Course- ENVIRONMENTAL STUDIES
Course Code – 22447

CO-a: Develop Public Awareness about Environment.

Unit Outcome- UO -1e

MSBTE LEAD- STUDY AT YOUR DOORSTEP

Topic-1 Environment

Written by

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Course Expert and Coordinator

What we will learn today

1. **Agenda point** – Environmental issues

Understand about environmental issues and their impacts.

Content

1.3 Environmental issues –Green house effects, Global Warming, Climate change and Acid rain.

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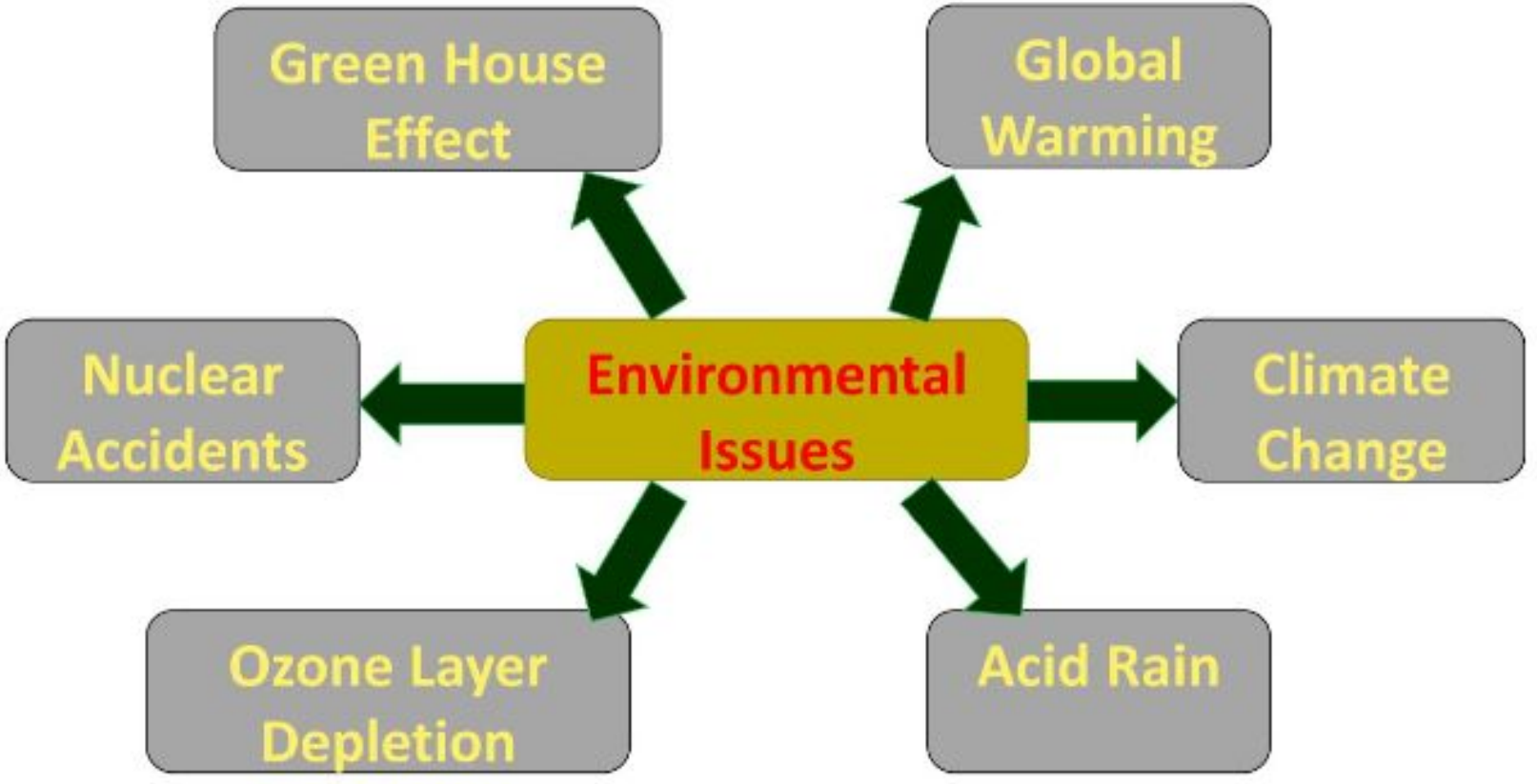
Learning Objective/ Key learning

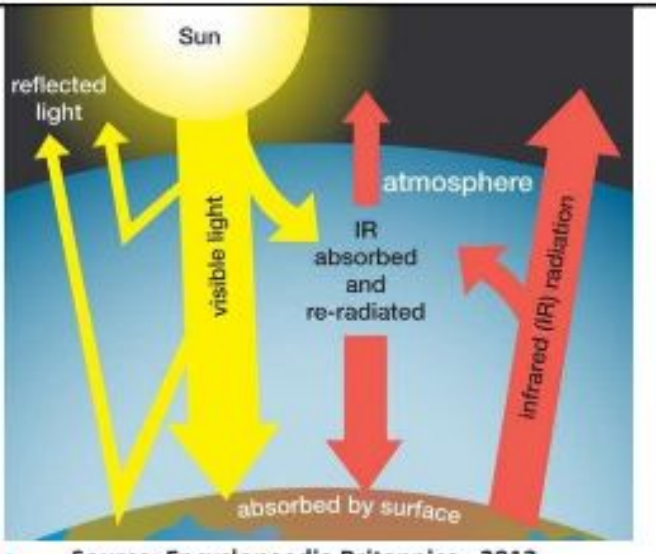
- 1e. Describe various environmental issues.

Concept Map



Environmental Issues: 1. Green House Effect:

- The phenomenon of increase in temperature of the earth as in artificial greenhouse is called ***green house effect***.
- The gases which are responsible for the greenhouse effect are called ***greenhouse gases*** [1].
- A warming of Earth's surface and troposphere (the lowest layer of the atmosphere) caused by trapping the heat in the form of infra red radiation near the earth surface by atmospheric constituents such as water vapour, carbon dioxide, methane, nitrogen oxides and Chloro Fluro Carbons.
- Environmental scientists estimated that the green house effect of carbon dioxide was 57%, chlorofluorocarbon was 25%, methane was 12% and that of the oxides of nitrogen was 6% [1; 2].



Source: Encyclopaedia Britannica, 2012

Footnotes

Environmental Issues: 1. Green House Effect:

Effects on animals:

- It has a role in spreading different types of diseases like malaria, filariasis, cholera, and diarrhoea etc due to rise in temperature.
- It has a role in increasing the number of vectors like insects transmitting diseases.

Effects on plants:

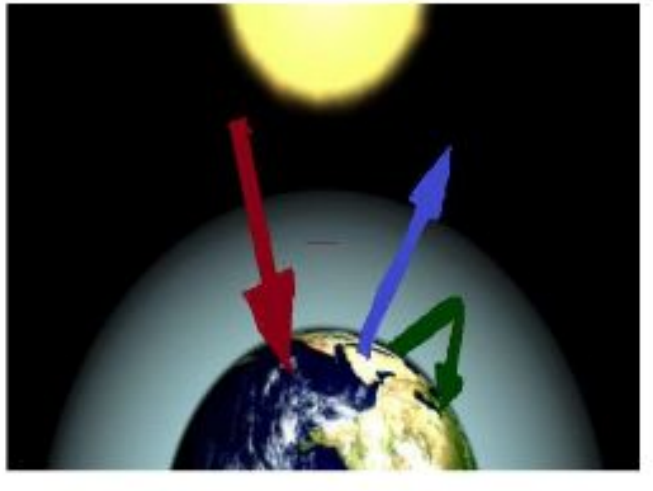
- It affects water cycle, soil moisture and soil composition. As a result, there is a change in cultivation and harvesting periods of crops.
- Tropical plants are seen at the temperate region.
- It affects on yield of crops.

Effects on climate:

- It increases the temperature of earth.
- It brings about the melting of ice in the Polar Regions, which increases the sea level due to which the low land coastal areas may sink and go underwater.
- It also changes the pattern of rainfall and weather conditions [1; 2; 3].

Environmental Issues: 2. Global Warming:

- Global warming is the phenomenon of rise in temperature of the earth by accumulation of green house gases.
- About 75% of the solar energy reaching the Earth is absorbed on the earth's surface which increases its temperature. The rest of the heat radiates back to the atmosphere. Some of the heat is trapped by greenhouse gases, mostly carbon dioxide this responds to keep the temperature warmer [2; 3; 4].
- **Effects :**
  - Temperature increases
  - Glaciers melt
  - Rising ocean levels
  - Alter forests, crop yields
  - Affect human health
  - Affect ecosystems
  - Season changes



Global Warming Potential (GWP):

- Global warming potential (GWP) for the 6 primary GHGs are summarized below:

Greenhouse Gas	Chemical formula	Global Warming Potential [Time Horizon] 20 years	100 years
Carbon Dioxide	CO_2	1	1
Methane	CH_4	42-70	16-26
Nitrous Oxide	N_2O	280	310
Hydrofluorocarbons	HFCs	460 - 9,100	140-11,700
Perfluorocarbon	PFCs	4,400-6,200	6,500-23,900
Sulphur Hexafluoride	SF_6	16,300	23,900

Source: https://iasmania.com/greenhouse-effect-greenhouse-gases/

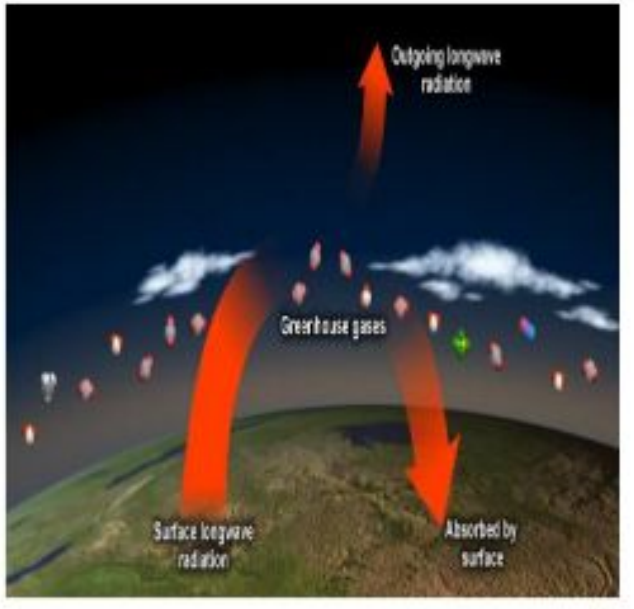
- **GWP is the global warming impact that a GHG would have over a 10-year timeframe.**
- **By definition, CO2 is used as the reference benchmark [2].**

Environmental Issues: 3. Climate Change

- Climate is the average weather at a given point and time of year, over a long period (typically 30 years).
- We expect the weather to change a lot from day to day, but we expect the climate to remain relatively constant.
- If the climate doesn't remain constant, we call it climate change [2; 4].

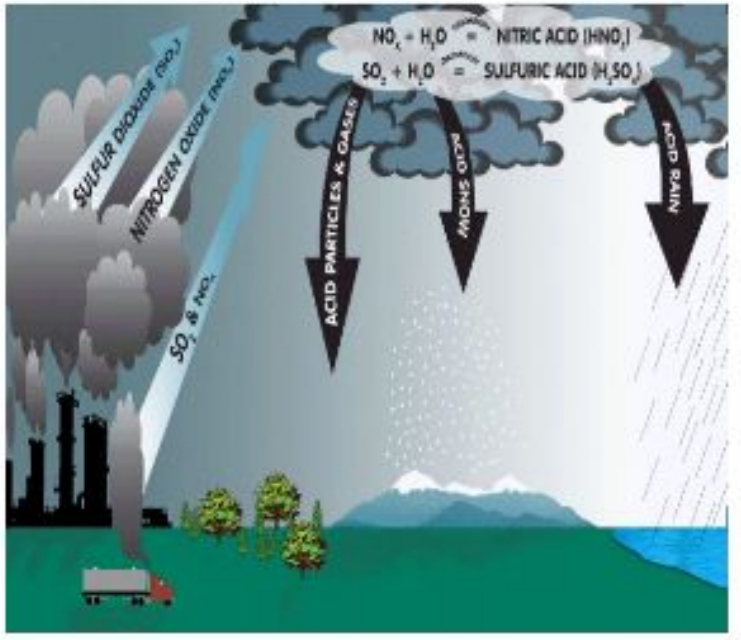
Changes in:

- **Sun's output (Solar radiation)**
- **Earth's orbit**
- **Drifting continents**
- **Volcanic eruptions**
- **Greenhouse gases**



Environmental Issues: 4. Acid Rain

- Acid rain is basically rain that has a low pH.
  - When fossil fuels such as coal, oil and natural gas are burned, chemicals like sulfur dioxide and nitrogen oxides are produced.
  - These chemicals react with water and other chemicals in the air to form sulfuric acid, nitric acid and other harmful pollutants like sulfates and nitrates.
  - These acid pollutants spread upwards into the atmosphere, and finally return to the ground in the form of acid rain [2; 4].



- EFFECTS OF ACID RAIN

  Acid rain is an extremely destructive form of pollution, and the environment suffers from its effects. Land, Buildings, Forests, trees, lakes, aquatic life, animals, and plants suffer from acid rain.

Revision

- **What we have learned today?**
  - Green house effect and its impacts.
  - Global warming and its impacts.
  - Climate change and its impacts.
  - Acid rain and its impacts.

Let's Have a Quiz……

References

1. Dr Prabhu Prasadini and Dr G. Swarajya Lakshmi, ENVIRONMENTAL SCIENCE, BIRM 301 Study Material.
2. Dr. Y. K. Singh, 2006. Environmental Science. NEW AGE INTERNATIONAL (P) LIMITED, PUBLISHERS, New Delhi, India.
3. Prof. Erach Bharucha, 2004. Textbook for Environmental Studies. University Grants Commission, New Delhi. India.
4. Michael Aaleby, 2000. Basics of Environmental science, 2nd Edition, Taylor & Francis Group, New York.
5. www. Britanica.com
6. www. Onlinesciencenote.com

Program – CIVIL ENGINEERING
Program Code – CE

MSBTEs E-content

Expert- Dr. B. R. Ambade, LCE, G P Bramhapuri

06/07/2020

MSBTE LEAD- STUDY AT YOUR DOORSTEP

Course- ENVIRONMENTAL STUDIES
Course Code – 22447

CO-a: Develop Public Awareness about Environment.

Unit Outcome- UO 1d, and 1e

MSBTE LEAD- STUDY AT YOUR DOORSTEP

Topic – 1
Environment

Written by

Dr. B. R. Ambade
Course Expert and Coordinator

What we will learn today

1. **Agenda point** – Environmental issues
2. **Agenda point** – Concept of 4Rs
3. **Agenda point** – Public awareness about environment

Understand about environmental issues and Public awareness about environment.

Content

1.3 Environmental issues - Ozone layer depletion and Nuclear accidents.

1.4 Concept of 4Rs – Reduce, Reuse, Recycle and Recover

1.5 Public awareness about environment.

Dr. B. R. Ambade

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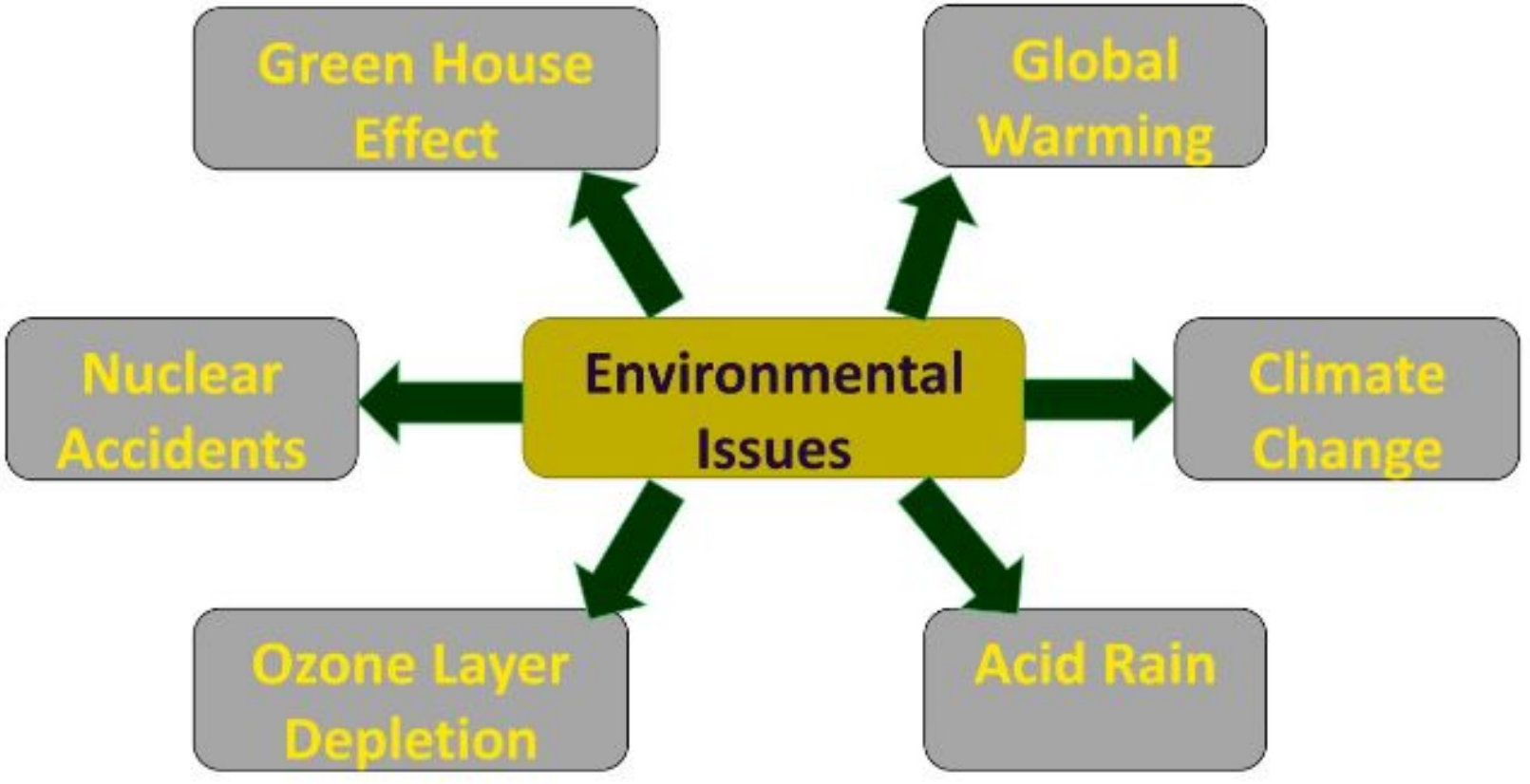
Learning Objective/ Key learning

- 1d. Discuss the need of public awareness about environment.
- 1e. Describe various environmental issues.

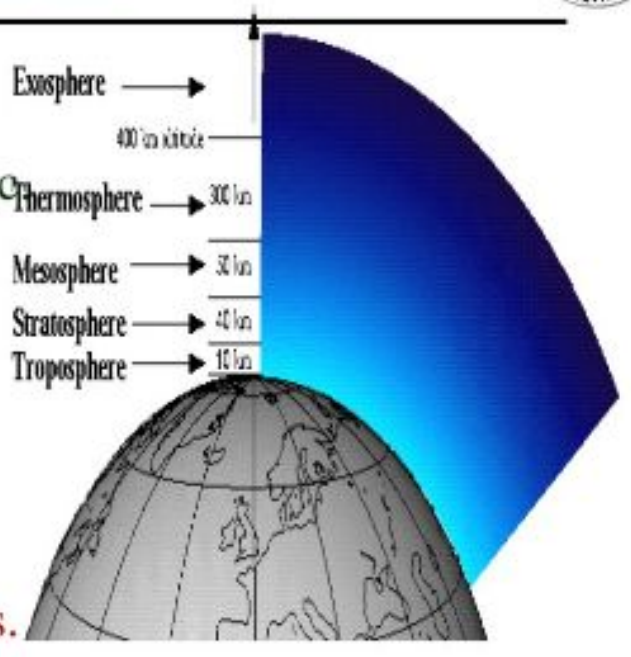
Concept Map



Environmental Issues: 5. **Ozone Layer Depletion**

- **Troposphere:**
  - The lowest layer (about 15 km from the ground)
  - Contains normal air composition of N_2, O_2, water vapour, CO_2, etc.
  - Temperature decreases with altitude.
- **Stratosphere:**
  - Above the troposphere
  - Temperature increases with altitude
  - Contains a lot of ozone (ozone layer):
    - Found in the stratosphere between 10 - 50km above the ground
    - Protects us from the harmful effects of UV of certain wavelengths.
    - Decrease in ozone concentration → Increase in UV-B radiation reaching the earth surface.
- **Formation of ozone layer** $O_2 + \text{sunlight} \rightarrow O + O$

$$O + O_2 \rightarrow O_3$$



Environmental Issues: 5. Ozone Layer Depletion

- Ozone layer in the atmosphere protects life on earth from the dangerous UV radiation from the sun.
- **Destruction of ozone Layer**

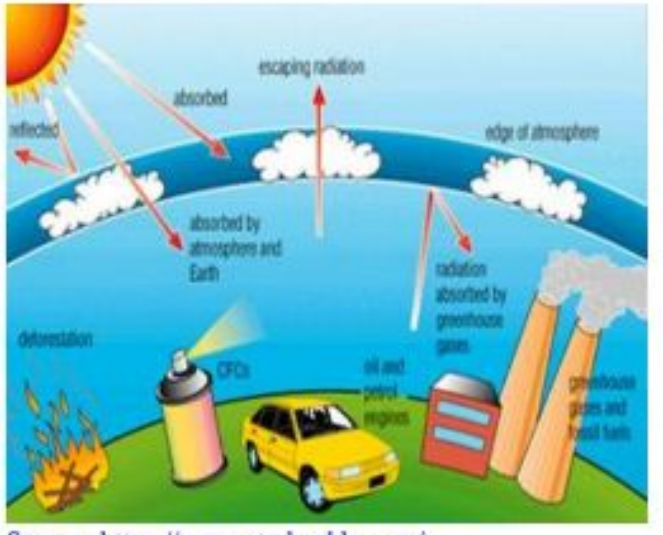
  Chlorine atoms from CFCs attack the ozone, taking away ozone and forming chlorine monoxide (ClO).

  $$O_3 + Cl \rightarrow O_2 + ClO$$

  Chlorine monoxide then combines with another oxygen atom to form a new oxygen molecule and a chlorine atom.

  $$ClO + O \rightarrow Cl + O_2$$

  The chlorine atom is free to destroy up to 100,000 ozone molecules



Source: https://www.studyadda.com/

Footnotes

IMPACTS OF OZONE LAYER DEPLETION

- Sunburn.
- Reduce our immune system.
- Skin Cancer.
- Cataracts and Other Eye Damages.
- Reduce photosynthesis and crops yield affected.
- Damage the plants.
- Reduces plankton population.
- Reduces penguin population.
- Reduces the percentage of hatching of frog eggs.
- Forming photochemical smog.
- Degrades building materials.

Environmental Issues: 6. **Nuclear Accidents**

- When safety measures and principles are ignored by nuclear plant operators, a nuclear accident can occurred with serious consequences for the environment, and human health. Now, efforts are made to prevent the radiation during accidents.
- Since 1957, ten major nuclear accidents have been reported by five countries:
  - Fukushima, Japan - March 2011;
  - Kashiwazaki, Japan - July 2007;
  - Mihama, Japan - August 2004;
  - Blayais, France - December 1999;
  - Tokaimura, Japan - September 1999;
  - Tokaimura, Japan - March 1997;
  - Chernobyl, Ukraine - April 1986;
  - Three Mile Island, USA - March 1979;
  - The Urals, USSR - October 1958;
  - Windscale, UK – October 1957.

Environmental Issues: 6. Nuclear Accidents

Impacts of Nuclear Accidents

- develop cancer ,
- deaths ,
- Species extinction,
- Alteration of DNA,
- Residual radioactivity in environment (environmental pollution),
- High fever, diarrhoea, fatigue, mortality, infection bleeding etc.,
- Skin diseases,
- Disturb aquatic life,
- Long term effects on environment.

Source: Pedraza , 2013

HOW TO AVOID THIS ?

Environmental Management:

Environmental Issues:

HOW IT CAN BE ACHIEVED ?

Concept of 4R's

► **Reduce:** Prevent generation of waste in the first place; by eliminating waste at source through better planning and design. Don't use a resource if there is an alternative. (Donate old things; Take good care of your things; choose walking / cycling than driving; Use glassware than paper wares).

► **Reuse:** Use a resource again and again without changing it or reprocessing it for different functions than what they are intended. (Old news papers used for packing; Plastic and steel containers used for plantation etc).

► **Recycle:** Reproduce / remanufacture the new material by using recyclable waste as raw material in its parent industry. (Paper, Glass, Plastic, Metal, Rubber etc).

► **Recover:** Producing usable products or energy by processing / treating the waste. (biogas, fertilizer, Waste to energy etc).

► **Benefits of 4R's – Reduces waste, Reduces pollution, Saves energy, Saves resources, Improves economy, Creates employment.**

Public awareness about environment

- Educate the people about environmental studies.
- Participation of people in environmental issues.
- Implementation of principle of 4Rs.
- Adoption of eco-friendly technology.
- Conserve the resources.
- Follow various acts on environment.
- Practice and promote good civic sense and hygiene.
- Practice and promote to Reduce pollution.
- Join local movements that support activities like saving trees in your area, go on nature treks, recycle waste, buy environmentally friendly products.
- Join a group to study nature, such as WWF-1 or another environmental group.

Public awareness about environment

Let's Together Build a World In Which Every Person Has.....

Public awareness about environment

WHEN WILL WE START FOR OUR FUTURE ?

NOW ?

OR

LATER ON ?

Revision

- **What we have learned today?**
  - Ozone layer depletion and its effects.
  - Nuclear accidents and its effects.
  - Concepts of 4R's.
  - Public awareness about environment.

Let's Have a Quiz.....

References

1. Dr Prabhu Prasadini and Dr G. Swarajya Lakshmi, ENVIRONMENTAL SCIENCE, BIRM 301 Study Material.
2. Dr. Y. K. Singh, 2006. Environmental Science. NEW AGE INTERNATIONAL (P) LIMITED, PUBLISHERS, New Delhi, India.
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Program – CIVIL ENGINEERING
Program Code – CE

MSBTEs E-CONTENT

Expert-Dr. B. R. Ambade, LCE, G P Bramhapuri

06/07/2020

MSBTE LEAD- STUDY AT YOUR DOORSTEP

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Course Code – 22447

CO-a: Develop Public Awareness about Environment.

Unit Outcome- UO 1a,1b, and 1c

MSBTE LEAD- STUDY AT YOUR DOORSTEP

Topic – 1
Environment

Written by

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What we will learn today

1. **Agenda point** – Environment its need and Scope.
2. **Agenda point** – Segments of Environment

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Understand about environment and its segments.

Content

1.1 Definitions. need of environmental studies.

1.2 Segments of environment- Atmosphere, Hydrosphere Lithosphere, Biosphere.

Learning Objective/ Key learning

- 1a. Discuss the scope of environment.
  - 1b. Describe various types of environment
    - 1c. Describe the importance of environmental studies.

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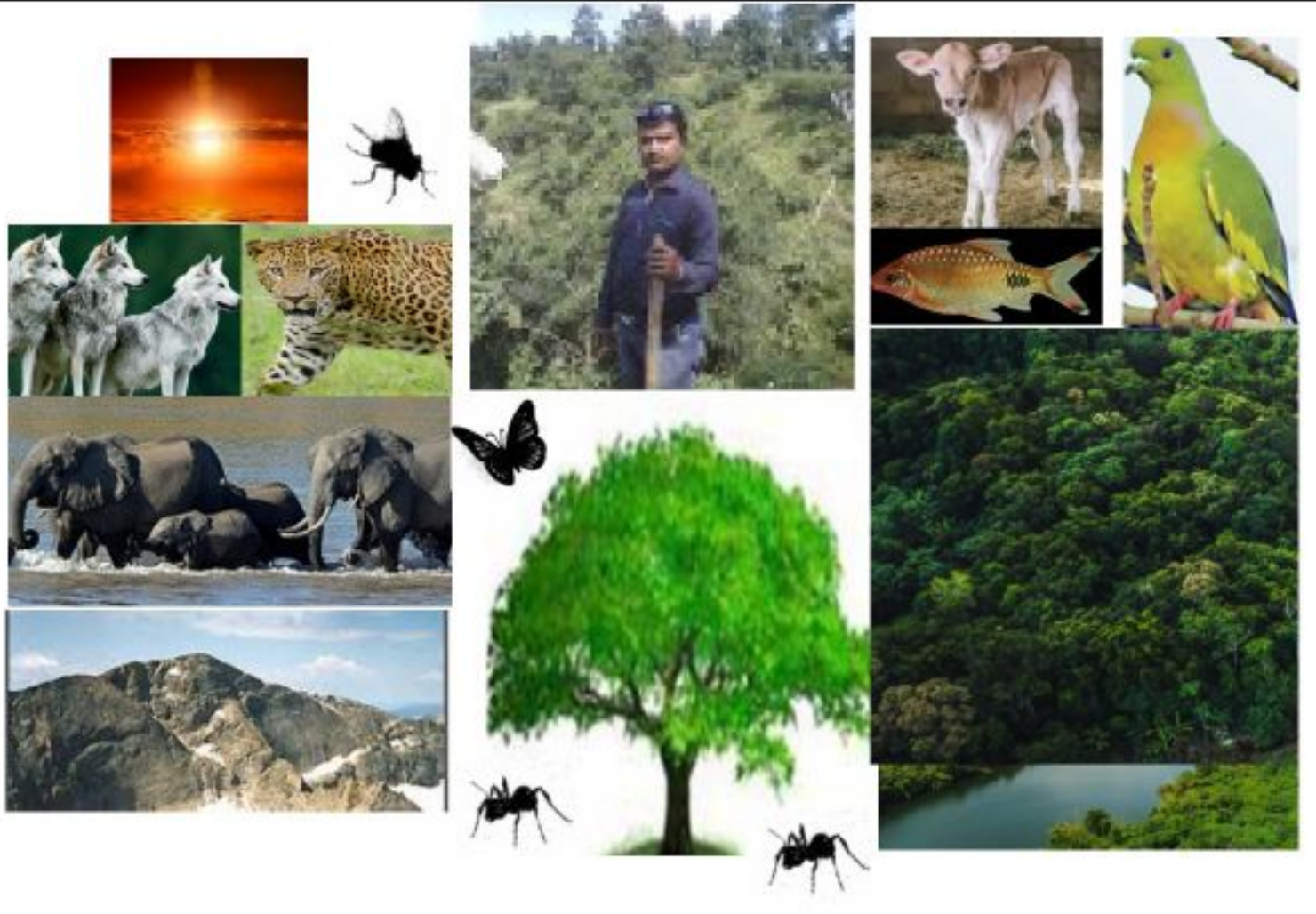
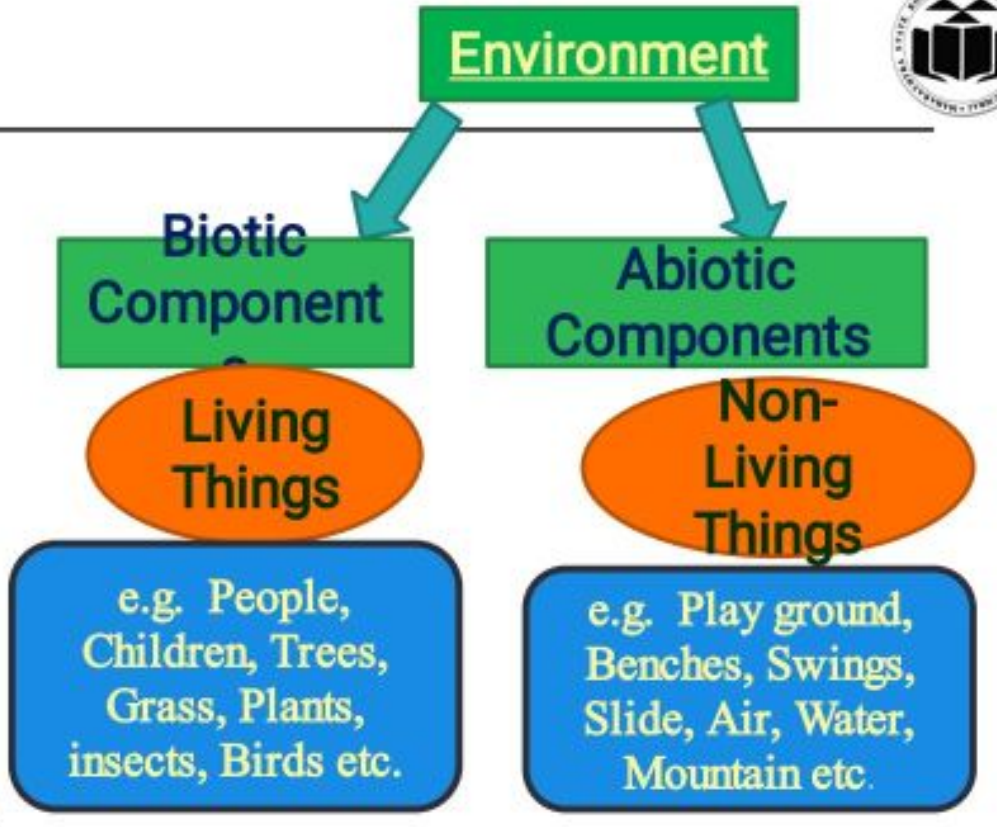
Concept Map of Environment



UNIT 1: ENVIRONMENT

- The word environment is derived from the French verb 'enviro' which means 'surrounding'. Thus, our environment can be defined as the physical, chemical and biological world that surround us.
- In Simple way the Environment is A place around us includes people, children, benches, ground, grass, trees, insects, birds, sunlight, air, land, water, mountain etc [2].
- Biotic components constantly interact and exchange things with each other as well as with an A biotic components for their survival and existence [2; 4; 5].



Footnotes

Types of Environment

Natural Environment

The environment in its original form without the interference of human beings is known as natural environment.

All living and nonliving things occurring naturally on earth

Man-made Environment

The environment changed or modified by the interference of human beings is called man made environment.

e.g., Infrastructure, Utilities, Institutions, housing, industries , parks, buildings, energy networks, transportations, etc

Social Environment

Social Environment includes an individual's social, economic and political condition wherein he lives.

e.g., Customs, Traditions, ethics, Language, Culture, Professions, Living conditions etc

Psychological Environment

Every individual has his own psychological environment, in which he lives.

The Psychological environment enables us to understand the personality of an individual. Both the person and his goal from psychological environment

STRUCTURE OF ENVIRONMENT :

Physical Environment

(i) **Solid** - The lithosphere (solid earth) : Soil / land and Mountain Environment

(ii) **Liquid** - The hydrosphere (water component) : River, Reservoir, Oceans and Glacier Environment

(iii) **Gas** - Various gases (oxygen, carbondioxide, nitrogen, méthane etc. present in atmosphere.

Biological Environment

i) **Plants (flora):** trees, grass, shrubs etc.

(ii) **Animals (fauna) :** domestic and wild animals, humans, birds, insects etc [2; 4].

SCOPE OF ENVIRONMENTAL STUDIES

- This subject educates the students, citizens and experts to understand the complexity of environmental issues.
- Experts having knowledge in the environmental fields that enables them to facilitate the solution of environmental problems.
- The current trend of environmental degradation can be reversed if people of educated communities are organized and empowered.
- By knowing this subject we can develop eco-friendly new technologies for various developments which can save the natural resources as well as reduces environmental pollutions and public health impacts.
- As, the new earth is not discovered till now we have no other option except to maintain the ecological balance on the planet Earth so that the liveable environment should be kept for our future generations.
- The major areas in which the role of environmental scientists are of vital importance are natural resources, ecosystems, biodiversity and its conservation, environmental pollution, social issues , human population and environment [2; 4; 5].

NEED AND IMPORTANCE OF ENVIRONMENTAL STUDIES:

- Public awareness.
- Environment issues being of international importance.
- Problems cropped in the wake of development.
- Conserve energy.
- For an alternative solution.
- Save species from extinction.
- Save the natural resources.
- Reduce the pollution.
- Wise planning of development.
- Sustainable development [2; 4; 5]

SEGMENTS OF ENVIRONMENT

The *atmosphere* is composed of nitrogen and oxygen. Besides, argon, carbon dioxide, and other trace gases.

Atmosphere

Biosphere : Biosphere indicates the realm of living organisms and their interactions with environment, viz atmosphere, hydrosphere and lithosphere.

Biosphere

Hydrosphere : The Hydrosphere comprises all types of water resources oceans, seas, lakes, rivers, streams, reservoir, polar icecaps, glaciers, and ground water.

Lithosphere : Lithosphere is the outer mantle of the solid earth. It consists of minerals occurring in the earth's crusts and the soil e.g. minerals, organic matter, air and water.

Lithosphere

Hydrosphere

SEGMENTS OF ENVIRONMENT

Atmosphere: The atmosphere implies the protective blanket of gases, surrounding the earth:

(a) It sustains life on the earth.

(b) It saves it from the hostile environment of outer space.

(c) It absorbs most of the cosmic rays from outer space and a major portion of the electromagnetic radiation from the sun.

(d) It transmits only here ultraviolet, visible, near infrared radiation (300 to 2500 nm) and radio waves. (0.14 to 40 m) while filtering out tissue-damaging ultra violate waves below about 300 nm [2; 4]

Source: vectorstock.com

SEGMENTS OF ENVIRONMENT

Hydrosphere: The Hydrosphere comprises all types of water resources oceans, seas, lakes, rivers, streams, reservoir, polar icecaps, glaciers, and ground water. 71 % of earth area is covered by water.

(i) Nature 97% of the earth's water supply is in the oceans,

(ii) About 2% of the water resources is locked in the polar icecaps and glaciers.

(iii) Only about 1% is available as fresh surface water-rivers, lakes streams, and ground water fit to be used for human consumption and other uses.

Lithosphere: Lithosphere is the outer mantle of the solid earth. It consists of minerals occurring in the earth's crusts and the soil e.g. minerals, organic matter, air and water.

Biosphere: Biosphere indicates the realm of living organisms and their interactions with environment, viz atmosphere, hydrosphere and lithosphere [2; 5].

Revision

- **What we have leaned today?**
  - Environment its definition and scope.
  - Types of environment.
  - Structure of environment.
  - Needs and importance of environment.
  - Segments of environment.

  Now let's have a Quiz.....

References

1. Dr Prabhu Prasadini and Dr G. Swarajya Lakshmi, ENVIRONMENTAL SCIENCE, BIRM 301 Study Material.
2. Dr. Y. K. Singh, 2006. Environmental Science. NEW AGE INTERNATIONAL (P) LIMITED, PUBLISHERS, New Delhi, India.
3. Rokonuzzaman M. S., 2014. Types of Environment, Department of Geology and Environment, Dhaka, Bangladesh.
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5. Michael Aaleby, 2000. Basics of Environmental science, 2nd Edition, Taylor & Francis Group, New York.
6. www.vectorstock.com, Accessed on 02/07/2020.