

Aquatic Ecosystem

Fresh water

Marine water

Eustrine

Fresh Water Ecosystem

Abiotic components - O_2 , CO_2 , N_2 , P, Ca, Amino acids etc.

Biotic components

(a) Producer

Photosynthetic bacteria
Green plants

(b) Consumers

- (i) Primary - zooplanktons
- (ii) Secondary - small fishes
- (iii) Tertiary - large fishes

(c) Decomposers

Bacteria & Fungi

Functions

Water purification

Control flood

Recycle nutrients

Estuarine Ecosystem

- (1) Eurythermal
- (2) Fluctuating water level
- (3) High food potential

Euryhaline

Abiotic comp.
Mix of fish & marine ecosystem.

Biotic comp.

Producer

Algae

Sea weeds

Phytoplankton

Consumer

Fishes

Crabs

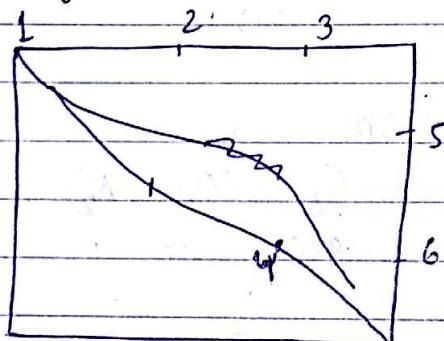
Shrimps

Decomposers

Bacteria

Fungi

Marine ecosystem



- (5) Photic
- (6) Aphotic

- ① Littoral zone - Shore line b/w land & open sea
Photosynthetic bacteria, algae, coral reef reefs etc.
- ② Neritic zone - Lies just above continental shelf
High biodiversity
High productivity
Abundant zooplankton & phytoplankton
- ③ Pelagic - constitutes 90% of total ocean
Phytoplankton, zooplankton, jelly fish, deep water fish, blue whales.
- ④ Benthic zone - Constitutes the floor of oceans
Sea leaves, star fish, sea cucumbers.
High Na, K, Mg, Ca
Phytoplankton, Mangro vegetation

Fungi, Bacteria

Grassland

- ① 32% of plant cover
- ② Africa, Canada, US, Asia

Eg:-

Components

Producers

Grass

Small plants

Herbs

Consumers

Primary - Cow, buffalo, goat, sheep

Secondary - Frog, snake, birds

Tertiary - Hawks, tigers

Decomposers

Actinomycetes, Fungi, Bacteria

Abiotic Comp.

CO_2 , H_2 , N_2 , O_2 , K, S etc

Desert Ecosystem

→ Scanty Flora & Fauna

→ Hot days, cold nights

→ Abiotic Comp.

CO_2 , N_2 , O_2 , K, less organic substances etc.

→ Biotic Comp.

① Producers

Succulents - Retains water

Hard grass

② Consumers

Insects, Reptiles

Nocturnal animals

(Camel, bat, owl)

③ Decomposers

Bacteria (Thermophilic bacteria)

Biodiversity

Diversity among biological components.

- (1) Genetic Biodiversity
- (2) species Biodiversity
- (3) Ecosystem Biodiversity

- Represent quality & characteristic features of life.
- Measure the health of different biological system.

Levels of Biodiversity

- Genetic biodiversity
- Diversity at the level of genes.
- Basic insts. from cellular components.
- Measured among population or a community etc.
- Very basic level so act as raw material for evolution and adaptation.
- Less diversity more uniformity
- Genetic biodiversity is lost when preferential cultivation.

- Species Biodiversity
- More species, more diversity.
- Easily identified
- More significant than genetic or ecological biodiversity
- Every species is important & so is its contribution so its loss may have serious consequences on ecological balance

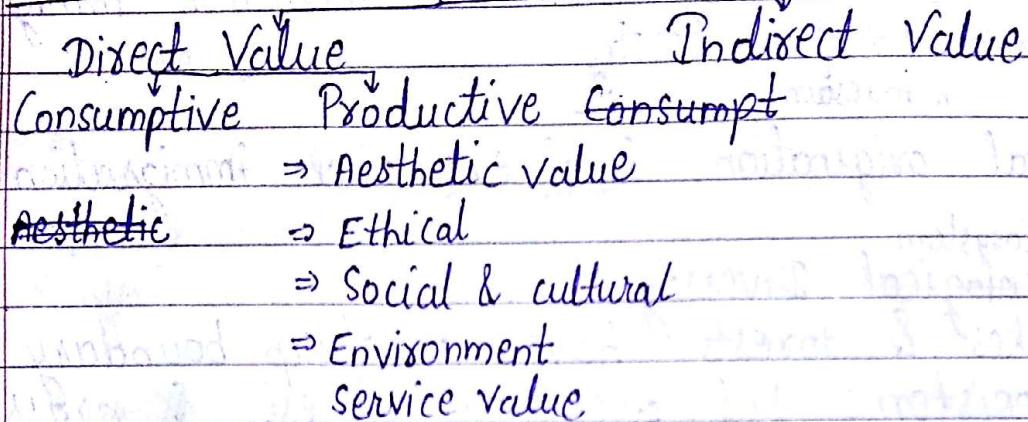
- Idea of number & variety of species
Diversity = origination - extinction + immigration
 - Cradle of diversity & museum
 - local origination, local extinction, immigration etc.
- Ecosystem
- Ecological Diversity
- Lakes & forests have a sharp boundary b/w ecosystems but deciduous forests & grasslands have open boundary so transition is easier, as a result ecosystem^{diversity} study become difficult.

Western Ghats] Hotspots of Biodiversity in India
Eastern Himalayas

There are total 34 hotspots in the world.
80% natural habitat is completely changed over time.
5% of fauna flora is present.

Endemic Species - Nilgiri leaf monkeys
(Restricted to particular area)

Values of Biodiversity



(#) Direct value -

Food resources - cereal, vegetables

Medicines

Fuel

Timbre

Silk, cotton, jute

Consumptive - Consume locally & not transported to international markets

① Food

Plants Fish

② Fuel - Fossil Fuels (Coal, Petroleum,

Natural Gas.

③ Drugs & Medicines - Herbs like quinine, penicillin, tetracycline etc.

Productive - Goods are sold in national & international markets. Eg. Textile, silk, leather, paper pulp etc.

(#) Indirect Value

The indirect benefit from biodiversity to human beings

Cultural values - Tulsi, people & cow are worshipped

Ethical values - Every species has a moral right to existence.

Aesthetic Values - Natural landscapes, zoological, botanical garden are a delight.

Environment service Value - CO₂ fixation reduces pollution, protection from soil erosion.

Threats to Biodiversity

- ① → Degradation of their natural habitat as a result of urbanization, industrialization.
- ② → Increase in agricultural areas which were home to wildlife because of intensification of agricultural practices.
- ③ → Pollution as a result of heavy metal industries, pesticides etc.
- ④ → Epidemics b'coz of pathogens, pollution & habitat destruction.
- ⑤ → Climate change as a result of global warming, carbon emissions & deforestation.
- ⑥ → Degradation of soil.
- ⑦ → Recreation - b'coz of overuse of spaces of mountain biking, water sports, paragliding.

⑩ Threats to marine life

- As a result of pollution and eutrophication.
- Tourism
- Over fishing
- Degradation of sea floor

- ⑨ • Loss of habitat
- ⑩ • Poaching of wildlife for horns, venomous skins, tusk etc
- ⑪ • Human-wildlife conflict: It is a multi faceted problem but can be reduced if proper strategy, approach and practice is applied.

Case Study:

In Rajasthan, around the Sariska Tiger Reserve Project, there are 117 villages with a population of more than 1 lakh people. Agriculture & rearing livestock are the main practices for their livelihood. Animals like nilgai damage their crops and sambar, cheetah are to be blamed for more exploitation. Tigers prey big domestic animals while leopards prey on goats, sheep and calves.

Vulnerable Endangered Species

Species are still abundant but under a serious threat of getting endangered.

Endangered Species

The species when their no. has been reduced drastically to a certain level is not protected and conserved. Eg. Red panda, golden cat, desert cat, Indian vulture, tiger etc.

Rare Species

They are neither endangered or vulnerable but are at risk

Extinct species

When it is not seen in the wild for 50 years.

Eg. - Dodo

Endemic species

Paleo Neo
Endemic Endemic

Restricted to a particular area

Paleo - As a result of climatic change or predators or human activities when organisms are confined to just one area.

Neo - When a continent splits apart, over a period of time two different species evolve which can't interbreed, thus significantly different from each

other.

Biodiversity Conservation

→ Legislation

Environment Protection Act

Forest Act (1927)

Forest Conservation Act (1980)

Wildlife Protection Act (1972)

→ In-situ

Conserving animals & plants in their own natural habitat. Eg. sanctuaries, Reserve forest.

→ Ex-situ

Preserving animals & plants away from their own natural habitats Eg. zoological parks, botanical gardens

→ Educating people & creating awareness

→ Community participation

→ International Conservation Strategies

The Convention on Biological Diversities (1992)

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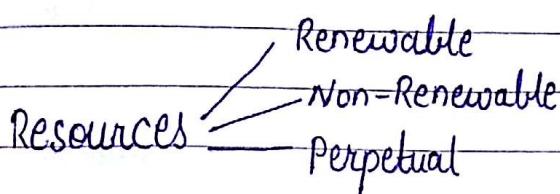
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Unit : Resources

- ✓ Mass bark
- ✓ Kharo and wali → Forest
- ✓ dug → Food
- ✓ addit → Energy
- ✓ Ladki → = Aabhaak

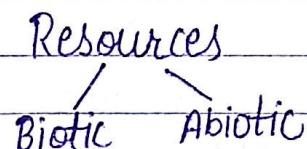
Forest



Perpetual Resources : The resources which are naturally occurring and completely inexhaustible. Eg. solar energy, water, tidal energy (tides), (sunlight)

Renewable Resources : Fresh water, forests etc.

Non-renewable Resources : Fossil Fuels



Forests



On the basis of density forests are classified into four types:

- (1) Closed ($> 40\%$) (crown cover density ccd)
- (2) Open ($10-40\%$ ccd)
- (3) Scrub land ($< 10\%$ ccd)
- (4) Mangrove across sea shore

Importance of Forests

- (1) Protective fns - Protects from floods, soil erosion, drought, intense radiations, natural calamities
- (2) Productive fns
- (3) Accessory fns

Significance:

- (1) Ecological
- (2) Economical

Deforestation

Causes

- (1) Over population
- (2) Urbanization
- (3) Industrialization
- (4) Forming of dams, mining
- (5) Natural calamities
- (6) Shifting cultivation

Effects -

- (1) Pollution
- (2) Soil Erosion
- (3) More floods & droughts
- (4) Micro climate get disturbed
- (5) Global Warming
- (6) Loss of biodiversity

Global Warming Forest Conservation (2 case studies)

Forest Conservation Act (1980)

- (1) Compensatory Afforestation - Conservation Method
- (2) Joint Forest Management Act (1988-90) - Protecting & Promoting degraded forests

- (4) Removed Subsidy (by Government)
- (5) In-Situ & Ex-Situ Conservation (Reserves) (zoological garden & botanical garden)
- (6) Environmental movement & Free press
- (7) National Forest Policy (1988)

Timber Extraction (2 case studies)

Dams

Mining

- (1) Deforestation
- (2) Pollution
- (3) Disturbance of micro climate
- (4) Health Hazards for miners
- (5) Hum loss of human life

Mineral Resources

1.) Metallic \rightarrow Ferrous - Iron, Nickel, Cobalt

Non-Ferrous - Copper, Zinc

Precious Metals - Platinum, Gold, Silver

2.) Non-metallic metallic - Mica, Salt, Sulphur

3.) Energy Resources - Fossil Fuels

Distribution

\rightarrow Iron Ore - Contributes 20% of global %age of iron

Mines in Orissa, Goa, Chattisgarh

\rightarrow Manganese Ore - Contributes to $\frac{1}{5}$ th of world's deposits

Main Reserve - KTK, Orissa, MP, Goa, Karnataka.

→ Copper Resources - Because Cu content is very less in ores in India. Extraction is expensive. Reserves in Rajasthan, Jharkhand, Karnataka, Andhra Pradesh.

→ Lead - Galena or is (ore)

Heavy but soft metal

25% out of total found in India

Reserves - Rajasthan, Andhra Pradesh, Tamil Nadu

→ Bauxite → Aluminium ore

Vast reserves in India

Found in Jharkhand, Chhattisgarh, MP, Gujarat

→ Mica - Insulator

Reserves in Jharkhand, Bihar, Andhra Pradesh and Rajasthan

→ Limestone → Found in rocks

Reserves in Chhattisgarh, Karnataka, HP, MP

Exploitation

→ By allocating mineral reserves.

→ Mining

→ Extraction of metal from mineral

Mining

It is of two types:

1.) Surface Mining

a) Open pit

b) Strip mining

When the mineral is lying around the surface

- Open pit - Digging a large hole to get mineral called quarry.
- Strip mining - Digging a long trench but not very deep and are parallel to each other.

Sub-Surface Mining

Deep inside the earth to collect coal and other ores. The surface of earth gets disturbed when numerous tunnels or shafts are used which go deep to reach mineral deposit. Expensive. Visibly envt. is not harmed but it has many physical, ecological and socio-economic impacts.

Impacts

Physical

- Soil Erosion
- Destruction of land

Ecological

- Loss of biodiversity
- Deforestation
- Ecological Imbalance

Socio-Economic

- Employment
- Urbanisation
- Infra development

- Cancer, bronchitis
- Loss of habitat & cultural identity
- Pollution

Case Study

- Jhansi open cast mining
- Marble mining in Rajasthan

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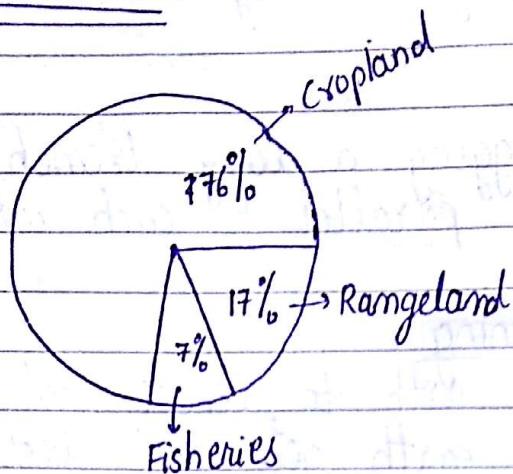
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Food Resources

Distribution

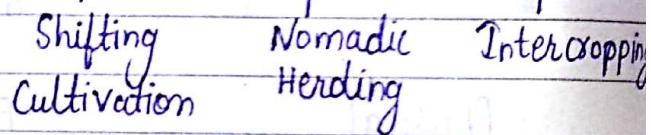
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Agriculture

Industrialised

Subsistence



① Industrialised Agriculture

- High i/p v used machinery & capital & energy
- Large production
- Use of machines

② Subsistence Agriculture

- Production of food to satisfy individual & his family
- Requires energy i/p from humans & animals.

a) Shifting

- Short period of cultivation
- Supports small population.
- Small patches of tropical forests are cleared.
- It is land intensive agriculture.

b) Nomadic Herding

- Very arid land is used.

c) Intercropping

- Growing of variety of crops in same field or by using rotational method.

Modern agriculture

- Use of fossil fuels & pesticides results in pollution. Thus it has certain drawbacks.
- It uses hybrid seeds resulting in better quality & quantity.
- High tech equipments for irrigation & other purposes are used.

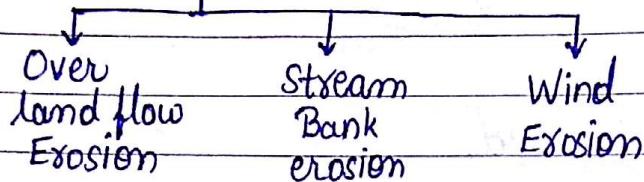
Impacts

- Impact b'coz of high yielding variety.
- Fertilizer related issues.
- Micronutrient imbalance
- Water logging
- Salinity problems
- Eutrophication

Impacts caused by Agriculture

→ Onside

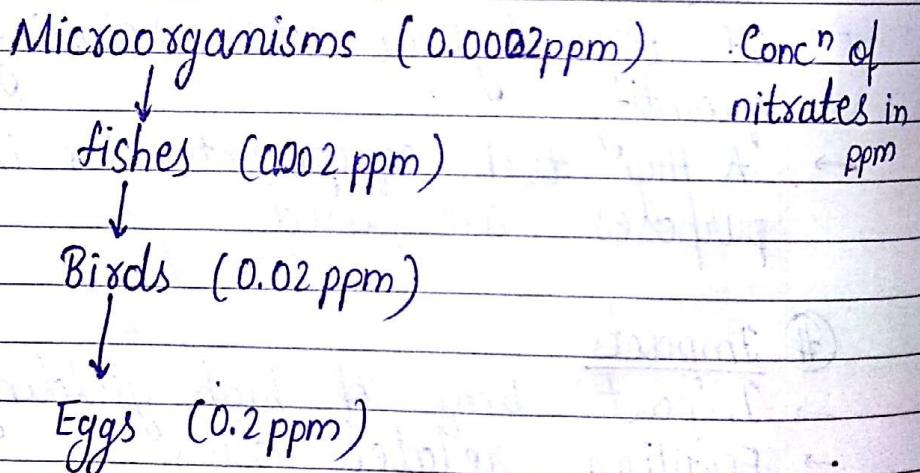
- Deforestation
- Depletion of nutrients
- Soil Erosion



→ Offside

- All kind of pollutions
- Serious health hazards
- Water logging and salinity
- Eutrophication

Biomagnification



Green Revolution

- Started in middle of 20th century to overcome global food shortage.
- Development of High yielding crops
- Use of fertilizers & machinery.

(#) Problems faced by Indian Agriculture

- Population Pressure
- Depleted Soil
- Inadequate irrigation facilities
- Low capital base
- Storage of food grains
As a result, salinization

(#) World Food Problem

- Under Nutrition
 - An individual needs 2600kcal nutritions on daily basis
 - But a large number of people do not get enough nutritions.
- Malnutrition
 - They may get food.
 - But the required nutritions are not obtained.
- Marasmus
 - Due to deficiency of calorie intake & proteins
 - In children of age less than 5 yrs.
 - Wastage of muscles
 - Retarded brain
 - Stunted growth
 - Bow shaped leg
- Kwashiorkar
 - Due to deficiency of proteins
 - Abnormal abdominal growth
 - Mental Retardation
 - Stunted growth
 - In children of age less than 5 yrs.

Overnutrition

- High blood Pressure
- Cholesterol
- Diabetes
- Obesity

Energy Resources

Classification

- ① a) Renewable ② a) Natural
b) Non-renewable b) Man-made

③ a) commercial (conventional)
b) Non-commercial Non-conventional

Solar Energy

- Made of semiconductor
 - Si (High grade crystallized)
 - Ge present b/w insulator & conductor
 - Photovoltaic cells or SPV's
 - Convert sunlight into electricity
 - Useful source for water pumping, power plant, telecommunication
 - Govt. provides subsidy for the use of solar energy in remote rural area.
 - Solar cell absorbs the light & +ve & -ve charges are generated & get collected at respective electrode.
 - It consists of a sandwich of n-type & p-type Si semiconductor.
 - Highly crystalline Ge intermediate b/w conducting & insulating part.
 - Very high grade Si is used
 - One solar panel of dimension 100×50 cm can light up 8 lamps.

Merits:

- Easy installation & maintenance
- Inexhaustible & eco-friendly

Limitations:

- High initial cost of installation
- Electricity is produced in DC which is converted later into AC by using inverter.

Wind Energy

- Gujarat & Kanyakumari
- 6000 MW plant located in Tamil Nadu & 5000 MW in Gujarat.

* Merits

- Non-polluting & eco-friendly
- Very low gestation period
- Power generation is very cheap

* Limitations

- Vast open area having favorable velocity of air (min. 15 km/h)
- Initial cost of construction and maintenance is high.
- Can be dangerous to the birds.
- Electricity produced is in DC

Hydro Energy ***

(#) Biomass Energy

- Biomass is oldest renewable source of heat energy.
- The ~~set~~ Crop residue, vegetable waste, cow waste etc. are decomposed anaerobically in biogas plant.
- Biogas has very high calorific value as it contains 78% CH₄.
- Initiatives taken by govt. for its promotion:
 - a) Biogas plant
 - b) Biomass gasifiers
 - c) Smart or Improved cook stoves
- The slurry left behind is removed periodically & serves as an excellent manure.

(#) Geothermal Energy

- The thermal energy from molten core is inexhaustible source of energy.
- It can be exploited only from the hotspots like volcanoes, hot springs, bubbling water etc.
- The water below earth surface gets converted into steam which remains entrapped b/w the rocks under high pressure.
- This energy is utilized to rotate the turbine Hence electricity generation.

* Merits:

- Least polluting
- Higher power generation as compared to solar & wind energy.

Limitations:

- Small lifespan.
- Noise pollution b'coz of drilling
- Hotspots are generally distant from the areas that actually require electricity.

Ocean Energy

- 1) Wave Energy
- 2) Tidal Energy
- 3) Ocean Thermal Energy (OTEC)

* OTEC

- B'coz of sunlight temp. diff. b/w water layers range from 10 to 30°.
- The warm surface water is used to boil volatile liquid like NH_3 .
- These vapours are used for rotating turbine & hence for power generation.

* Merits

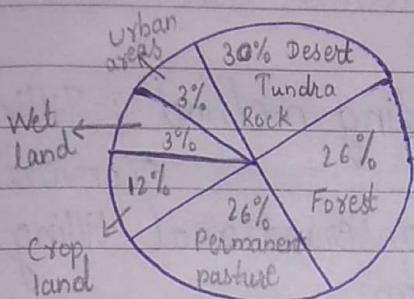
- Inexhaustible
- Eco-friendly
- Renewable
- It does not have seasonal variations in o/p.

* Limitations:

- High capital investment
- Low efficiency

Land Resources

Land Resources



Topmost layer of earth's crust is called soil

Pedogenesis

The process of soil form".

Withering - Breaking of rocks into smaller particles.

(#) Types of soil in India

- Red soil - Rich in iron & Mg
Covers max^m part
- Black soil - Clayey soil
Central part of India
- Laterite soil → Non-fertile soil
- Alkaline soil → ↑ soil salt content
Not suitable for crops
- Mountain & forest soil → Most fertile soil

(#) Land degradation

- Decline in overall quality of soil as a result of natural & human activity.

- Cause - Timber extraction - Overgrazing
- Deforestation
 - Soil erosion
 - Soil salination
 - Agricultural activities

- Soil erosion

Detachment of topmost layer of soil b'coz of water, wind or other human activities is k/a soil erosion

Causes - Deforestation

- Faulting cultivating method: Tilling

(Conventional Tilling)

Instead use conservational tilling

- Shifting cultivation

- Overgrazing

- Forest fires

- Lack of proper drainage

- Natural climatic changes

Impacts - Loss of soil fertility

- No. one source of water pollution in US

- Renewable only on long time frames.

- Salination

Causes - Poor drainage system

- Water logging

- Poor irrigation

- As a result salt is left behind & makes the soil saline.

Harmful for crops

Destroys fertility of soil

Exists in areas of Punjab, Haryana, UP, Bihar, etc

Prevention - Proper Drainage

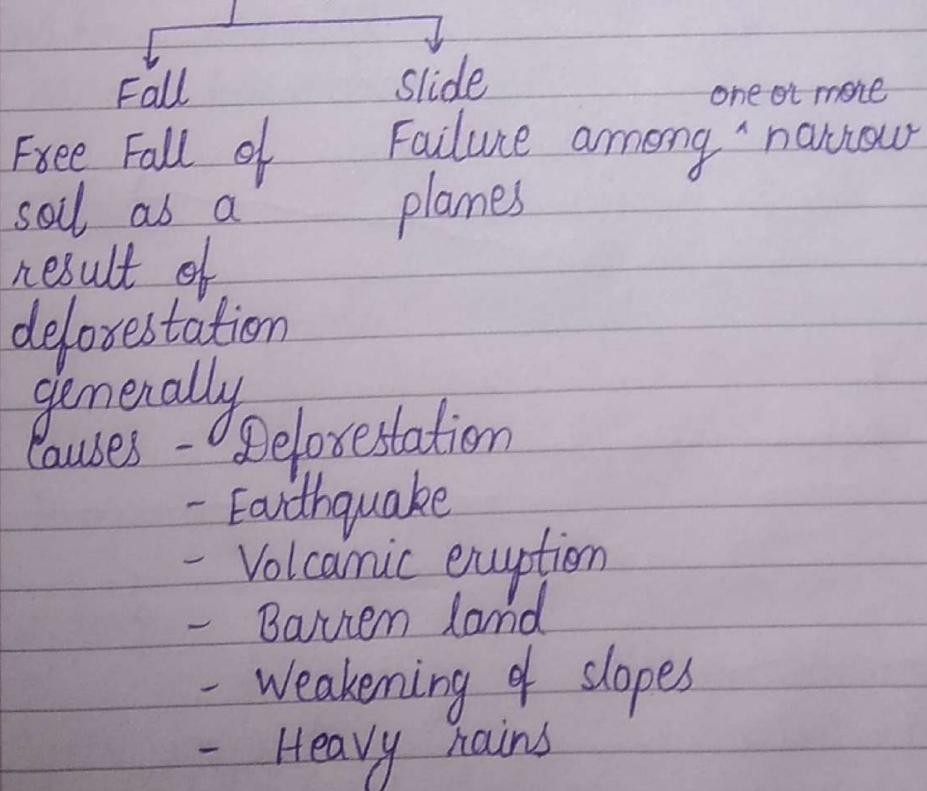
- Reduced Irrigation

- Salt the crops which are tolerant to salt content must be developed

- Not growing crops for 2 to 5 yrs for soil replenishment.

- Implementing underground drainage system
- Water logging
Due to poor drainage system
- Desertification
Causes : Deforestation
Overgrazing
Overcultivation
Soil Erosion
Urbanisation
Industrialization
Prevention : Compensatory afforestation

- Land Slides



- (#) Conservation of soil
 - Conservational tillage
 - Alley Cropping

- Terrace farming
- Use of organic fertilizer
- By using compost
- By crop rotation

Unit - C

Water Resources

Type of resource

Surface Water - Lakes, Rivers

sub-surface Water - Wells, Handpump, Underground water

Water Crisis

Water Conservation & Management

- Rainwater Harvesting
- Avoiding pollution
- Proper disposal of waste
- Better & efficient irrigational equipments
- Water renewal
- Water harvesting

* Floods

Type of floods :

- 1.) Flash flood
- 2.) Temporary Flood

Effects :

Damage to buildings & other constructions

Health hazards

loss of natural habitat

loss of biodiversity

Economic loss

Flood management

* Drought

- Permanent
 - Meteorological
 - Seasonal
 - Contingent
- Extremely dry
 - When rainfall is less than 75%
 - B'coz of less rainfall
 - irregular Invis. occurrence

Agricultural Drought Causes

Overexploitation of water resources

Consequences

Impact on Envt.

Impact on health

" " Agriculture

Economic Impact

Social "

Loss of habitat

* Kaveri river conflict