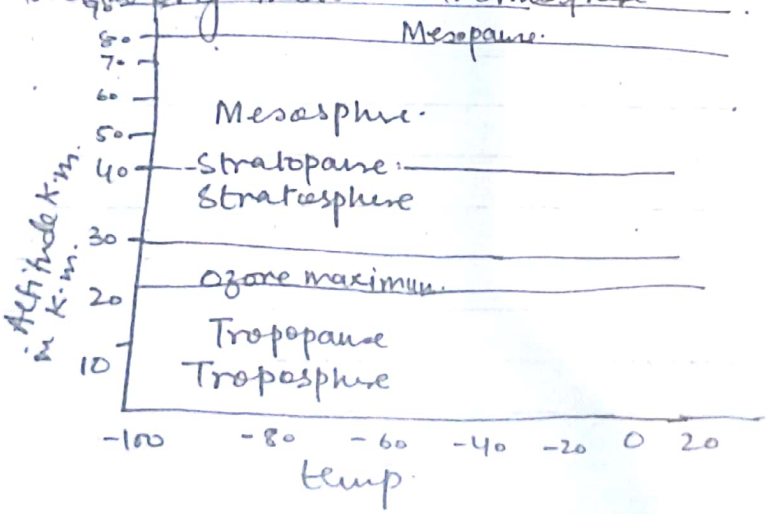
Syllabus code 19ES1 5014 / Unit-3 Environmental Management

Atmosphere

3.1 The atmosphere: Structure, Composition & Energy source.

Atmosphere is an envelope of gases wrapped around the earth. Solar energy is the input which drives the system. Energy is used, stored & transferred between the earth & its atmosphere. The output is the radiated energy lost into space. The gases present are transparent & odourless. The pull of the earth keeps the atmosphere attached to it.

The atmosphere has 4 layers: the troposphere, that we live in near the surface of the earth, the Stratosphere that houses the ozone layer, the mesosphere, a colder and lower density layer with about 0.1% of the atmosphere, and the thermosphere, the top layer, where the air is hot but very thin. Thermosphere.



It extends up to 1000Km above the earth, 97% of the atmospheric mass is within 30Km of the surface. Atmospheric pressure decreases rapidly with height. All these layers are identified by temperature characteristics.

The troposphere is the lowest layer which touches the surface of the Earth.

Some of the characteristics of the troposphere are listed below

* Percentages of both water vapour and carbon dioxide are higher than in other parts of the atmosphere
* The earth's cloud & weather systems are concentrated here
* It contains most of the atmosphere's water vapour, cloud, dust & pollution.

In contrast Stratosphere is dust free & cloudless * Little carbon dioxide & water vapour are present * The air is dry * greatest concentration of ozone.

Ozone absorbs incoming Ultraviolet radiation from the sun. Top layer is the warmest and a sharp rise in the temperature is recorded in the Stratosphere.

Composition of the Atmosphere

Dry surface air dominated by only two gases

Nitrogen 78.09% — Oxygen 20.95%

makes up 99% of the atmosphere by volume

→ Both are needed for plant growth.

→ Oxygen is produced by plants during photosynthesis & is used by other forms of life on earth.

Other gases are.

0.93% Argon (inert gases) e.g helium. Carbon dioxide 0.03%.

The importance of carbon dioxide is enormous, as it is soaked by plants for photosynthesis.

* It absorbs long wave heat radiation from the surface.
* Nitrogen & oxygen retain little heat without carbon dioxide the earth would be about 30°c colder, which would make it frozen & life less.

Importance of ozone:

The amount of ozone in the atmosphere is 0.00006%. but it plays a vital role in allowing life on earth. It is concentrated in the Stratosphere, where many of the cancer-inducing U.V rays, would harm plants, and Animals, Humans.

* Amounts of water vapour vary greatly from place to place ⟶ It is the source of cloud formation & precipitation in the troposphere. This % by volume is little in deserts but in tropical areas with active weather system this can rise to as much as 4-1.

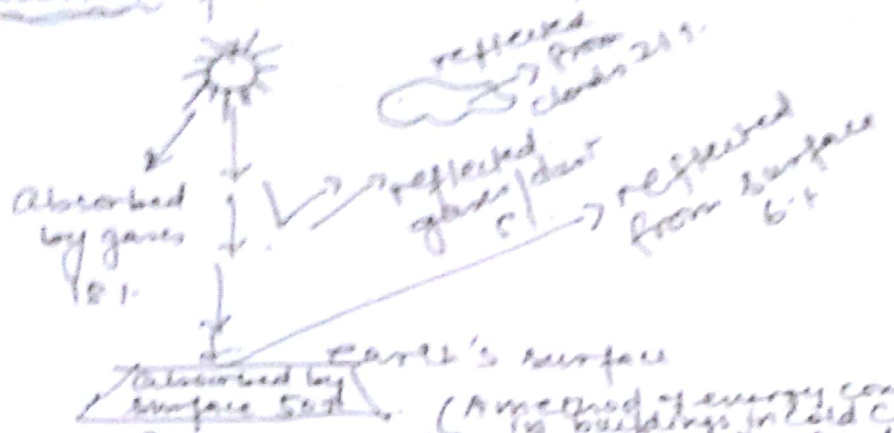
The Sun as an energy source:-

Light radiated from the Sun is the source of all energy on earth.

⟶ Sun light is short wave radiation.
⟶ Solar energy absorbed by the surface is transformed into a long-wave radiation.

⟶ Some absorption takes place in the atmosphere mainly by gases.
⟶ Reflection of light back into space occurs from clouds, gases & dust particles in

the atmosphere. As surface temperature rise radiation of heat takes place



(Improved energy conservation in buildings in cold climate)

Insulation: Prevention of heat loss from the surface.

Insolation: Solar energy reaching the surface the source of heat energy on earth.

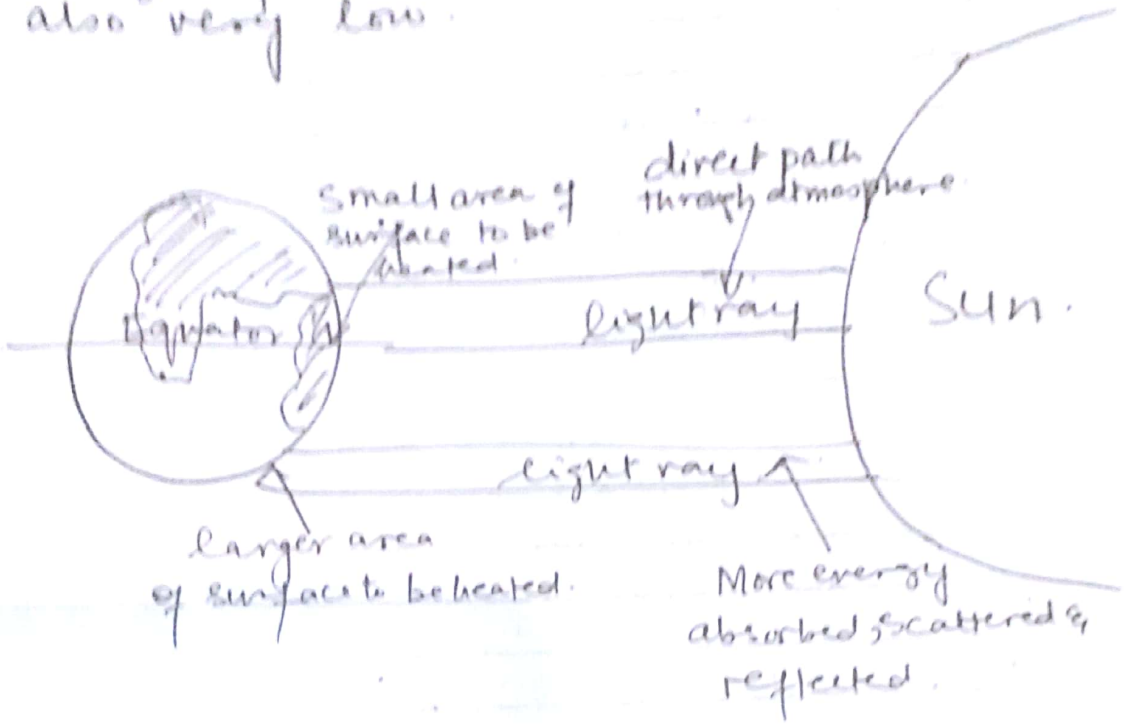
★ Rates of insolation vary greatly from place to place, the main control is latitude.

★ Insolation is the greatest at the equator and in the tropics, where sun shines from high angle of the sun.

★ The sun light has a direct path through the earth's atmosphere and less is lost by reflection. Because the sun rays are almost vertical where they strike the surface, each ray has a smaller area of surface to heat up.

★ In contrast near the poles the sun rays approach the earth's surface at an oblique angle, so that each ray has a larger surface area to heat up. A longer journey through the atmosphere means that more of the light is absorbed & reflected, which leaves less to be used for

heating up the surface. In mid winter in high latitudes, when hours of day light are short & the sun is shining from a very low angle of the sun, the amount of insolation is also very low.



Snow has a high albedo. (It is a high proportion of sunlight is ~~absorbed~~ instead reflected instead of being absorbed.
→ 80% of light reaches the surface is reflected back from snow covered surfaces.

The atmosphere is useful to humans as a source of energy.

- Water power, wind power, Solar power.

Already study (Pg 122, 123)

3.2 Atmospheric Pollution: Causes, effects & Strategies.

People are changing the atmosphere in four different ways:

* Amount of smoke & other solid particles suspended in the atmosphere:
Causes → burning of fossil fuels, wastes burnt from chemical factories → effects → Poor air quality, formation of acid rain reduced visibility (mist, fog)
→ health problems like asthma
→ increased acidity in lakes
→ increased acidity in soils.

* People are reducing the proportion of high level ozone
Causes: use of chemicals CFC's & halons
effects: depletes the ozone layer leading to ozone holes, increases U.V radiation reaches the surface → Increased risk of cancers in people

* Increasing the proportion of carbon dioxide in the atmosphere
Causes: deforestation & burning the wood burning fossil fuels
effects: traps more of the heat radiated, increase the earth's temperature, rising sea levels, changes in world weather

* Reducing the amount of water vapour returned to the atmosphere:-
Causes: deforestation
effects: less cloud formation, drought, lower crop yield, less food supply.

Pollution in Urban Areas:

Air pollution is more in urban areas than in rural areas. Causes: People, Cars & industries
Traffic → Source of gases unburnt hydrocarbons, smoke particles pollute

the atmosphere → effects the people's health
★ high Temperature → photochemical reaction
★ Haze & Smog → in Urban areas

Examples: cities effected by air pollution & photochemical smog
★ Los Angeles, Mexico city, Santiago in Chile -

Strategies to improve Urban Air quality

★ On bad Smog days people with chest problems → warned to stay indoors in Los Angeles

★ In Santiago, days when Smog levels are high, cars are banned from entering the city

★ Compulsory fitting of catalytic converters is one Strategy for reducing air pollution but it doesn't Solve all pollution problem. (catalytic converters remove many nitrogen oxides, Carbon monoxide & unburnt hydrocarbons (They work efficiently when engines are hot)

★ Replacing petrol & diesel with cleaner fuels like gas.

★ In Los Angeles from 1996 the use of CBG (Cleaner burning gasoline) was made compulsory (It reduces ozone forming emissions from road vehicles by 15%)

* Improving public transport & making it more attractive.

Acid Rain:

The increased acidity comes from the presence of pollutants in the atmosphere, mainly sulphur dioxide & nitrogen oxides. Both are released when fossil fuels are burnt. coal fired power stations & vehicle exhausts are the main sources.

→ Pollutants are carried by prevailing winds. Some are deposited directly on the earth's surface, this is known as dry deposition.

→ The rest is converted into acids (sulphuric & nitric) which fall to the ground in rain, as wet deposition.

Effects of Acid Rain:-

It is mainly a developed world problem. It is mostly associated with industrialized countries in Europe & North America → where rate of fossil fuels use from power stations, industries & cars are found.

→ Pollutants can be transported over long distances by the wind → Acid rain is a problem in Scandinavian countries (Norway & Sweden) because prevailing westerly winds carry the oxides of sulphur & nitrogen from UK's coal fired power stations.

→ effects the land based ecosystem

The higher concentration of hydrogen ions in acid rain causes faster leaching of soil nutrients. Important soil nutrients such as calcium & potassium are washed away and replaced by manganese & aluminium which are harmful to root growth

→ High acidity is damaging water based ecosystem as well resulting in the deaths of fish & plant life in rivers & lakes.

→ Fresh water supplies are polluted.

→ It also effects on people → directly effects the crop yield → decline in human health → leads to bronchitis & lung cancer.

Strategies to reduce the effects of Acid Rain

→ ~~To~~ To reduce its effects use the process known as flue gas or desulphurization (FGD)

→ use a mixture of limestone & water which converts the sulphur dioxide into Calcium Sulphate → Nitrogen oxides in flue gases can be reduced by 'selective Catalytic reduction' adding ammonia & passing it over a catalyst to produce nitrogen & water. Both cost money & increased the cost of electricity.

→ Fitting catalytic converters reduces nitrogen oxide emissions from cars.

→ Use of alternative energy sources that do not produce nitrate or sulphate gases (HEP, nuclear, solar & wind).

Damage to the ozone layer

Causes :- Release of a family of chemicals which contain chlorine, the so called CFCs (Chlorofluorocarbons) and halons into the atmosphere are the main causes

→ CFC's are used as propellants in aerosol spray cans, which are widely used for hair spray, deodorants & insect killers.

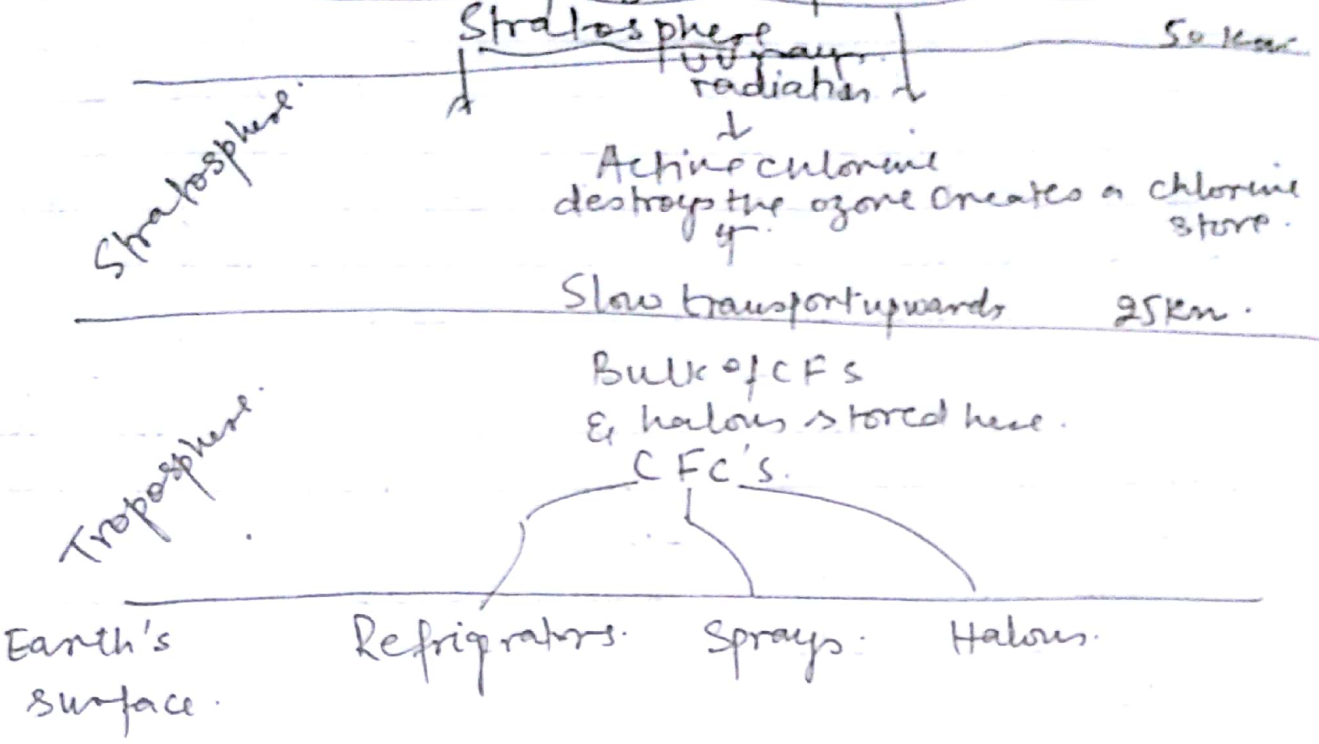
→ Coolants used in refrigerators and air conditioning systems also contain CFCs.

→ Halons are also very useful in fire extinguishers, especially in ships, aircraft & computer rooms.

World production of CFC gases increased quickly from about 180 million kg per year in 1960 to over 1000 million by 1998.

→ The ozone layer was first detected over Antarctica as pollutants in the atmosphere travel around the world with the winds

Causes of ozone depletion in the Stratosphere



→ Human activities have sent number of CFC's.

Strategies for Ozone recovery:-

→ Govts signed up an international agreement called the Montreal protocol in 1987.

→ Rapid reduction in the use of CFCs & halons & to stop using them by 2000 except for safety uses.

Global warming & the Green house effect

Causes: Human activities have sent levels of greenhouse gases in the atmosphere soaring / the increase in proportion of greenhouse gases, which is upsetting the natural balance of gases in the atmospheric system.

The main reason for this is that global energy use is absolutely dominated by fossil fuels. Since the start of the Industrial revolution, humans have been taking stored carbon out of the earth in the form of fossil fuels & releasing it back into the atmosphere when these fuels are burnt.

Green house gases are: carbon dioxide, methane, CFC's & nitrogen oxides → Sources of these gases are burning of fossil fuels, deforestation, used in aerosols, refrigeration, use of chemical fertilizers on farms e.t.c

Effects: Melting of ice sheets in Arctic & Antarctica → Rising sea levels → flooding of low-lying coastal areas like deltas, wetlands & coral islands → Sea defences breached →

→ Rise in temperatures → across the globe → greatest in high-latitudes & near the poles.

For example: the local warming over Green Land will be one to three times greater than the global average → Complete melting of

Ice-cap would result in a sea-level rise of about 7 meters → Island countries like Maldives & Seychelles in the middle of the Indian Ocean are very alarmed at the prospects of global warming — as also are delta countries such as Bangladesh & the Netherlands.

Strategies to deal with the causes & effects of global warming

* → Planting trees — will increase the size of the CO_2 store in the biosphere → it will reduce soil erosion; lower the risk of flooding & the improved habitats for species.

* → Use alternative sources of energy → it will replace fossil fuels with clean energy sources → it will conserve the non-renewable resources for future generations.

* → Energy conservation measures → reduce amount of fossil fuels burnt → leads to cleaner air & less acid rain.

* → ban use of CFC's in aerosols & fridges → cut emissions of CFC's → reduce health risks for example Skin cancer.

3.3 Measuring the weather

Weather refers to the state of the atmosphere its pressure, temperature, precipitation, wind & sun.

Instruments are used to measure each of these. They are placed with great care to ensure accuracy of measurement that allows weather between places in different parts of the world.

The instruments to measure weather are:

1- Weather vane: measure the direction of the wind
2- anemometer measure the wind speed.
3- rain gauge: measure precipitation.
4- Sunshine recorder: records the sunshine.
5- thermometer screen: to measure temperature
6- Mercury barometer - to measure atmospheric pressure.

1- Air Pressure:-

Air has weight & exerts a force or pressure on the earth's surface.

→ The instrument used for measuring is the barometer.

→ Meteorologists record air pressure in millibars with 1000 mbs equal to 750 mm in the mercury barometer.

→ Above 1000 mbs there is a tendency towards high pressure & dry weather, below 1000 mbs it is towards low pressure & wet weather.

→ Barometer is not quite as accurate but has the advantage of providing a continuous reading.

→ It is an aneroid barometer, that has a metal

box which contains very little air in its centre.
→ The top of the box is sensitive to changes in pressure → when pressure increases the pointer is forced upwards.

2- Temperature :-
Air temperatures are recorded by thermometers kept in the shade.

Temperatures are constantly changing, the two temperatures each day that interest the meteorologist are highest & lowest.
→ The maximum thermometer is a glass tube containing mercury & a metal index which just fits the tube. When the temperature rises, the mercury expands & pushes the index up the tube. When the temperature falls the mercury contracts the leaves the index behind. The reading is taken from the bottom of the index.
→ The minimum thermometer is an identical glass tube. When the temperature falls, the alcohol contracts & its meniscus (the curved upper surface of liquid on the tube), when the temperature rises the alcohol expands & flows past the index. The index remains in the low position in the tube to which it was dragged. The reading for minimum temperature is taken from top by the index.

3- Measuring precipitation, Wind & Sunshine

Precipitation is measured by the raingauge Rain falling into the funnel placed on top of the outer metal container is guided into the inner container (either a metal can or a glass bottle).

→ At the same time each day, water from the inner container is emptied into a glass measuring cyclinder.

→ Reading shows the depth of rain that has fallen over an area equivalent to that top of the funnel.

→ The cyclinder is placed on a level surface & read from the bottom of the meniscus

4- Wind

Direction of the speed is measured by wind Vane, which consists of a rotating arm mounted on top of a long pole. The arm has an arrow. Below it are the fixed compass directions. The arrow head always points in the direction from which the wind blows.

Wind Speed is measured by the anemometer. Three or four metal cups rotate at the end of metal ~~arms~~ ~~cups~~ arms, placed at the top of the long pole. The movement of the cup operates a meter, which records the number of rotations from which the speed of the wind can be worked out.

5- Sun shine :-

→ The Sun shine recorder consists of a glass sphere which concentrates the sun rays on one point. Behind is a metal frame which reflects the pin points of heat on to the recording sheet.

→ Hours are marked on the recording sheet. When the sun is shining the card board recording sheet is scorched, the total length of scorching is added up at the end of the day to give the number of sun shine hours.

Weather forecasts are made by
→ weather stations
→ Satellites & radars
→ Ships & planes
→ weather balloons
→ meteorological weather centres
→ information processed using computers
→ forecasts are made.

Examples of companies & people interested in weather forecasts.
→ cricket club → farmer
→ fisherman → air line pilot → insurance company → electricity company
→ tourists boards.

3.4 World Climates & their effects on human activity

→ Climate is the average weather condition recorded at a place over many years.
→ Climatic factors are temperature & precipitation.
→ Tropical climates such as equatorial, Savanna monsoon & desert are hot because of high rates of insolation through out the year.
→ Tropical climates are distinguished from one another by the amount & distribution of the rainfall. The world's wettest & driest places are in the tropics.

Wet tropical climates:

Singapore has an equatorial climate, which is characterized by being hot & wet all year.
→ There is little difference in temperature during the year, usually only 2° or 3° C, length of the day varies, Sun shines from high angle of the Sun, heavy rainfall experienced in all months
→ Much of the rainfalls from after noon thunder storms, caused by intense surface heating. cumulus clouds can develop into tall rain bearing clouds because pressure is low through out the year.

A Savanna Climate is different because it has two distinct seasons, a wet season & a dry season. Places with this type of climate are locates further away from the equator than those with an equatorial climate. Farmers cannot grow crops in the dry season without irrigation.

Desert:

The World's hot deserts have precise locations. The Sahara Desert with extentions into Arabian & South Asia, is the giant because it occupies the continent of Africa at its widest point.

Hot deserts are away from the coast, where prevailing trade winds from the east in the tropics carry moisture on-shore. Above the tropics of Cancer & Capricorn high pressure persists all year, air is sinking, not rising. The cold currents cause condensation, forming fog offshore, but this doesn't spread inland beyond the coastal strip. Without cloud cover, with the sun high in the sky in summer, temperatures become very hot indeed. The world's hottest places are in deserts only the occassional unpredictable downpour interrupts total dryness.

Desert countries are the most water poor regions on Earth. There are no permenant settlements in hot deserts except where water is available from undergroundaquifers, surfacerivers, piped else where from dam storage or from desalination plants.

Temperate & Cold Climates :-

These include cool temperate interior & tundra Climates. Both types are only found in the Northern hemisphere, where large amounts of land exist in high latitudes. At similar latitudes south of the equator is the Southern Ocean, while the continent of Antarctica

itself is ice-covered & too cold for tundra. Similar climates also exist at high altitudes in all the world's large mountain ranges such as the Himalayas & Andes.

→ There is not much difference between these two types of climate — both are cold all year & very cold in winter. Annual totals of precipitation are low. Most precipitation falls in summer, although precipitation that falls at other times is mainly in the form of snow.

→ Tundra is the colder of the two in summer, in a tundra climate, in no month does the average monthly temperature exceeds 10°C. Both are kept very cold in winter by biting polar winds & little day light.

→ Cultivation is impossible, these lands are largely empty of people, except where they can live off sea resources, as in Greenland, or where mineral deposits can be exploited, as with oil in Alaska.

→ Tundra regions are land without trees whereas cool temperate interiors are covered by a great extent of coniferous trees known as taiga in Siberia.

Climate & human activity

→ Types of farming.

Arable: growing crops.

Commercial farming: growing crops & keeping animals for sale.

Small-scale subsistence farming: A farmer growing crops to feed himself & his family.

Climate is directly controls the human activities regarding the people living in cold regions & hot region.

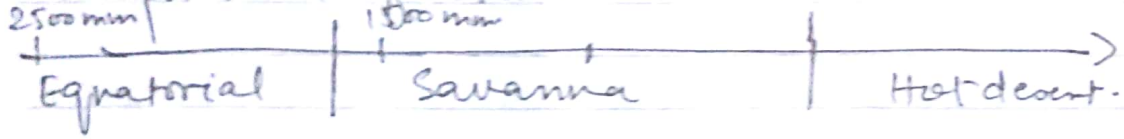
Cold → need for shelter (heating)
→ double glazed windows
→ insulated roofs.

Hot → open windows
→ Air conditioners

indirect effect on food especially in too hot & too cold regions.

Factors affecting farming.

Rain The amount of rainfall is the important factor.



Vegetation. Mangrove swamp. Tropical rainforest. | Tall grasses & Scattered trees. Thorn Scrubs & tufted grass | Bare surface. little

Types of farming: Shifting cultivation. plantation. | Nomadic grazing. Subsistence cultivation. | farming, livestock Camels.

3.5 Farming systems: Agricultural techniques & management:-

Farming systems include

Inputs	processes	outputs
• Physical: Climate, Soil	• Sowing	• Milk & their products
• Human: Labour, capital, machinery, seeds	• ploughing	• wheat,
	• harvesting	• money.
	• threshing	
	• feeding animals	

Example 1. Shifting cultivation.

It is practised by people in the tropical forests of South America & South East Asia.

→ A small plot of forest is cleared by slash & burn — cutting down the smaller trees & burning the vegetation during a drier period. The resulting ash helps to fertilize the soil for a short time.

↓

→ crops like maize, dry padi (rice) bananas & vegetables are planted.

↓

→ Little attention is given to them, nothing is added to the soil → After 2 or 3 years soil lost its fertility → Another plot is cleared in another part of the forest & the process is repeated.

→ plants & small trees grow rapidly to take over the abandoned plot.

Factors affecting Shifting cultivation

☆ Usually traditional methods of farming are used → So output is low

→ hand labour → farming is for survival.

Example 2: Wet rice (padi) cultivation in Asia.

Rice is the staple (main) food in much of the Asia, vast majority of Asian farmers are subsistence farmers, there are some large commercial farms where rice is grown for sale → this is mostly associated with the floodplains & deltas of large Asian rivers such as the Ganges & Mekong, where rice is grown in the patch work of small flooded fields.

Factors for rice cultivation in Ganges valley.

Physical

- Heavy rainfall in June & September
- flat flood plains
- Silt soils are fertile

Human

- large no of people living in rural areas
- hand labour is needed for planting seeds
- Rice - cultivation is labour intensive.

Pg#7

Agricultural techniques to increase Yields

→ farming output had to increase fast to keep pace with the growth in world population
→ Food is grown in the world to feed 6-7 billion plus people.

Techniques to increase yield:

1- Irrigation 2- Chemicals 3- Mechanization
4- capital 5- HYV seeds.

1- Irrigation. It is an artificial supply of water from rivers, lakes, reservoirs & underground sources to farm lands.
   → water is transfered through canals & small channels to the fields.
   → Sometimes giant sprinklers used on certain fruit crops.

Examples of climate in which irrigation is used:

- Hot deserts : dry all year → Such as Egypt Middle East, California in the U.S.A
- Savanna & Monsoon → East Africa, India & Pakistan:

2- Chemicals: Inorganic fertilizers like Pesticides & fertilizers, herbicides are used to increase the crop yield.

Today only ~~one~~ cash crops

Cash crops like Banana, sugarcane, cocoa or coffee are grown on tropical plantations

3. Mechanization : Use of harvestors, tractors for large-scale farming to increase the yield.

4. Capital : More use of capital intensive things like irrigation, chemicals, machinery used by farmers increase the yield. Some times govt gives subsidies to the farmers to increase the yield.

5. HYV seeds : After 1960, 'Green revolution' started - people used the HYV seeds to increase the crop production especially the staple crops like maize, wheat & rice.

Advantages & Disadvantages of the Green Revolution

It was begun in Mexico in 1950's by American researchers to try to solve Mexico's food shortages.

Effects:

Successes

1- Yields increase by 3 times for farmers to afford HYV's & fertilizers.
2- fast growing crops → 2 times in a year
3- Increased output creates a surplus for sale / raised rural incomes & standard of living

Failures

For the country
→ More exports
→ less dependence on imported food
→ lower rate of malnutrition,
→ reduced rates of rural to urban migration

failures for farmers.

- Poor Peasants unable to afford new seeds & fertilizers
- farmers who borrowed money — end up in debt
- gap between large scale farmers & small-scale poor farmers.

for the country

- Environmental problems from the use of fertilizers & pesticides
- Salinization
- for paying debts — sell up → move to the cities.

World Patterns of trade :-

There is a wide gap between the developed Countries in the North & developing countries in the South.

→ Growers receive only a tiny percentage of the final selling price.

e.g. What goes into the price of a banana sold in the UK.

→ 2·1. for workers in country of growth

→ 10·1. to farm owners (labour, fertilizer, transport, profit)

→ 20·1. importers cost for ripening & distribution

→ 35·1. to storage & shipping costs

→ 33·1. to whole sale & & Shop owner.

Adverse effects of Modern Agricultural practices:-

(A) → over use of chemical pesticides & Inorganic fertilizers :-

- Excess concentrations of nitrates in ground & river water used for drinking water
- Eutrophication in rivers & lakes

(B) Use of irrigation water :-

- Salinization — too salty for crop growth
- Negative consequences of building large dams & reservoirs

(C) over cultivation & overgrazing of farm land :-

- Soil erosion, degradation & desertification.

Human impacts :-

- Only wealthy farmers can afford HYV, pesticides, fertilizers ——> More production

Govt gives subsidies to farmers (e.g U.S.A & E.U)

Strategies for Sustainable Agriculture:-

- They should be well suited to local climate & environment & → give long term benefits → appropriate for local people.

Examples of appropriate technology in agriculture:-

1- Irrigation: • wells instead of dams
• Trickle drip irrigation → water is directed to the plant roots which means that more is used by the plants & less is evaporated.
• Buried clay pot irrigation.

2- organic fertilizers: organic fertilizers from animals is better, green manuring from compost is possible in rice & other cereal growing areas.

3- Mixed cropping:
• Monoculture (growing only one type of crop) practiced on large farms

• Small farms — growing of mixture of cash crops for income / healthy for environment & economic reasons.

→ Inter-cropping — multi-storey cropping.

4- Natural Predators

Harmful pesticides can be replaced by natural predators → This can be done by encouraging an increase in the number of birds → which eat small animals & insects that damage crops

e.g in rice growing lands of Indonesia

5- New seeds & plant varities.

- focus on plant seeds which are rain fed than irrigation
- focus on crop of drier regin e.g peas & lentil rather than cereals
- Instead of focussing on yield should be on resistant to diseases, pests & drought are (fertilizer hungry)

more useful to African farmers.

Power from living Resources

90·1. from biomass

10·1. oil, coal & electricity

Types of biomass used

biomass, wood & animal dung especially in Nepal.

It is a renewable energy source but more than one billion people are consuming fuelwood resources faster than they are being replenished.

*Growth in biofuel is more recent.

Biofuels:- fuels made from crops either from vegetable oils for use in diesel engines. Ethanol or from fermented & distilled products of crops such as corn & sugar cane for use in petrol engines.

In 1975, Brazil launched its National alcohol programme to make ethyl alcohol from sugar cane. The country grew massive amounts of sugar cane for which export demand was going down, & there was spare capacity in its sugar mills.

Biogas: Gas produced from cowdung.

Clean methane gas is produced from cowdung & other wastes. Its use was pioneered in India in 1950's → mainly use for their cooking & lighting.

→ In Pakistan, the use of biogas is not as wide spread as except for some places in Sindh & the Punjab.

Please check fig 3.64 on Pg 166 for How a biogas plants works.

3.6 Climatic Hazards: Causes & Consequences

A natural hazard causes damage to people & property.
The main climatic hazards are
1- Cyclones: are tropical storms bringing very strong winds & heavy rain. Their visits to a coastal location may last only 24-48 hours but destruction can be total.

2- Floods: temporary surplus water which usually cover dry areas last for 2 or 3 days until the rain ceases & river level subsides e.g Bangladesh with its low lying location on the Ganges delta is with high risk floods.
3- Droughts: are periods of dry weather which last longer than normally expected & may last for months, occassionally years. It is considered as the climatic hazard for the people not in deserts but for the people living outside the desert where expected rain fails to arrive. These occur most in the tropics in areas like monsoon & savanna.
4- Tropical cyclones: cyclones are formed when the sea water at its hottest (27°c or more)
→ cyclone is the name for tropical storms which form in the Indian ocean. Hurricanes in the Caribbean & typhoons in the South China Sea are the same phenomena but with different names
→ Air above the sea surface is heated & the warm moist air starts to rise. As it does so, a deep centre of low pressure

develops, which sucks up even more air from the surface.

→ Wind speeds around the centre of the cyclone increase to 150-200 KPh in a large circular swirl of cloud which may be up to 600 K.M across. Torrential rain falls from towering cumulo-nimbus clouds, except in the 'eye' in the very centre where the weather calm & dry.

Climatic Hazard Impacts & Strategies for their reduction:-

Cyclones: wind speed 300 kph

impact: Social loss, economic loss (damage to crops, homes, business e.t.c)
- water supply, sewage
- water related diseases
- Mosquito increase
- loss to fruit trees (5 - to 10 years for fruit bearing trees to grow back)

Strategies: • Satellites monitoring
- cyclone shelter building (emergency supply & drinking water.

Droughts: It is for months / years.

impact: malnutrition → famine → low immunity (children + elderely affected sick)

Strategies: • Temporary refuge camps
• tree planting to stop run off + soil erosion
• making organic compost pit
• Small stones, concrete or earth dam to hold water flowing down the valley sides.

Case Study: Cyclones in orissa India

- lasts for 36 hours
- winds 270 km
- 10 m high wave
- $1.3 m public & private damage
- 10,000 death toll
- Agriculture damage (Rice, or other major crops)
- Coastal areas covered with salts
- trees damage / irrigation network damage.

→ oil Slick using booms (floating inflatable tubes prevents slicks from spreading)

→ Some of By Skimmers (oil drawn up absorbent belt, Rollers scarpe & squeeze oil into collecting tank)

→ by using detergent sprays (Chemicals break up ~~into~~ oil into droplets dispersing larger slicks)