total capacity of 22,465 MW upto December 2014.

Status = TN, Gujarat,

Maharashtra, AP

Muppandal, Kanyakumari dist^{HP} → TN

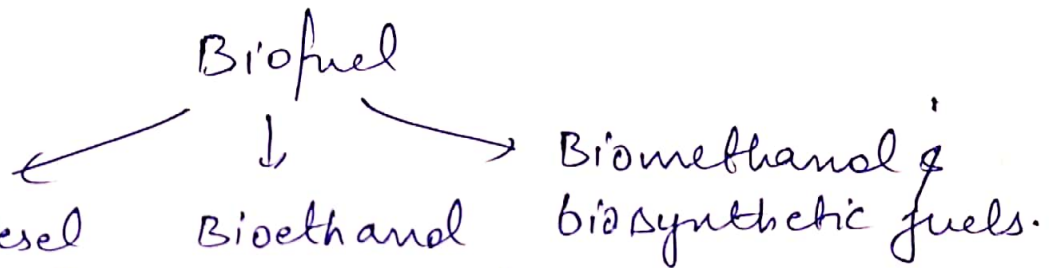
Total capacity = 1500 MW

20/9/19 National Policy on Biofuels

Imp non food feedstocks to be raised on degraded or wastelands that are not suited to agriculture, thus avoiding a possible conflict of fuel vs Food security definitions! -

(i) 'Biofuels' - are liquid/gaseous fuels produced from biomass resources and used in place/addition to diesel, petrol or other fossil fuels for transport, stationary, portable & other applications.

(ii) 'Biomass' resources are the biodegradable fraction of products, wastes and residues from agriculture, forestry & related industries as well as the biodegradable fraction of industrial & municipal wastes.



Biodiesel
→ methyl & ethyl ester of fatty acids produced from vegetable oil, both edible & non edible, or animal fat of diesel quality.

Bioethanol
- ethanol produced from biomass such as sugar containing material

* Imp. policy facts
→ For encouragement concept of MSP (Minimum Support Price) by govt.

5% blending of ethanol with gasoline already taken up OMC (Oil Marketing Companies) - 20 A to 4 U To

Forest Resources

→ GFR Report (2015)

Reduction in forest area from 4.1 billion ha →
(25 years) 4.0 billion ha

→ Forest cover across the globe:-

① Russia - 48%.

② India ranked 10th - 20% of ~~the~~ country's area

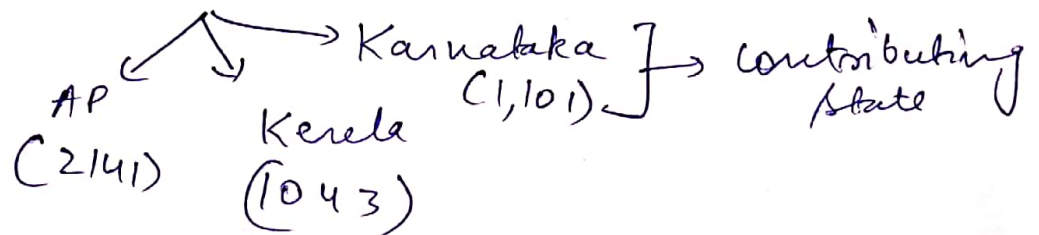
* Forest cover (2017 Assessment)

→ 21.54% of total geographic area under forest

largest forest cover - Madhya Pradesh (77,414 sq km)

→ Imp. highlights:-

at national level ↑ in 6,778 sq km.



↓ RFA ↓ forest cover → Maharashtra, Rajasthan, Telengana

→ Considerable ↓ in the forest cover in NE States of Arunachal Pradesh, Meghalaya, Mizoram, Nagaland, Tripura → due to shifting agriculture & development pressure.

↑ in Assam, Bihar, Haryana, HP, J&K, UP - attributed to social forestry and farm forestry practices.

* Forest Resources in India :-

FSI report 2017 \rightarrow 7,08,273 Sq. km

FSI (2017) = $\frac{21.34\%}{21.54\%}$ or 21.54% of total geographical area

- ① MP \rightarrow largest forest cover in the terms of area
- ② AP
- ③ Chhattisgarh ④ Odissa.

* Change in forest cover = (Overall) +ve trend.

Afforestation activities, participation of locals for better protection measures in plantations as well as in traditional areas.

(Some -ve trends) :- harvesting of short rotational plantations, clearances in encroachment areas, Biotic pressure & Shift & Burn agriculture.

* Comparison b/w IFSR (2015) & (2017)

Net \uparrow of 6778 sq. km of forest at National level.

| | | | |
|--------|-----------|---|---------------|
| AP | Karnataka | & | Kerala |
| (2141) | (1,101) | | (1043) Sq. km |

* Numbers are in turn dependent on the ~~res~~ quantification of Reserved Forest (RF) & Protected Forests (PF).

* Forest in the NE :- AP, Meghalaya, Mizoram, Nagaland & Tripura ↓ due to shifting cultivation & other developmental pressure.

Fun Fact

No of tribal districts = 215.

* The total forest cover in tribal districts = 4,21,170 sq. km i.e.

(37.43% of total geographical area of the district).

Deforestation

(1930 - 2013) → 28% loss in forest cover.

blw (1930 - 1975) → deforestation at a gross annual rate of 0.77%.

(1975 - 1985) → 0.29%.

(1985 - 1995) → 0.14% (VS)

(1995 - 2005) → 0.07% Assam (0.3%)

(2005 - 2013) → 0.05% Meghalaya (0.21%)

Case of NE States.

North East States: 7-8% of total geographical area but (1/4th) of forest cover.

65.34% of geographical area VS 21.54% of National

Imp.

Net ↓ of 630 sq. km

Forest Rights Act, 2006

(Scheduled Tribes & Other Traditional Forest Dwellers Act, 2006)

- 80 million tribal population / 8.2% of ^{Total} population
- controversies and problems generated from Indian Forest Acts - 1927

did not recognise the right to collect

(NTFP)

→ Non Timber Forest produce

- + medicinal plants
- + fruits
- + flowers
- + gums, resins, honey

→ Incorporation of cultural & ethical values associated.

→ Importance

- + carrier of Traditional Ecological Knowledge (TEK)
- + local stakeholders & guardians of forest & forest ecosystem.
- + consideration for cultural and religious values
- + Diversity in the population

573 tribal communities

+ 80% → Central India
+ 20% → NE States

Prominent gp → + Santhals
+ Gonds
+ Bhils

Tribal gp of A & N Islands
+ Andamanese
+ Onges
+ Jarawas

HIP → Gaddi

Imp provisions of FRA (2006)

① definitions —

(A) community forest resource

(B) critical wildlife habitat

(C) 'Forest dwelling Scheduled Tribes' —

members or Community of Scheduled Tribes who primarily reside in & who depend on forests or forest land for bona-fide livelihood needs.

(D) Gram Sabha

(E) 'Other traditional forest dweller' ~~means~~

means any member or community who has for at least 3 generations prior to 13th day of December 2005 primarily resided in and who depend on forest or forest lands for bona fide livelihood needs.

★ Rights which are guaranteed under this act:—

① right to hold and live in the forest land under the individual or common occupation for habitation or for self cultivation for livelihood.

② right of ownership, access to collect, use and disposal of minor forest produce which has been traditionally collected within or outside village boundaries.

③ other community rights of uses or entitlements such as fish & other products of water bodies, grazing & traditional seasonal resources access of nomadic or pastoralist communities.

④ rights in or over disputed lands under any enactment in any State where claims are disputed.

* Niyamgiri Controversy :-

Place :- Lanjigarh in Kalahandi district
(Niyamgiri hills) + Niyamgiri hill region of Raigarh distt.

* Base of discontent :-

MOU b/w OMC (Odisha Mining Corporation) & Vedanta Aluminium (1997).

→ ~~OMC~~ acco. to govt. 723.43 hectares is applied by company out of which 58.94 hectares is forest land.

→ However company needs 721.323 hectares which includes 580.861 hectare ~~of~~ of forest land

States

Odisha
4% - 0

↓

Environment clearance

denied by MoEF (2010)

↓ OMC filed petition in Supreme Court

2013 - Supreme Court ordered proceeding of Gram Sabhas (12 villages)

↓

← OMC filed petition against 2013 resolution

under
FRA 2006

2016
Supreme
Court
Scrapped