

ENVIRONMENT & ECOLOGY

BAS104/204

UNIT-4

POWERPOINT PRESENTATION

BY: Mr. ANUPAM RATN,

ASTT. PROFESSOR,

APPLIED SCIENCE DEPT.

BAS104 / BAS204: ENVIRONMENT AND ECOLOGY SYLLABUS

Unit-4:

Current Environmental Issues of Importance; Global Warming, Green House Effects, Climate Change, Acid Rain, Ozone Layer Formation and Depletion, Population Growth and Automobile pollution, Burning of paddy straw.

LECTURE-23: CONCEPT OF GLOBAL CLIMATE CHANGE, GLOBAL WARMING AND GREENHOUSE EFFECT.

GLOBAL CLIMATE CHANGE

Climate change usually refers to changes of climate caused by human activities such as industrialization, urbanization, deforestation, mining, construction etc. All these activities are responsible for environmental pollution.

Effects of climate change:

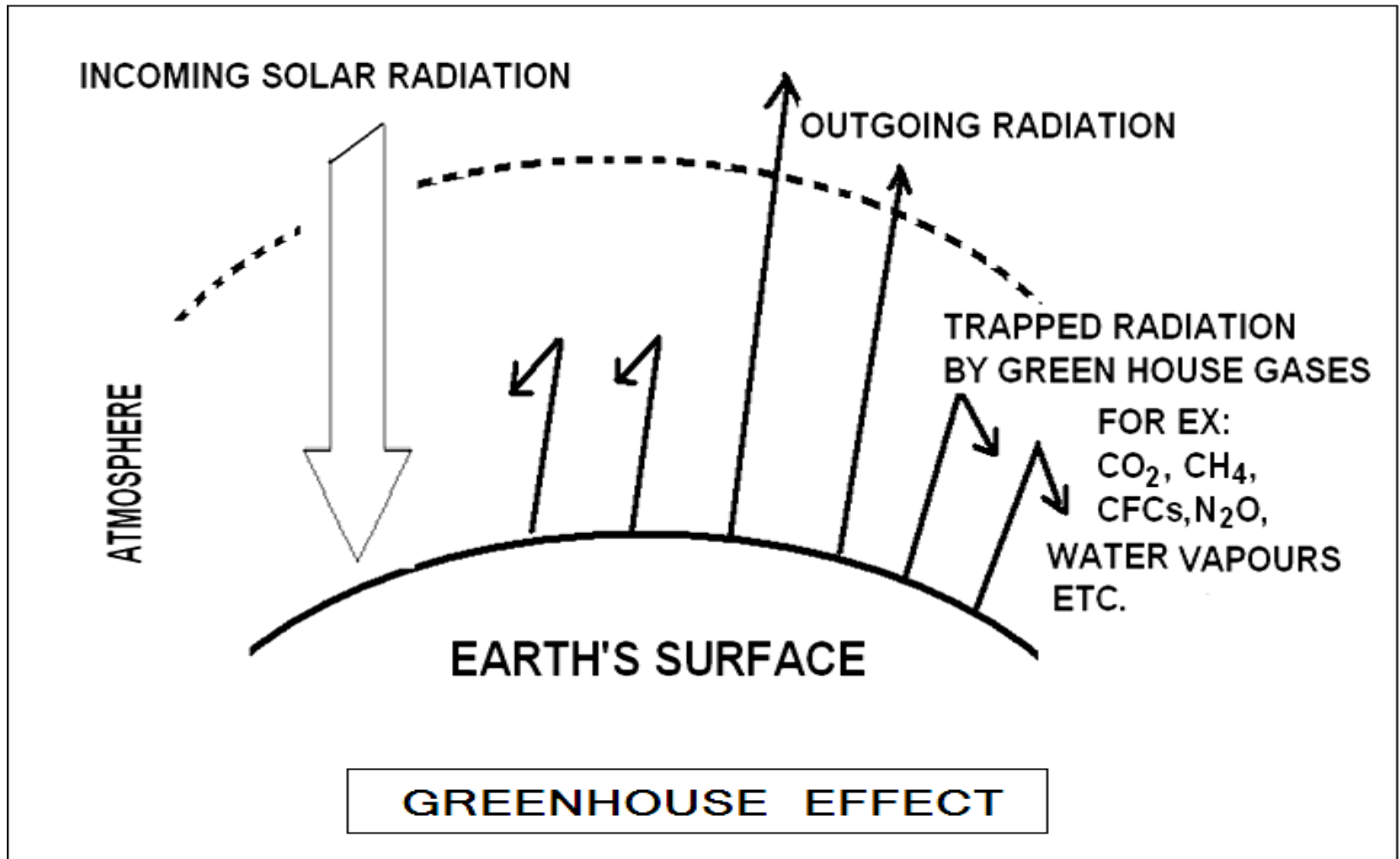
- The global temperature increase (rise) will have negative effect (i.e. low production) on food crops for ex: wheat, maize etc.
- Melting of polar ice/glaciers due to global warming.
- Rise in sea level
- It is estimated that by the year 2080 nearly one third of the total biodiversity will go under sea (i.e. will be submerged).
- Disturbance in rainfall pattern
- Flood in heavy rainfall areas (i.e., coastal regions)
- Drought in low rainfall areas
- Loss of wildlife and biodiversity

LECTURE-23: CONCEPT OF GLOBAL CLIMATE CHANGE, GLOBAL WARMING AND GREENHOUSE EFFECT.....

GREENHOUSE EFFECT / GLOBAL WARMING:

There are several gases in the earth's atmosphere (primarily CO₂ and water vapours) that allow the solar radiation (short wave radiation or visible light) to come to earth's surface, but do not allow the reflected long wave heat radiation (infrared radiation) to go back into the atmosphere. Therefore much of the heat is retained in the earth's atmosphere, which causes a warming effect. This phenomenon is known as greenhouse effect (GHE).

LECTURE-23: CONCEPT OF GLOBAL CLIMATE CHANGE, GLOBAL WARMING AND GREENHOUSE EFFECT.....



LECTURE-23: CONCEPT OF GLOBAL CLIMATE CHANGE, GLOBAL WARMING AND GREENHOUSE EFFECT.....

GREENHOUSE GASES (GHGS)	% CONTRIBUTION	SOURCE
CO ₂	55%	Burning of fossil fuels, burning of biomass (wood), deforestation, respiration of plants and animals
CH ₄	15%	Burning and decomposition of biomass, Paddy (rice) cultivation, fossil fuels, Enteric fermentation in cattles
CFC's (Chlorofluorocarbons)	17%	Air conditioners, refrigerators, aerosol spray propellants, sterilizers of medical use
N ₂ O (Nitrous Oxide)	6%	Burning of fossil fuels, fertilizers, animal wastes
Others	7%	-----

LECTURE-23: CONCEPT OF GLOBAL CLIMATE CHANGE, GLOBAL WARMING AND GREENHOUSE EFFECT.....

IMPACT OF GLOBAL WARMING/ENHANCED GREEN HOUSE EFFECT:

Climate change: According to scientific estimation global warming may cause the world's temperature to rise by 4.5°C to 5.5°C by the year 2050.

Effects of climate change due to global warming:

- Melting of polar ice/glaciers due to global warming.
- Rise in sea level
- It is estimated that by the year 2080 nearly one third of the total biodiversity will go under sea (i.e. will be submerged).
- Disturbance in rainfall pattern
- Flood in heavy rainfall areas (i.e., coastal regions)
- Drought in low rainfall areas (i.e., Central India)
- Loss of wildlife and biodiversity

LECTURE-23: CONCEPT OF GLOBAL CLIMATE CHANGE, GLOBAL WARMING AND GREENHOUSE EFFECT.....

STEPS TO MINIMIZE (I.E. PREVENTION, CONTROL AND REMEDIAL MEASURES) GLOBAL WARMING:

- Environmental education and public awareness
- Plantation (i.e. Afforestation and Reforestation programme)
- Implementation of sustainable agriculture or organic farming
- Reduction in use of fossil fuels (coal, petroleum etc.).
- Use of alternative sources of energy. For ex: solar energy, wind energy, geothermal energy, biomass energy etc.
- Use of CNG and biofuels (biodiesel and biopetrol).
- Pollution control laws should be enforced strictly.

LECTURE-24: CONCEPT OF ACID RAIN AND OZONE LAYER DEPLETION

Acid rain: Term acid rain was given by Robert Angus Smith in 1852, meaning *“the presence of excessive acids in rain water”*.

pH value of normal rainfall: about 5.6

pH value of acid rainfall: less than 5.6

LECTURE-24: CONCEPT OF ACID RAIN AND OZONE LAYER DEPLETION.....

MECHANISM OF ACIDRAIN FORMATION

Combustion of Fossil fuels



Release of Pollutants like Oxides of Sulphur (SO_x), Oxides of Nitrogen (NO_x), CO_2 etc. into the atmosphere.



Oxides of Sulphur (SO_x), Oxides of Nitrogen (NO_x), CO_2 etc. react with *water vapours* (H_2O) in the atmosphere in the *presence of sunlight* and as a result *strong acidic compounds* are formed.



These acidic compounds get precipitated in the form of rainfall.

LECTURE-24: CONCEPT OF ACID RAIN AND OZONE LAYER DEPLETION.....

EFFECT OF ACID RAIN ON ENVIRONMENT

1. Acid rain causes corrosion of buildings and monuments made up of marble.
2. Acid rain removes the waxy protective coating of leaves, damaging them and inhibits (stop) photosynthesis.
3. Acid rain increases the acidity of soil due to which beneficial (=useful) microorganisms and earthworms get destroyed.
4. Acid rain increases the acidity of lakes, rivers, and ponds which results in death of aquatic organisms

LECTURE-24: CONCEPT OF ACID RAIN AND OZONE LAYER DEPLETION.....

OZONE LAYER DEPLETION

“Ozone layer depletion refers to the phenomena of reduction in the amount of ozone in the stratosphere”.

Scientists (Farman *et. al.*,) in 1985 discovered that ozone layer was thinning (reducing) in Antarctica (South Pole) during polar spring (August, September). This thinning of ozone layer was said ozone hole.

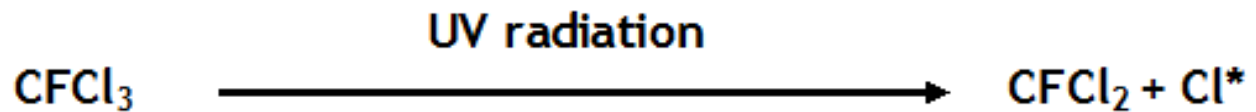
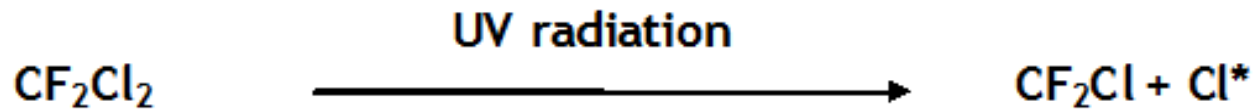
CAUSES OF OZONE LAYER DEPLETION

Chlorofluorocarbons, methane and nitrous oxide cause destruction of ozone layer.

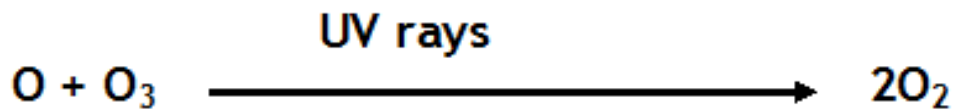
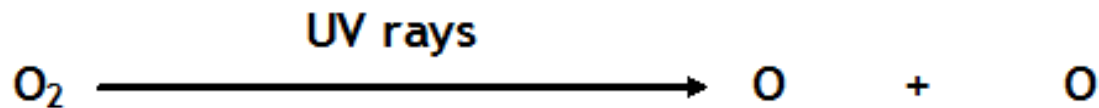
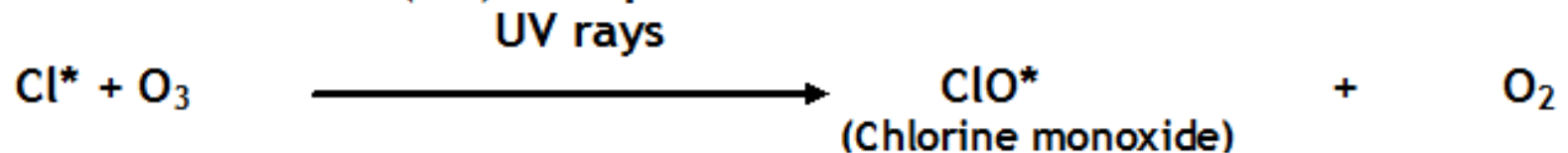
LECTURE-24: CONCEPT OF ACID RAIN AND OZONE LAYER DEPLETION.....

MECHANISM OF OZONE LAYER DEPLETION:

CF_2Cl_2 and CFCl_3 are destroyed by UV radiation in the stratosphere and chlorine is released in this process.



The chlorine radical (Cl^*) thus produced is called ozone eater.



LECTURE-24: CONCEPT OF ACID RAIN AND OZONE LAYER DEPLETION.....

EFFECT OF OZONE LAYER DEPLETION/OZONE HOLE

- ❑ The thinning of ozone layer results in more UV-B radiation reaching the earth's surface which adversely affects the life on earth.
- ❑ UV-B radiation from sun destroys the protein in the body cells and may cause skin cancer, which is known as melanoma.
- ❑ UV-B radiation damages the DNA (Nucleic acid) of the cell and can cause mutation.
- ❑ UV radiation can cause eye damage and cataracts.
- ❑ UV radiation damage functioning of immune system.

LECTURE-25: CAUSES, IMPACTS AND CONTROL MEASURES OF AUTOMOBILE POLLUTION

Automobiles are the largest source of air pollution in cities. They contribute about 60% of air pollution.

COMPOSITION OF AUTOMOBILE EXHAUST:

- Carbon monoxide (77.2%)
- Oxides of Nitrogen (7.7%)
- Hydrocarbons (13.7%)
- Oxides of Sulphur, particulates and some lead compounds

LECTURE-25: CAUSES, IMPACTS AND CONTROL MEASURES OF AUTOMOBILE POLLUTION.....

POLLUTANTS	EFFECT ON ENVIRONMENT/LIVING BEINGS/HUMAN HEALTH
CO	It causes <i>blood poisoning</i> .
NO _x (Oxides of Nitrogen)	Acid rain, photochemical smog
UNBURNT HYDROCARBONS (For ex: Benzene, Benzopyrene and Methane)	Unburnt hydrocarbons react with oxides of nitrogen in the atmosphere in presence of sunlight and as a result Photochemical smog is formed. It causes eye irritation and bronchial disorder. Hydrocarbons show carcinogenic effect (i.e., hydrocarbons can cause cancer).
SO _x (Oxides of Sulphur)	Acid rain, sulphurous smog
Particulate matter	Long term exposure to particulate matter in air results in increased rate of bronchitis/asthma and reduced lung function.

LECTURE-25: CAUSES, IMPACTS AND CONTROL MEASURES OF AUTOMOBILE POLLUTION.....

CONTROL OF AUTOMOBILE POLLUTION:

- *Vehicles should be checked at regular interval.*
- *Upgrading of fuel quality and use of cleaner fuel*
- *Use of unleaded petrol*
- *Use of CNG*
- *Use of biofuels (biodiesel/biopetrol)*
- *Use of filters and catalytic convertors in engines*

LECTURE-25: CAUSES, IMPACTS AND CONTROL MEASURES OF AUTOMOBILE POLLUTION.....

Particulate matters are the discrete mass of any material. For ex: dust, mist, fog, fumes, smoke, fly ash, fur, hair, spores, pollen grains etc.

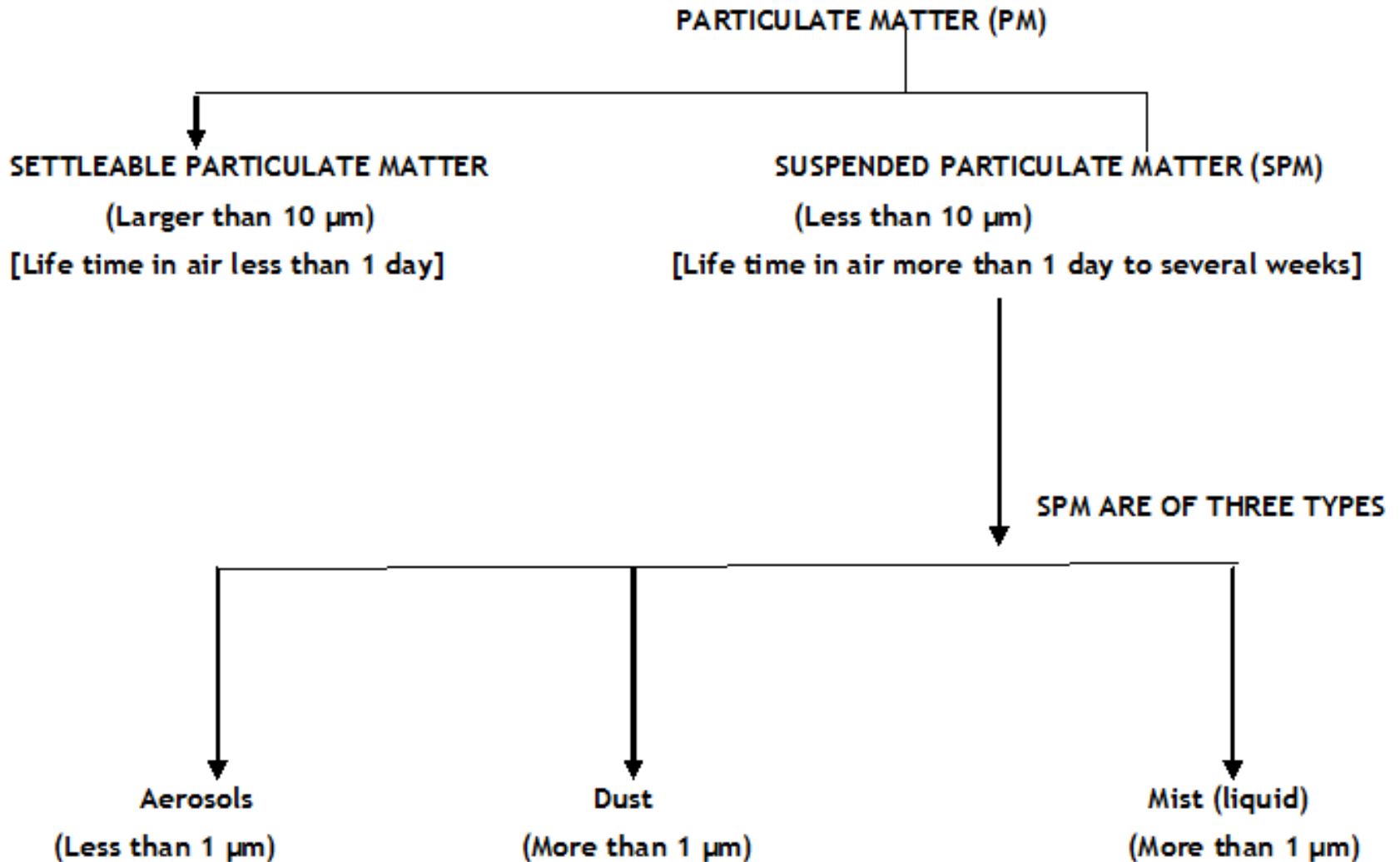
Particulate in atmosphere arise from natural sources like soil and rock debris, volcanic emission, forest fires and anthropogenic activities.

Particulate matter:

Size range: Between 0.0002 μm to 500 μm

Life time: few seconds to several months

LECTURE-25: CAUSES, IMPACTS AND CONTROL MEASURES OF AUTOMOBILE POLLUTION.....



LECTURE-25: CAUSES, IMPACTS AND CONTROL MEASURES OF AUTOMOBILE POLLUTION.....

CONTROL MEASURES:

- *Gravity settling tanks:*
- *Porous filters:*
- *Electrostatic precipitators:*
- *Cyclone collector:*

LECTURE-26: BURNING OF PADDY STRAW, ITS CAUSES, ENVIRONMENTAL IMPACTS AND CONTROL MEASURES

Paddy straw burning or stubble (parali)

burning is a method of removing paddy/rice crop residues from the field to sow wheat (Rabi crops) from the last week of September to November.

- Paddy straw burning is a process of setting on fire the paddy straw stubble, left after the harvesting of grains of paddy (=rice).

LECTURE-26: BURNING OF PADDY STRAW, ITS CAUSES, ENVIRONMENTAL IMPACTS AND CONTROL MEASURES

EFFECTS OF PADDY STRAW BURNING:

- ❑ Environmental pollution and formation of smog.
- ❑ The smog caused irritation in eyes, irritation in nose, irritation in throat, cough and wheezing problem.
- ❑ Burning husk on the ground **destroys the nutrients in the soil**, making it less fertile.
- ❑ The heat generated by stubble burning **penetrates into the soil, leading to the loss of moisture** and useful microbes.

LECTURE-26: BURNING OF PADDY STRAW, ITS CAUSES, ENVIRONMENTAL IMPACTS AND CONTROL MEASURES

SOLUTIONS (REMEDIAL MEASURES) TO THE BURNING PROBLEM:

- **Agricultural machineries:** Farmers can also manage crop residues effectively by employing agricultural machines like:
 - ❑ **Happy Seeder** (used for sowing of crop in standing stubble)
 - ❑ **Rotavator** (used for land preparation and incorporation of crop stubble in the soil)
- **Converting Crop Stubble to Biodegradable Cutlery**
- **By converting Crop Stubble into Animal Feed, Manure and Cardboard**

THANK YOU