Ministry of Higher Education and
Scientific Research
University of Babylon
College of Engineering
Department of Environmental Engineering

Lecture Eight

Solid Wastes Management

By : Asst. Lecturer
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تصميم المحاضرة

عنوان المحاضرة	ادارة النفايات الصلبة
الفئة المستهدفة	طلبة المرحلة الرابعة لقسم الهندسة البيئية
مدة المحاضرة	ساعتان حضوريا في القاعة الدراسية
استراتيجيات التعليم	• استخدام العصف الذهني • المناقشات الجماعية • القاء المحاضرة باستعمال العروض التقديمية • استخدام الوسائط المتعددة
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تصميم المحاضرة

وصف المحاضرة	تتناول المحاضرة أساليب وإجراءات التخلص من النفايات باستخدام المكبات، بما في ذلك عمليات التجميع والفرز والتخزين الآمن. كما تتطرق المحاضرة إلى الجوانب البيئية والصحية المتعلقة بتشغيل مكبات النفايات وكيفية التعامل مع التحديات المرتبطة بها.
مسار المحاضرة	• مراجعة المحاضرة السابقة و ربطها بالمحاضرة الحالية • استعراض اهداف المحاضرة و اعطاء مقدمة بسيطة عنها • شرح مكونات المحاضرة الاساسية (يتخللها عصف ذهني و انشطة صفية) • استعراض الاسئلة التقويمة بشكل مناقشة جماعية • الخاتمة
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الهدف الوسيط
General objective

The aim is to identify the methods of solid waste disposal and identify the correct engineering design of landfills, its components and types.

الاهداف السلوكية
Behavioral objectives

At the end of this lecture the student should be able to:

- Enumerate methods of waste disposal
- Define landfill and its types.
- Explain the components of landfill
- Know the considerations for choosing a landfill site
- Learn about landfill operations
- Calculate the volume of waste in the cell

Outlines

- Introduction
- Methods of Waste Disposal
- Disposal of Wastes on Landfill
- Types of Landfills
- Components of Landfill
- Landfill Site Selection
- Landfill operations
- Example
- Evaluation questions
- Conclusion
- Reference

Introduction

Waste management is a process that combines all the activities necessary for managing waste including **collection** of garbage, **transportation**, and **disposal of** trash. Its primary purpose is to lessen the waste of unusable materials and avoid potential environmental and health risks.

Methods of Waste Disposal

1. Reducing Waste Generation
2. Recycling
3. Incineration
4. Composting
5. Sanitary Landfill
6. Disposal in Ocean/Sea

Disposal of Wastes on Landfill

landfill is a place to dispose of solid wastes by burying it and covering it over with soil according to engineering designs.

Figure: Solid waste landfill site.

Activity 8-1

Does this image represent a sanitary landfill? Why?

Send the answer to the Google Form link

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TYPES OF LANDFILLS

Trench Landfills

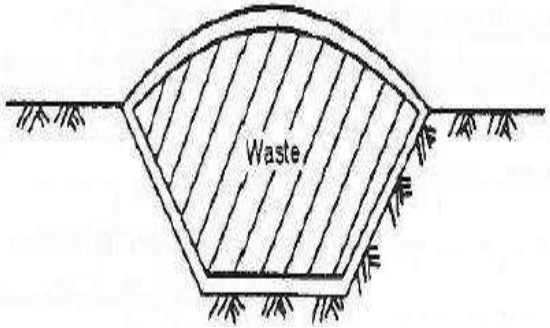


Figure : Trench Landfill.

Area Landfills

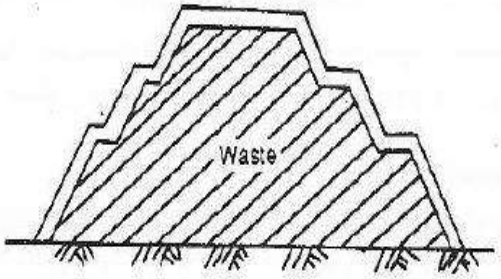


Figure : Area Landfill.

Slope Landfills

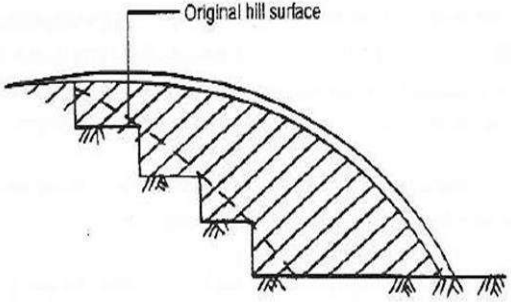
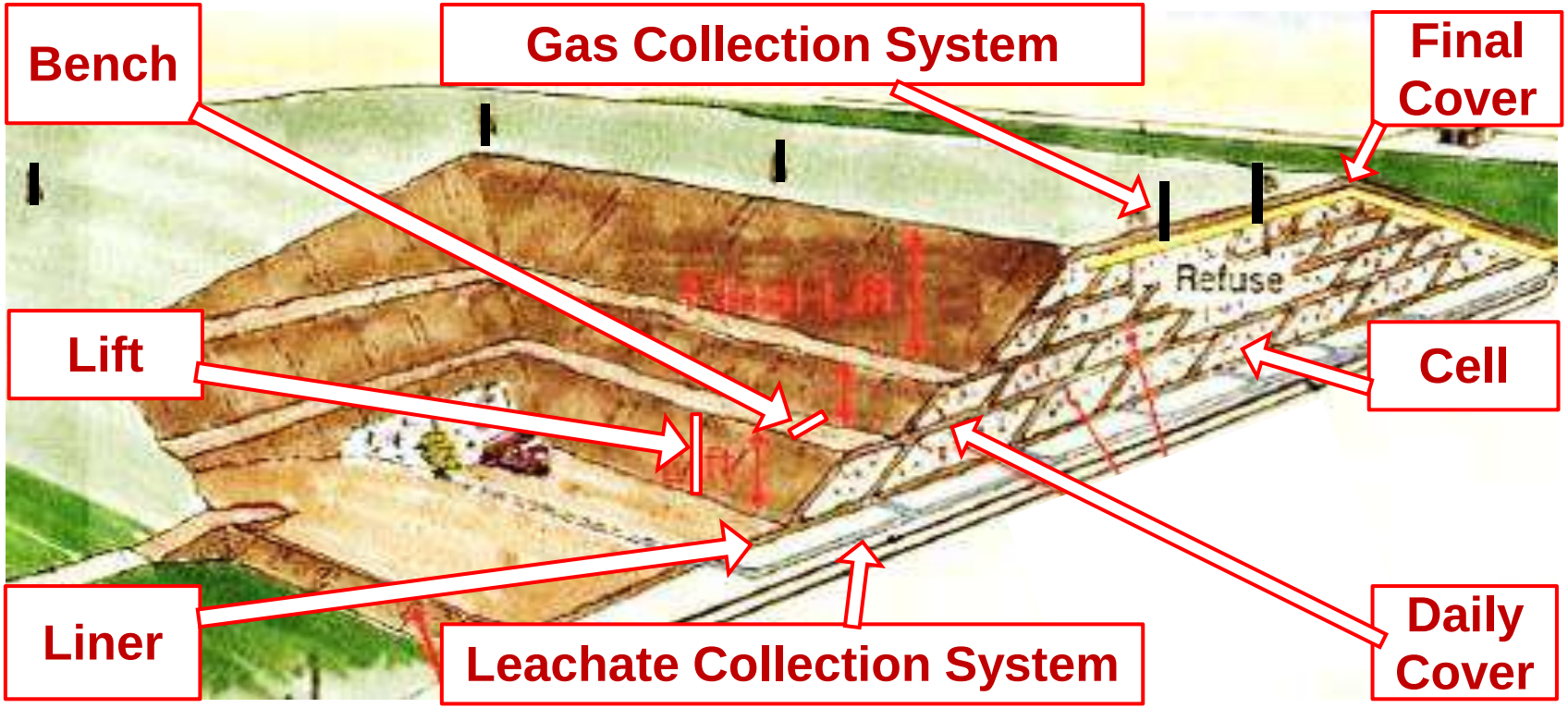


Figure : Slope Landfill.

Components of Landfill



Activity 8-2

What type of landfill is appropriate to establish in Babylon Governorate? And why?

a) Trench Landfills
b) Area Landfills
c) Slope Landfills

Send the answer to the Google Form link

https://forms.gle/mPgD7bRQrHzuSq7e9

Landfill Site Selection

The considerations in the selection of a landfill site are:

- Landfill should be located away from the city .
- Land area available should be sufficient for five years.
- Groundwater table should be deep in the area.
- Soil to be used for daily cover should be available nearby.
- A comprehensive EIA should be carried out.

LANDFILL OPERATIONS

Landfill operations include:

- Weighing of Waste: Wastes received at the landfill site should be weighed over a weigh bridge.

- Waste Deposition in Cells: Layout of cells is depends upon the type of landfill and methods adopted for disposal of wastes.

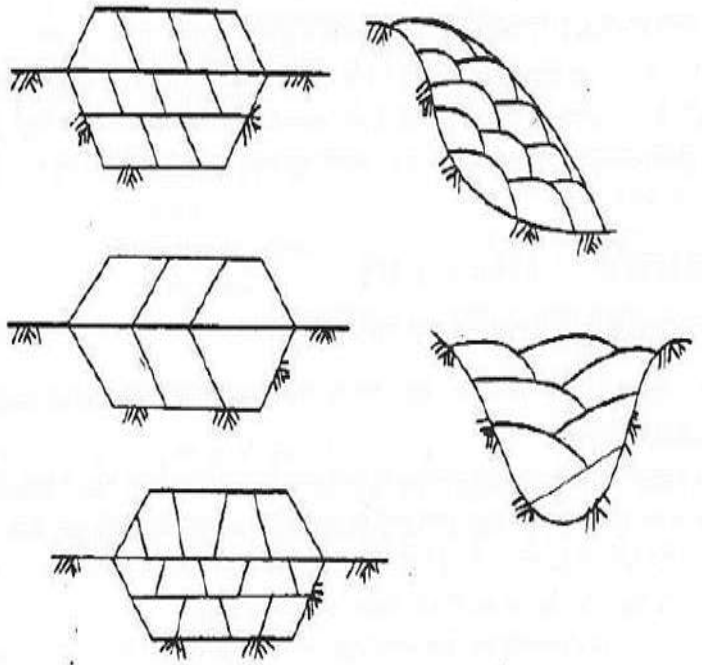


Figure: Types of cells Layouts.

LANDFILL OPERATIONS

- Providing Daily Cover: Wastes deposited in the cell should be covered each day with 15 cm thick soil .
- Safety and Security: To avoid health risks to workers, hazardous waste must be handled properly to avoid exposure to humans or the environment.
- Record Keeping: It is necessary to maintain a proper record of wastes received at the landfill to ensure compliance of legal requirements.

EXAMPLE

A colony having a population of 65,000 generates solid wastes at the rate of 2 kg/capita/day. The compacted specific weight of solid wastes in landfill is 650 kg/m3 and the average depth of compacted solid wastes in landfill is 5m. Determine the required landfill area.

Solution :

Total solid wastes generated from the colony = 65000 x 2 = 130,000 Kg/d

Volume of solid wastes = 130,000 / 650 = 200 m^3/d

Area required = 200 / 5 = 40 m^2/d

Area required annually = 40 x 365 = 14,600 m^2/year

= 1.46 ha/year

Evaluation questions

Q1/ What are the methods of waste disposal?
Q2/ Define landfill and its types ?
Q3/ What are the components of landfill?
Q4/ What are The considerations in the selection of a landfill site?
Q5/ Explain landfill operations?

Assignment 8-1

H.W/ A community generates solid wastes at a rate of 75 tons/day. The solid wastes has to be disposed off in landfill cells of 5 m width and 3 m lift having a slope of 3:1 in its working face. Thickness of daily soil cover is 150 mm. Determine the ratios of volume of wastes to cover soil. Assume average specific weight of wastes as: 350 kg/m^3

Send the answer to the Google Form link

https://forms.gle/Uz9aPHK5jDvm5ZDK9

Conclusion

A landfill is a common method for disposing of solid waste, and its types vary according to the region in which it is constructed. There are many components to a properly engineered landfill.

Reference

Iqbal, H. K., & Naved, A. (2003). Textbook of Solid Wastes Management. SKJ for CBS, Publishers and Distributors, 22-25.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Lecture Nine

Sustainability

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تصميم المحاضرة

عنوان المحاضرة	الاستدامة
الفئة المستهدفة	طلبة المرحلة الرابعة لقسم الهندسة البيئية
مدة المحاضرة	ساعتان الكترونيا باستخدام منصة Google Meet
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تصميم المحاضرة

وصف المحاضرة	تتناول المحاضرة التعريف بمفهوم ومبادئ الاستدامة و التنمية المستدامة و اهدافها و طرق الانتقال الى مجتمعات مستدامة عن طريق استخدام وسائل الطاقة المتجددة للحفاظ على البيئة.
مسار المحاضرة	• مراجعة المحاضرة السابقة و ربطها بالمحاضرة الحالية • استعراض اهداف المحاضرة و اعطاء مقدمة بسيطة عنها • شرح مكونات المحاضرة الاساسية (يتخللها عصف ذهني و انشطة صفية) • استعراض الاسئلة التقويمة بشكل مناقشة جماعية • الخاتمة
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الهدف الوسيط
General objective

Understanding the concept of sustainability, sustainable development goals, and ways to move to sustainable societies.

الاهداف السلوكية
Behavioral objectives

At the end of this lecture the student should be able to:

- Define sustainability
- Enumerate the importance of SRM
- Understand the principles of SRM
- Explain the components of sustainable development
- Realize the Sustainable Development Goals (SDGs)
- Recognize the types of resources
- Understand the need to find alternatives to non-renewable resources

Outlines

- Introduction
- Definition of sustainability
- Importance of Sustainable Resource Management
- Principles of Sustainable Resource Management
- Components of sustainable development
- Sustainable Development Goals (SDGs)
- Types of Resources
- Urgency to Find Alternatives to Nonrenewable Resources
- Evaluation questions
- Conclusion

Introduction

Achieving sustainability requires thinking in an integrated manner about the environmental, economic and social impacts of the decisions and activities we undertake in our daily lives and in our societies and economy in general. This lecture discusses the principles of sustainability, sustainable development goals, and ways to move to sustainable societies

Definition

Sustainability : is the responsible management of resources to meet current needs without compromising the ability of future generations to meet their own needs.

Importance of Sustainable Resource Management

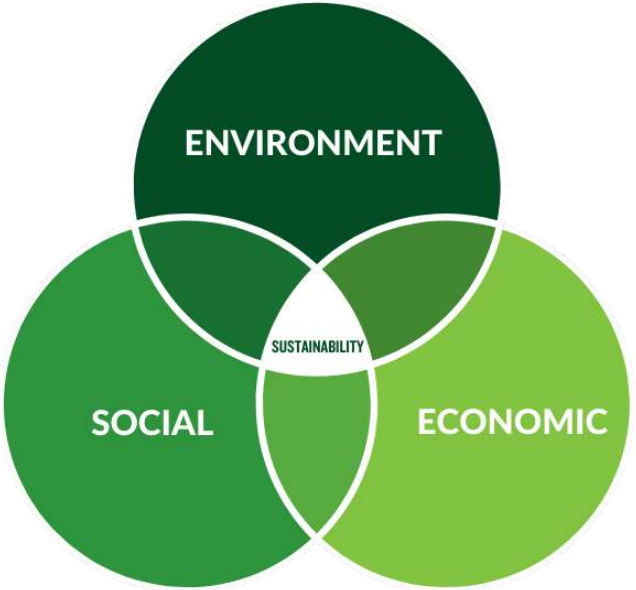
- Ensuring the longevity of resources,
- Mitigating environmental impact,
- Fostering a resilient and equitable society.
- Reducing the use of both renewable and nonrenewable resources and providing long-term solutions.

Principles of Sustainable Resource Management

1. **Reduce:** Minimize consumption to decrease overall resource demand.
2. **Reuse:** Extend product lifespan through reusable alternatives.
3. 3. Recycle: Convert waste materials into reusable resources.
4. **Minimizing Waste:** Stress the importance of waste reduction.
5. **Circular Economy:** Promote continuous resource use, design for reuse, and recycling.

Components of sustainable development

- **Economic development**
- **Community development**
- **Environmental protection**



Sustainable Development Goals (SDGs)

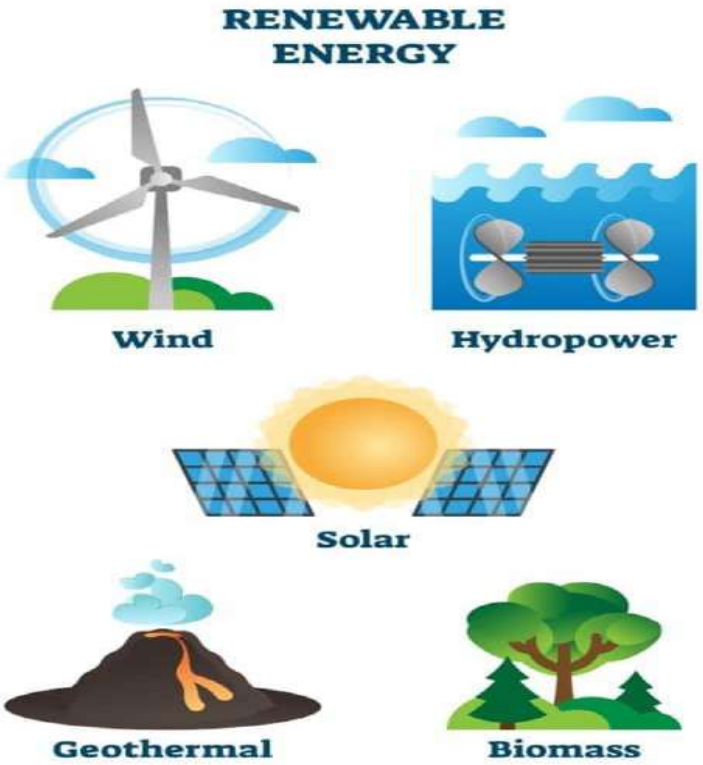
Activity 9-1

In your opinion, what is the most important sustainable development goal that we should work to achieve in Iraq? And why?

Scan the QR code and send the answer

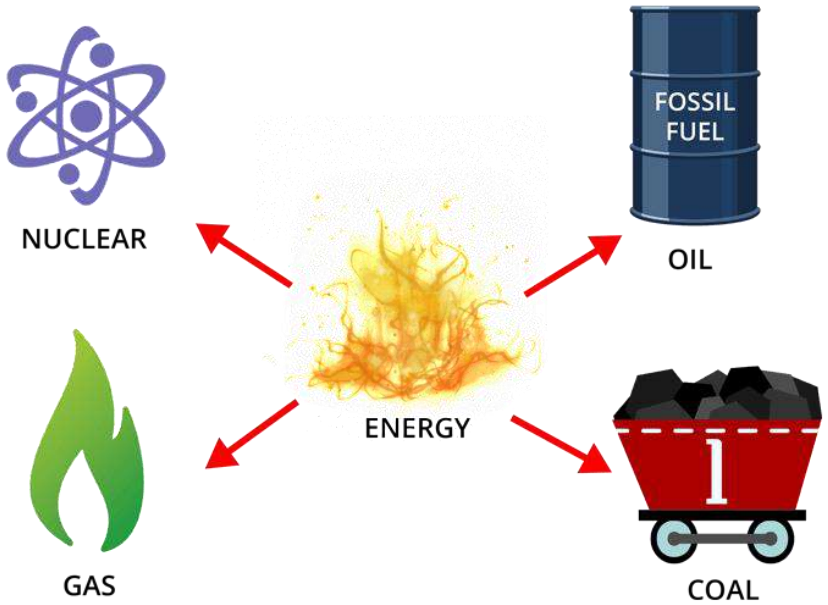
Types of Resources

Renewable Resources: are natural sources that can be replenished naturally over time.



Types of Resources

Nonrenewable Resources: are finite and cannot be replaced on a human timescale. Their extraction and use pose challenges to environmental sustainability.



Urgency to Find Alternatives to Nonrenewable Resources

1. Environmental Impact
2. Climate Change Mitigation
3. Resource Depletion
4. Geopolitical Instability
5. Economic Vulnerability

Evaluation questions

Q1/ Define sustainability
Q2/ What is the importance of SRM?
Q3/ What are the principles of SRM?
Q4/ Explain the components of sustainable development
Q5/ What are the Sustainable Development Goals (SDGs)
Q6/ What are the types of resources?
Q7/ What is the need to find alternatives to non-renewable resources?

Assignment 9-1

H.W// Mention other examples of renewable and non-renewable energy sources other than those mentioned in the lecture and give examples of their application?

Scan the QR code and send the answer

Conclusion

Sustainability is not just a philosophical concept, but rather a vital necessity for our future and the future of our planet. If we want to preserve the environment and ensure the well-being of future generations, we need to shift towards more sustainable lifestyles and economic systems.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Lecture Ten

Water Quality Management

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تصميم المحاضرة

عنوان المحاضرة	ادارة جودة المياه
الفئة المستهدفة	طلبة المرحلة الرابعة لقسم الهندسة البيئية
مدة المحاضرة	ساعتان حضوريا في القاعة الدراسية
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تصميم المحاضرة

وصف المحاضرة	تتناول المحاضرة التعريف بمفهوم و طرق تقييم جودة المياه الاكثر شيوعا و كذلك تتناول مصادر و انواع الملوثات التي من الممكن ان تلوث مصادر المياه السطحية .
مسار المحاضرة	• مراجعة المحاضرة السابقة و ربطها بالمحاضرة الحالية • استعراض اهداف المحاضرة و اعطاء مقدمة بسيطة عنها • شرح مكونات المحاضرة الاساسية (يتخللها عصف ذهني و انشطة صفية) • استعراض الاسئلة التقويمة بشكل مناقشة جماعية • الخاتمة
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الهدف الوسيط
General objective

Understand the most common water quality assessment methods as well as the sources of pollutants that can contaminate surface water resources.

الاهداف السلوكية
Behavioral objectives

At the end of this lecture the student should be able to:

- Enumerate methods for evaluating water quality
- Define the Water Quality Index (WQI)
- Explain responsible use of water
- Demonstrate water recycling and reuse
- Define water pollution
- Enumerate the sources of water pollution
- Explain the effects of water pollution
- Explain the challenges of water pollution in Iraq

Outlines

- Introduction
- Water Quality Assessment Methods
- Water Quality Index (WQI)
- Responsible Water Use
- Water Recycling and Reuse
- Water pollution
- Sources of water pollution
- Effects of water pollution on humans and the environment
- Water pollution challenges in Iraq
- Evaluation questions
- Conclusion

Introduction

The water demand is rising because of the growing population, expanding economic activity, and urban expansion. Therefore, the decline in surface water quality has become a serious problem and one of the main objectives of water resources conservation policy is to monitor water quality.

Water Quality Assessment Methods

1. Comparing the measured water quality parameters with the permissible limits of the WHO or with national standards.
2. Use water quality indicators such as:

- (NSF-WQI).
- (CCME-WQI).
- (WA-WQI).

3. Use mathematical models developed for a specific body of water.

Table: water quality limits of parameters for drinking uses according to Iraqi standards (2009) and WHO standards (2017).

No.	Parameter	Unit	Iraqi standards	WHO standards
1	Temp.	°C	….	25
2	pH	…..	6.5 - 8.5	6.5 - 8.5
3	EC	µS/cm	2000	2000
4	TDS	mg/l	1000	1000
5	Turbidity	NTU	5	5
6	DO	mg/l	5	5
7	BOD_5	mg/l	Nil	5
9	Alkalinity	mg/l	200	120
10	TH	mg/l	500	500
11	Ca	mg/l	150	75
12	Mg	mg/l	100	50
13	Cl	mg/l	350	250
14	NO_3	mg/l	50	50
15	SO_4	mg/l	400	250

Water Quality Index (WQI)

WQI is a dimensionless number that aggregates together various parameters for any water body to evaluate its water quality. The WQI methods significantly reduce the amount of data and streamline and describe the state of the quality of water in a single number.

Responsible Water Use

- **Water Conservation:** reducing water consumption through awareness and efficient practices in homes, industries, and agriculture.
- **Efficient Irrigation:** precision irrigation methods to minimize water wastage in agriculture, such as drip irrigation and soil moisture monitoring.
- **Water Quality Protection:** safeguarding water quality through pollution prevention measures and proper waste disposal.

Water Recycling and Reuse

- **Innovative Solutions**
- **Freshwater Conservation**

Water pollution

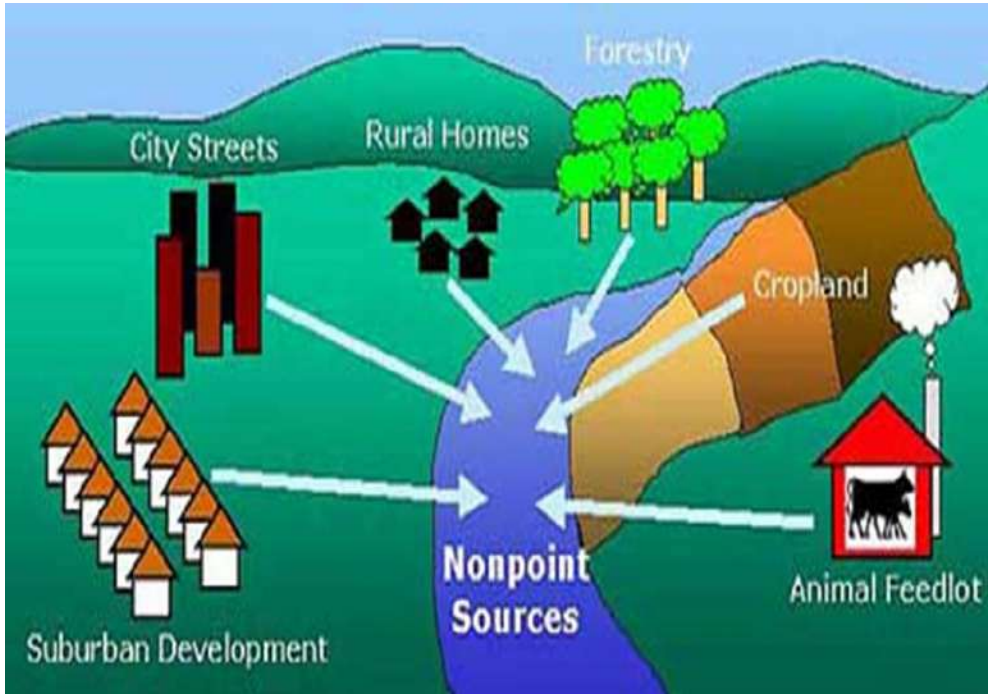
Water pollution: is the negative impact on water quality as a result of foreign substances entering its components. Water pollution includes the pollution of all water sources on the surface of the Earth, whether fresh water or sea water, such as: seas, rivers, oceans and groundwater.

Sources of water pollution

Point sources: They are a pipe or channel similar to those used in factories or sanitary drains, and they are easy to manage and control. Because it is a known source.

Sources of water pollution

Non-point sources: They are the biggest cause of water pollution, and they are one of the most difficult sources of pollution to treat.



Activity 10-1

Give examples from your city of point and non-point water pollutants

Scan the QR code and send the answer

Effects of water pollution on humans and the environment

Eutrophication

Spread of mosquitoes & snails

Human poisoning

Diseases; Such as cholera

Water pollution challenges in Iraq

- **Direct discharge of wastewater**
- **Absence of regulations**
- **Lack of financial allocations**
- **Effects of climate change**

Evaluation questions

Q1/ What are the methods for evaluating water quality?
Q2/ Define Water Quality Index (WQI)
Q3/ Explain responsible use of water
Q4/ What are the ways to recycle water?
Q5/ Define water pollution
Q6/ What are the sources of water pollution?
Q7/ Explain the effects of water pollution
Q8/ What are the challenges of water pollution in Iraq?

Assignment 10-1

H.W// What are the main causes of water pollution in Iraq? What are the appropriate solutions for each cause?

Scan the QR code and send the answer

Conclusion

Providing clean water for present and future generations and preserving biodiversity can be achieved by taking effective measures to reduce pollution and improve water resource management.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Lecture Eleven

Air Quality Management

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تصميم المحاضرة

عنوان المحاضرة	ادارة جودة الهواء
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تصميم المحاضرة

وصف المحاضرة	تتناول المحاضرة التعريف بأهم مصادر تلوث الهواء وانوعها ومصادرها و اثارها على الصحة العامة. أيضا التعرف على الغازات الدفيئة ليتمكن الطالب من فهم الاثار البيئية الناجمة عنها في المحاضرات التالية.
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الهدف الوسيط
General objective

Understanding the sources and types of air pollution and its impact on the environment, including the impact of increased concentrations of greenhouse gases.

الاهداف السلوكية
Behavioral objectives

At the end of this lecture the student should be able to:

- Define air pollution
- Enumerate the types of air pollutants
- Classify air pollutants
- List the sources of air pollutants
- Explain the effects of air pollutants
- Enumerate the layers of the Earth's atmosphere
- Enumerate the major greenhouse gases

Outlines

- Introduction
- Definitions
- Type of air pollutants
- Classification of air pollutants
- Sources of air pollutants
- Effects of air pollutants
- Atmosphere of earth
- Layers of Earth's atmosphere
- Major greenhouse gases
- Evaluation questions
- Conclusion

Introduction

Air pollution is a change in the composition of natural atmospheric air due to the addition of harmful substances to it, and it is one of the most pressing environmental problems of the current era. Air pollution is the release of a variety of air pollutants into the atmosphere, which can be toxic or unhealthy to humans, plant and animal life.

Definitions

Air Pollution is the present of contaminated substances in air in such concentrations that can produce harmful effects on man and his environment.

Pollutants are undesirable materials that cause pollution if they present in such concentration in air. These materials may be physical, chemical or biological such as gases, particulate, radioactive materials, and many others.

Type of air pollutants

1. Particulate Matter (PM)

2. Gaseous pollutants

Classification of air pollutants

1) **Primary pollutants:** They are that are directly emitted into atmosphere from natural sources or are produced as a result of human activity

2) Secondary pollutants: They are those that are formed in the atmosphere by chemical interaction among primary pollutants and normal atmospheric constituents

Sources of air pollutants

1) **Natural sources:** such as oceans, volcanoes, swamps, biologically decaying organic matter, desert and non-desert areas, forest and forest fires.

2) Created by human activities: which gives rise to air borne pollutants, are:

a) Industrial sources
b) Thermal power stations
c) Automobiles

Effects of air pollutants

1. Effects on atmospheric properties.
2. Effects on vegetation.
3. Effects on animals.
4. Effects on human beings.
5. Effects on land and water bodies.
6. Effect on material.

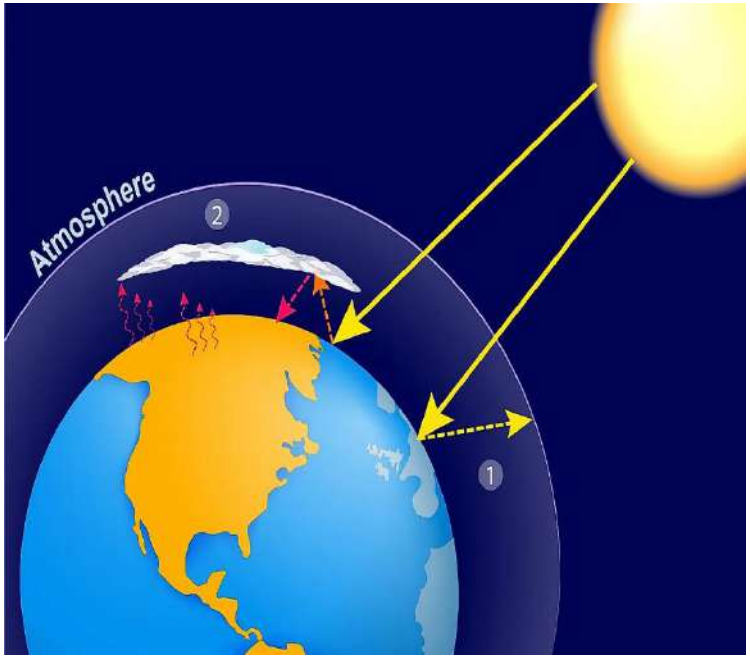
Activity 11-1

What are the effects of air pollution on humans? What diseases can it cause?

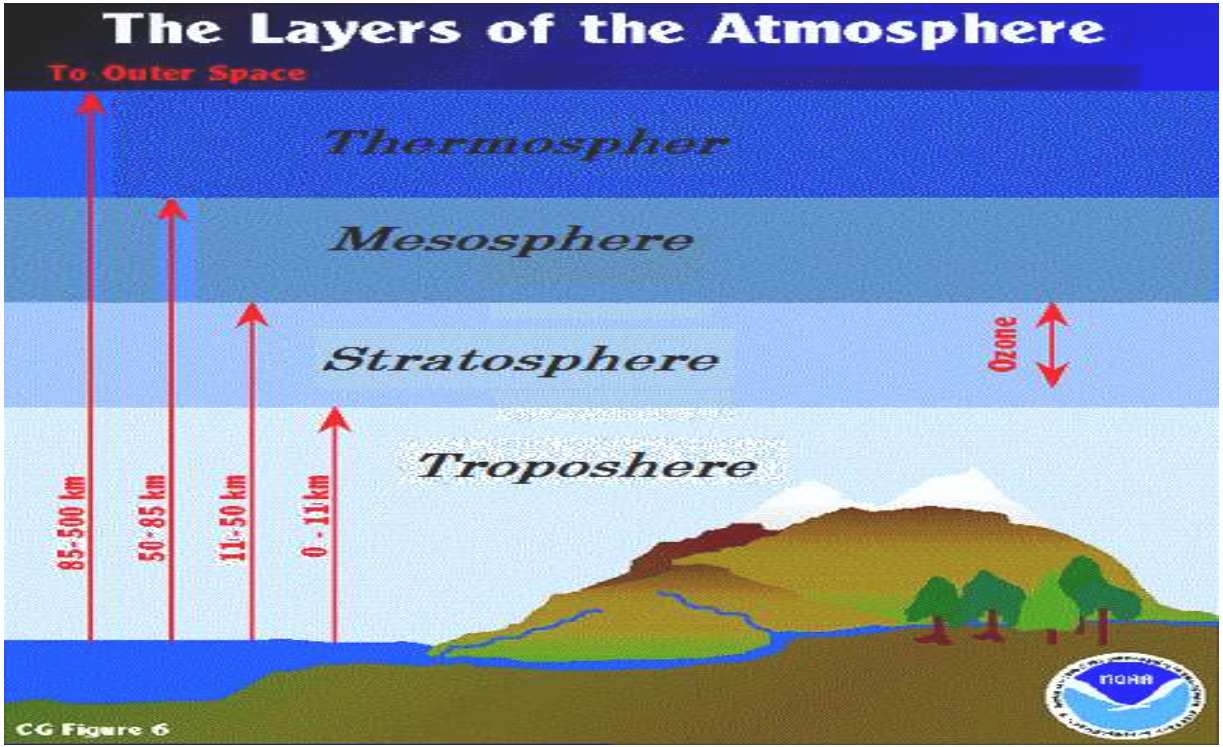
Scan the QR code and send the answer

Atmosphere of earth

The atmosphere comprises of a mixture of gases surrounding the planet earth. It acts as a gaseous blanket protecting the earth by absorption the dangerous ultraviolet solar radiation (UV), warming the surface of the earth through the heat retention (greenhouse effect).

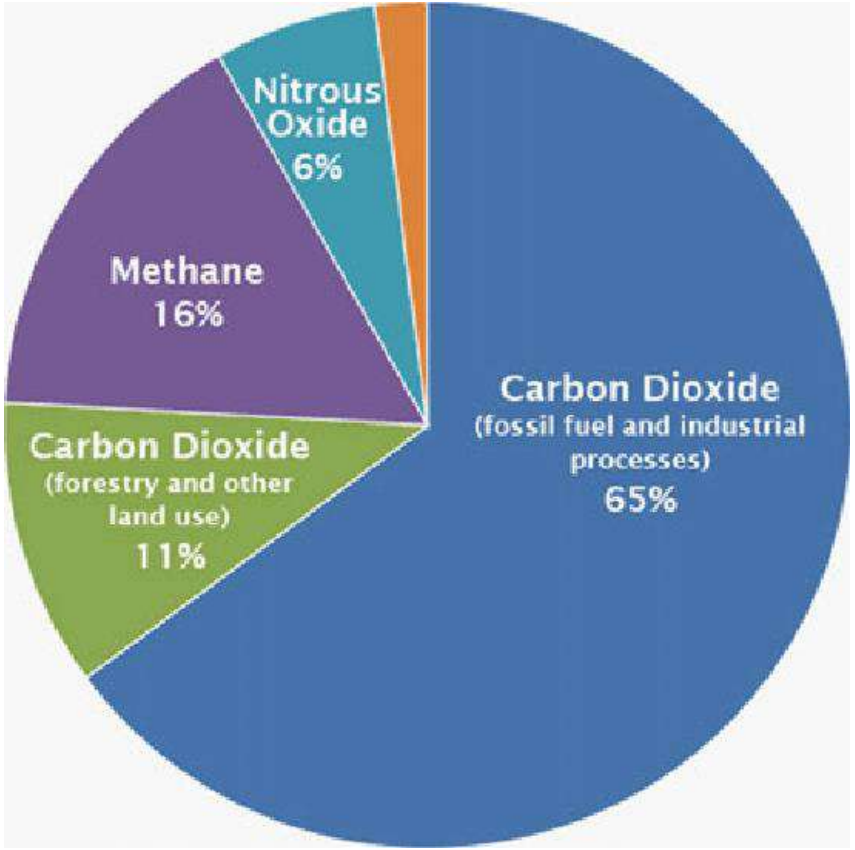


Layers of Earth's atmosphere



Major greenhouse gases

- Water vapor (H2O)
- Carbon Dioxide (CO2)
- Methane (CH4)
- Nitrous Oxide (N2O
- Ozone (O3
- Chlorofluorocarbons, CFCs



Evaluation questions

Q1/ Define air pollution
Q2/ What are the types of air pollutants?
Q3/ What are the classifications of air pollutants?
Q4/ What are the sources of air pollutants?
Q5/ Explain the effects of air pollutants
Q6/ What are the layers of the Earth's atmosphere?
Q7/ What are the main greenhouse gases?

Assignment 11-1

H.W// What are the techniques for treating air pollution? Enumerate them and explain the most important techniques from your point of view in detail.

Scan the QR code and send the answer

Conclusion

Air pollution shows the importance of joint action to protect the environment and human health. By adopting clean, sustainable technologies, and encouraging environmentally friendly behaviors', we can reduce the impacts of air pollution and maintain clean air quality for generations to come.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Ministry of Higher Education and
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Lecture Twelve

The Ozone Layer

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تصميم المحاضرة

عنوان المحاضرة	طبقة الاوزون
الفئة المستهدفة	طلبة المرحلة الرابعة لقسم الهندسة البيئية
مدة المحاضرة	ساعتان الكترونيا باستخدام منصة Google Meet
استراتيجيات التعليم	• استخدام العصف الذهني • المناقشات الجماعية • القاء المحاضرة باستعمال العروض التقديمية • استخدام الوسائط المتعددة
الوسائل التعليمية	• العروض التقديمة على الشاشة • السبورة • الحاسوب المحمول • الاوراق و الاقلام

تصميم المحاضرة

وصف المحاضرة	تتناول المحاضرة التعريف بطبقة الاوزون التي تحيط بالارض و اهميتها في التصدي للاشعة فوق البنفسجية. كذلك التطرق الى اسباب و اثار انحسار طبقة الاوزون و الوسائل التي من شأنها المحافظة عليها.
مسار المحاضرة	• مراجعة المحاضرة السابقة و ربطها بالمحاضرة الحالية • استعراض اهداف المحاضرة و اعطاء مقدمة بسيطة عنها • شرح مكونات المحاضرة الاساسية (يتخللها عصف ذهني و انشطة صفية) • استعراض الاسئلة التقويمة بشكل مناقشة جماعية • الخاتمة
التقويم و التقييم	• الانشطة الصفية • المهام و الواجبات البيتية • الامتحانات التحريرية • الاسئلة الشفهية المباشرة

الهدف الوسيط
General objective

Understanding the ozone layer and its importance, as well as addressing the causes and effects of the depletion of this layer.

الاهداف السلوكية
Behavioral objectives

At the end of this lecture the student should be able to:

- Explain the ozone layer
- Explain the causes of ozone hole depletion
- List the sources of ozone layer depletion
- Enumerate the effects of ozone layer depletion
- Explain solutions to ozone layer depletion

Outlines

- Introduction
- The Ozone Layer
- Ozone layer depletion
- Source of ozone layer depletion
- Effects of ozone layer depletion
- Solutions to Ozone Layer Depletion
- Evaluation questions
- Conclusion

Introduction

Global environmental issues present major challenges that affect planetary health and human well-being. These issues include ozone layer depletion, global warming, climate change, air and water pollution, and others.

In this lecture, we will discuss the depletion of the ozone layer and address other environmental issues in the following lectures.

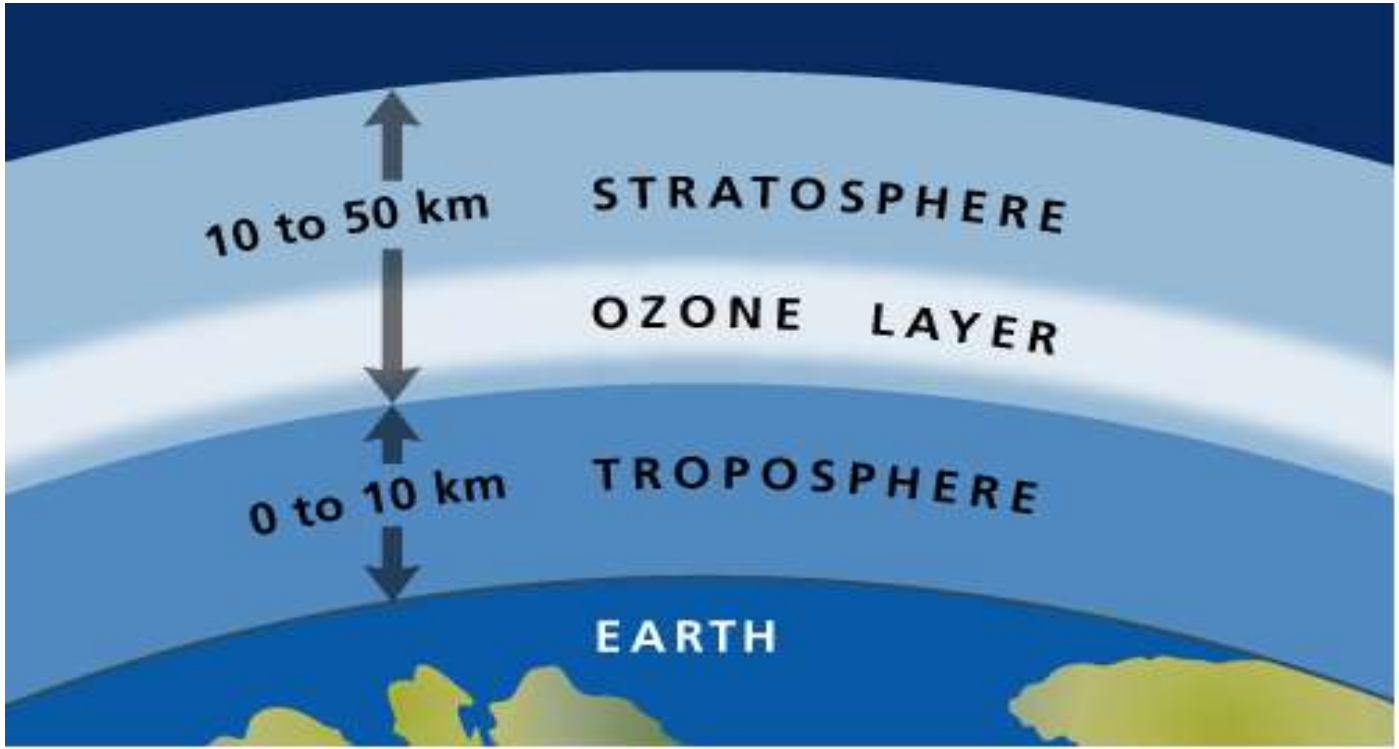
The Ozone Layer

The ozone layer in the stratosphere serves as a shield, protecting the earth's surface from the suns' ultraviolet radiation (UV). Ozone layer absorbs 97-99% of the UV radiation.

$$O_3 \xrightarrow{UV} O_2 + O^*$$

$$O_2 + O^* \longrightarrow O_3$$

The Ozone Layer



Ozone layer depletion

The ozone layer depletion occurs as results of releasing of chemicals such as chlorofluorocarbons (CFCs). CFCs introduced in the lower troposphere pass through the ozone without any change and reach the stratosphere. Here, they impact by the UV-radiation and release destructive chlorine atoms:

$$CFCl_3 \xrightarrow{UV} CFCl_2 + Cl$$

$$CF_2Cl_2 \xrightarrow{UV} CF_2Cl + Cl$$

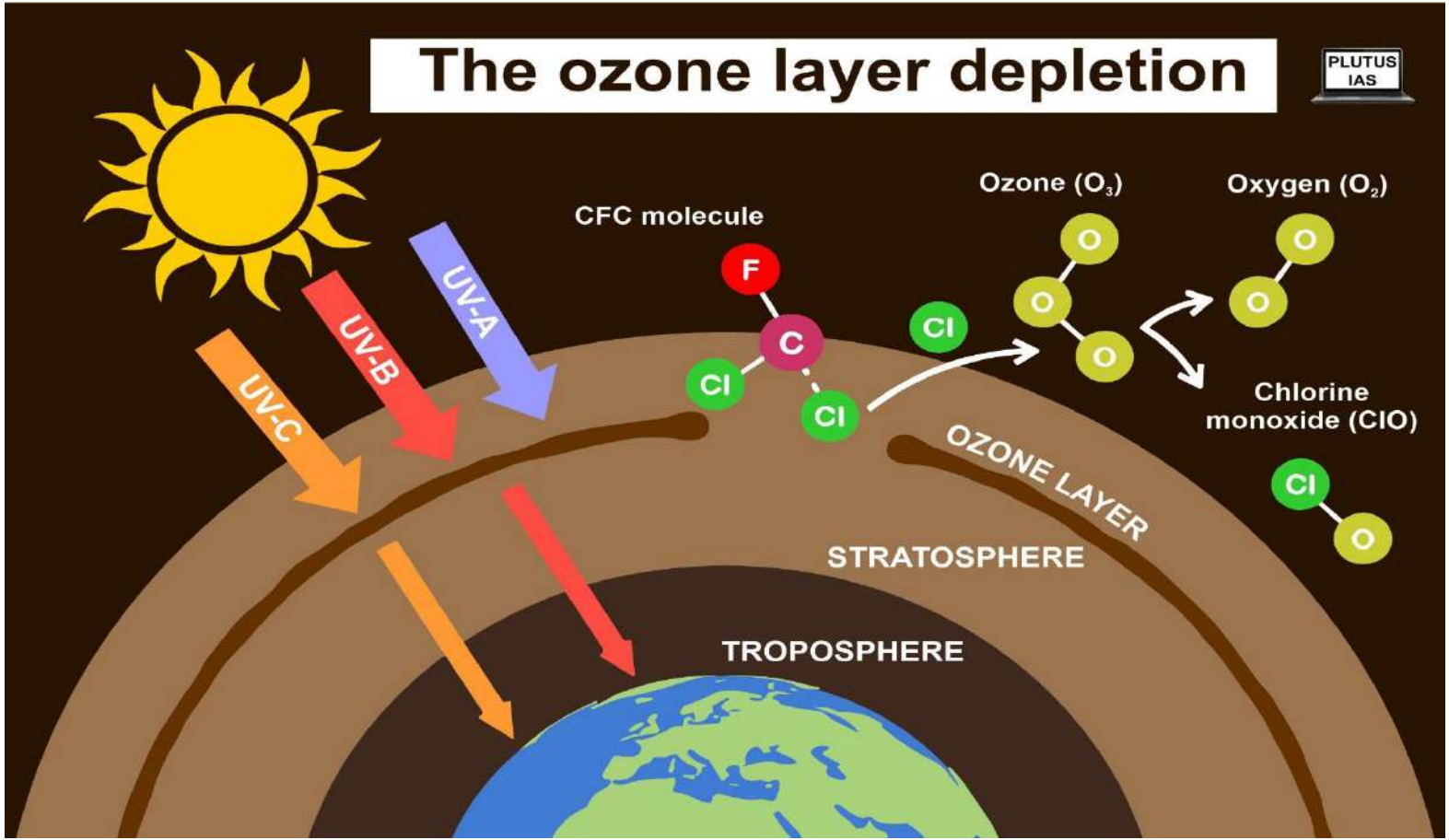
Ozone layer depletion

The chlorine atom quickly reacts with the ozone molecule breaking it into oxygen:

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

The ClO produced reacts with oxygen radical forming more chlorine atom that can react with more ozone

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

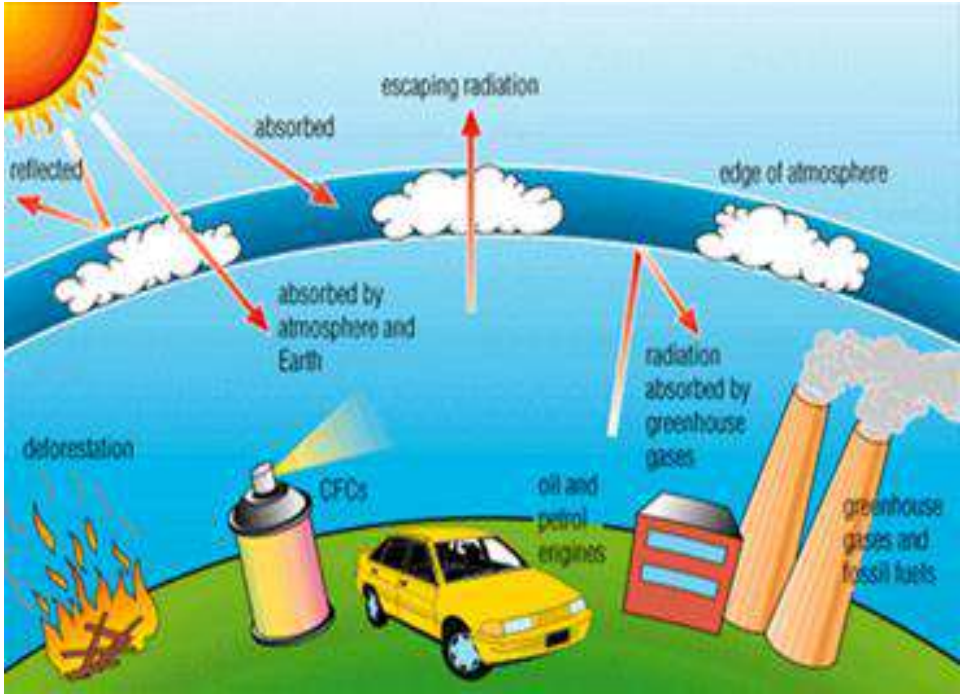

The ozone layer depletion
PLUTUS IAS
CFC molecule
F
C
Cl
Cl
Cl
Ozone (O_3)
Oxygen (O_2)
O
O
O
O
O
Chlorine monoxide (ClO)
Cl
O
UV-A
UV-B
UV-C
OZONE LAYER
STRATOSPHERE
TROPOSPHERE

Source of ozone layer depletion

1- Chlorofluorocarbon, CFCs

2- Nitrogen oxides

3- Nuclear test



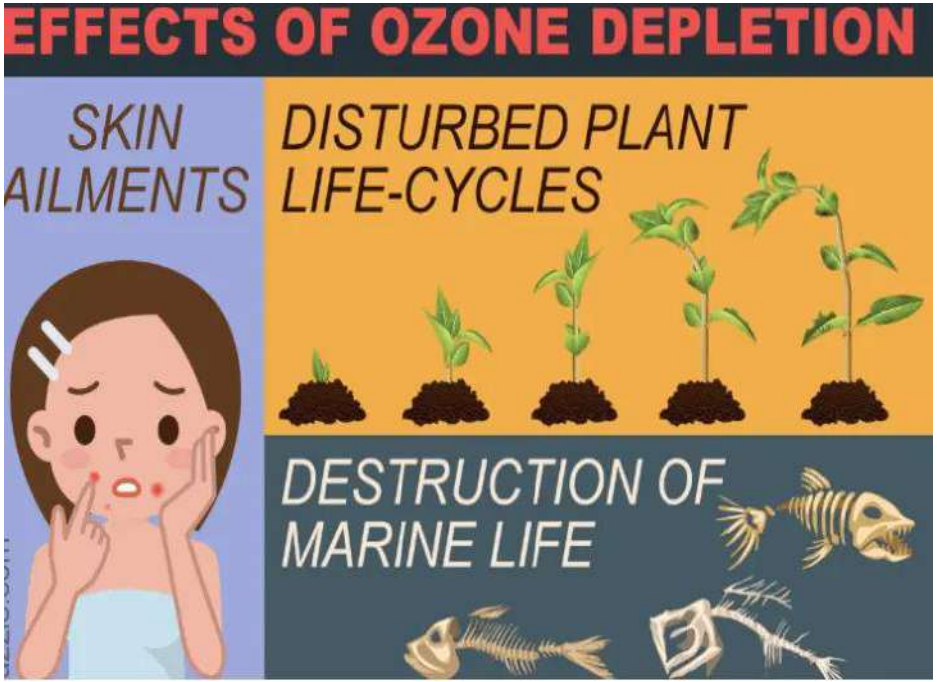
Activity 12-1

What are the health effects of ozone layer depletion on humans?

Scan the QR code and send the answer

Effects of ozone layer depletion

- Effects on human health
- Effects on animals
- Effects on the environment
- Effects on marine life



Solutions to Ozone Layer Depletion

- Avoid Using ODS
- Stop using products with CFCs
- Minimize the Use of Vehicles
- Choose eco-friendly cleaning
- Ban nitrous oxide

Evaluation questions

Q1/ What is the ozone layer?
Q2/ What are the causes of ozone hole depletion?
Q3/ Enumerate the sources of ozone layer depletion
Q4/ What are the effects of ozone layer depletion?
Q5/ Explain solutions to ozone layer depletion?

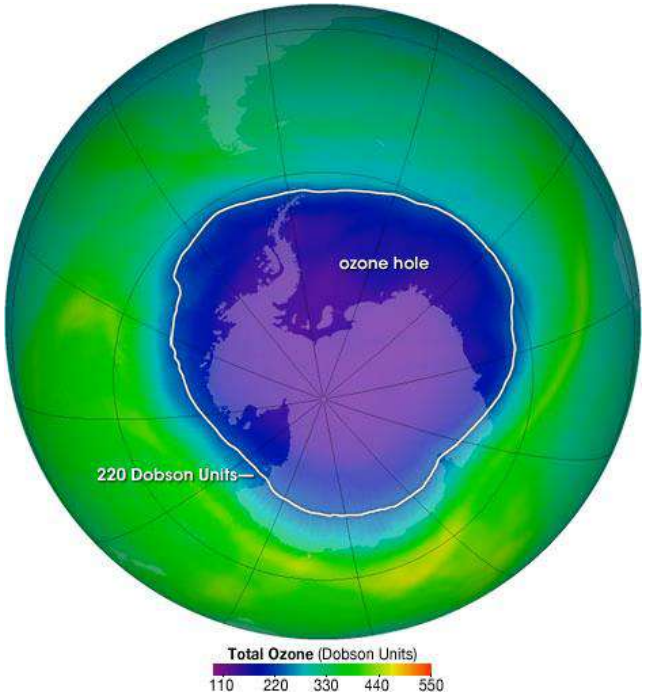
Assignment 12-1

H.W// Write a report on the development of ozone layer depletion over the years and the impact of the industrial revolution on it?

Scan the QR code and send the answer

Conclusion

The ozone layer is a vital barrier that protects our planet from harmful ultraviolet rays, so we must all work together to preserve it. Let us always remember that our efforts today may protect future generations and contribute to building a better future for planet Earth.

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Lecture Thirteen

Global warming

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تصميم المحاضرة

عنوان المحاضرة	الاحتباس الحراري
الفئة المستهدفة	طلبة المرحلة الرابعة لقسم الهندسة البيئية
مدة المحاضرة	ساعتان حضوريا في القاعة الدراسية
استراتيجيات التعليم	• استخدام العصف الذهني • المناقشات الجماعية • القاء المحاضرة باستعمال العروض التقديمية • استخدام الوسائط المتعددة
الوسائل التعليمية	• العروض التقديمة على الشاشة • السبورة • الحاسوب المحمول • الاوراق و الاقلام

تصميم المحاضرة

وصف المحاضرة	تتناول المحاضرة التعريف بمفهوم الاحتباس الحراري و اسبابه و اثاره و الفرق بينه و بين الظاهرة الدفيئة للارض . كذلك التطرق الى اهم طرق السيطرة على ظاهرة الاحتباس الحراري.
مسار المحاضرة	• مراجعة المحاضرة السابقة و ربطها بالمحاضرة الحالية • استعراض اهداف المحاضرة و اعطاء مقدمة بسيطة عنها • شرح مكونات المحاضرة الاساسية (يتخللها عصف ذهني و انشطة صفية) • استعراض الاسئلة التقويمة بشكل مناقشة جماعية • الخاتمة
التقويم و التقييم	• الانشطة الصفية • المهام و الواجبات البيتية • الامتحانات التحريرية • الاسئلة الشفهية المباشرة

الهدف الوسيط
General objective

Understanding the phenomenon of global warming, its causes and effects, and the most important ways to control global warming.

الاهداف السلوكية
Behavioral objectives

At the end of this lecture the student should be able to:

- Define the greenhouse effect
- Explain the importance of the greenhouse effect
- Define global warming
- Explain how global warming occurs
- Distinguish between the greenhouse effect and global warming
- Explain the effects of global warming
- Explain ways to control global warming

Outlines

- Introduction
- Greenhouse Effect
- Important of greenhouse effect
- Global warming
- How does global warming happen?
- Comparison between Greenhouse Effect & global warming
- Effects of global warming
- Controlling global warming
- Evaluation questions
- Conclusion

Introduction

One of the most important global environmental issues facing our planet is global warming. There can be significant effects in cases of temperature increases above permissible limits. In this lecture, we will discuss the phenomenon of global warming, its causes and effects, and how to reduce it.

Greenhouse Effect

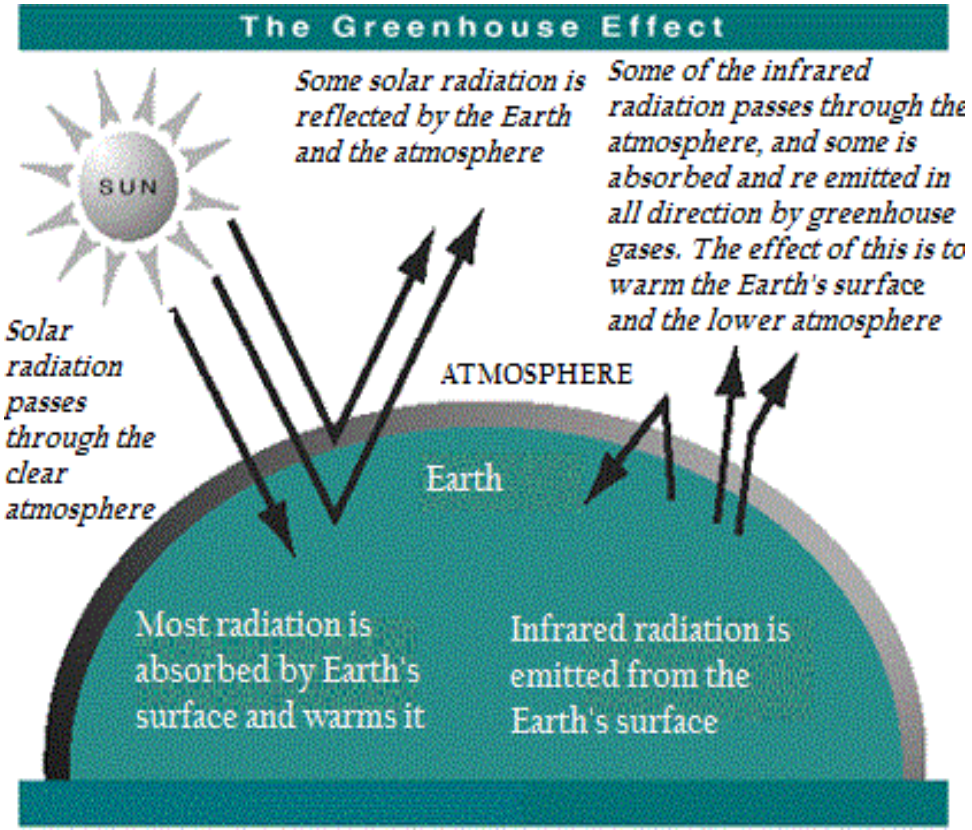
Greenhouse Effect: is the effect on the environment where greenhouse gases accumulate in the atmosphere are able to absorb and absorb ultraviolet and infrared rays, which leads to heat retention and heating of the atmosphere and the Earth's surface.

Important of greenhouse effect

1. To maintain the average temperature of world. The average temperature should remain constant and governs all life process.
2. To maintain the sea level.
3. The polar ice caps remain intact.

Global warming

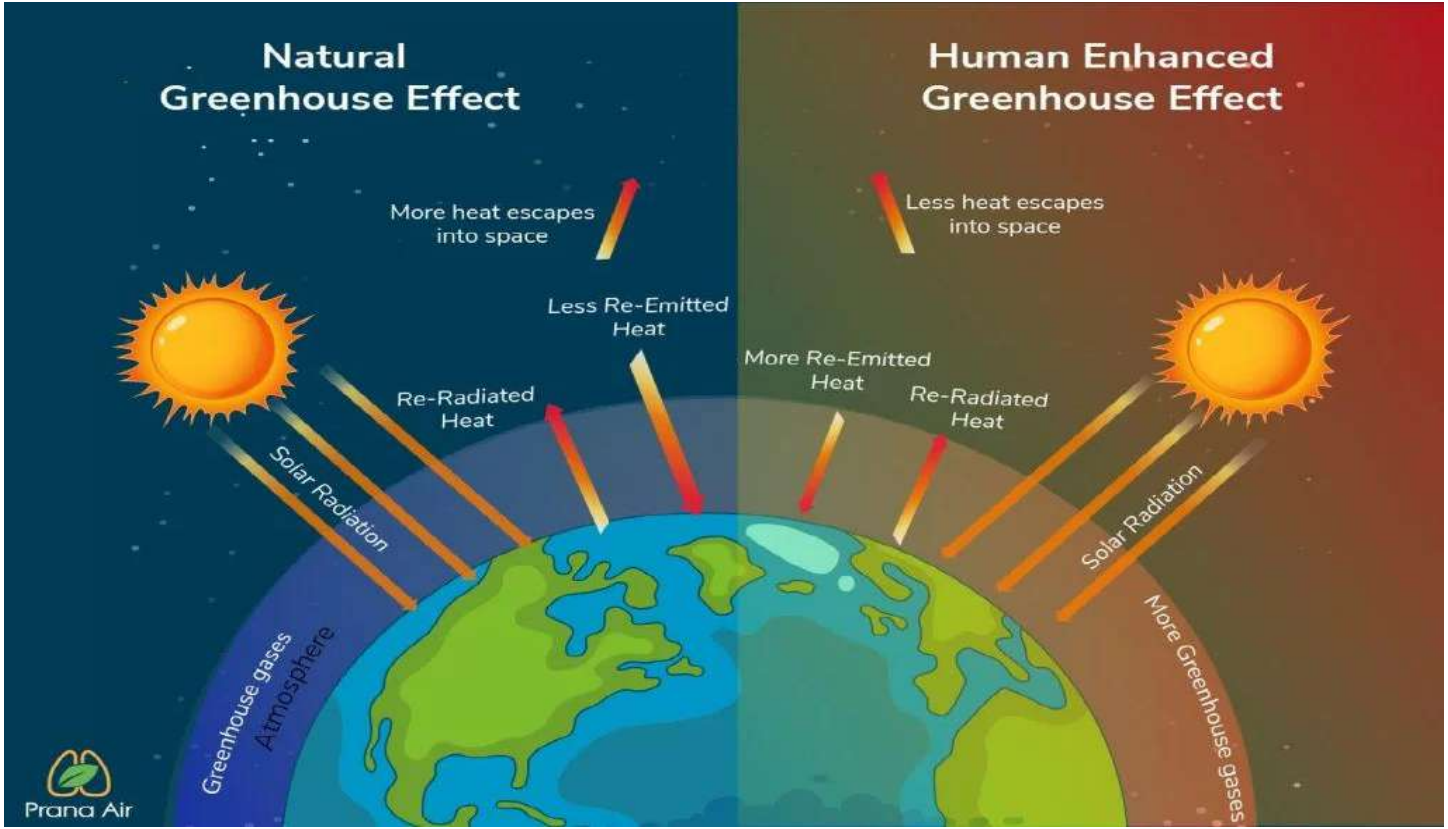
Global warming: is increase in global average temperature near the Earth's surface as a result of increasing in concentration of greenhouse gases in the atmosphere from human activities.



How does global warming happen?

The Global Warming occurs when the concentration of GHGs, such as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O), increases in the atmosphere by burning fossil fuels, industrialization, mining, deforestation, and automobiles, trapping more heat and causing global temperatures to rise.

Comparison between Greenhouse Effect & global warming



Effects of global warming

1- Melting of polar ice caps.
2- Changes in regional wind systems.
3- Growth in insect population
4- Disrupts the Water supply and rain.
5- Leads to declining biodiversity.
6- Increase evaporation of surface

Controlling global warming

1- Reduce deforestation and use sustainable agriculture.
2- Use of technologies to absorb CO2 from emission.
3- Increased absorption of CO2 by planting more trees.
4- Sequester CO2 in deep ocean.
5- Increased dependence on renewable energy source and abandon dependence on fossil fuels.
6- Use electric and environmentally friendly transportation

Activity 13-1

How can global warming reduce biodiversity? Discuss it.

Scan the QR code and send the answer

For Discussion

Evaluation questions

Q1/ Define the greenhouse effect?
Q2/ What is the importance of the greenhouse effect?
Q3/ Define global warming?
Q4/ How does global warming happen?
Q5/ What is the difference between the greenhouse effect and global warming?
Q6/ Explain the effects of global warming?
Q7/ What are the ways to control global warming?

Assignment 13-1

H.W// What are the effects of the melting of ice at the poles due to global warming on the environment in general? Why is this considered dangerous?

Scan the QR code and send the answer

Conclusion

Confronting global warming requires joint efforts at a global level, including taking action to reduce greenhouse gas emissions, promoting renewable energy, and adopting technologies to adapt to expected climate changes.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Lecture Fourteen

Climate Change

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تصميم المحاضرة

عنوان المحاضرة	التغير المناخي
الفئة المستهدفة	طلبة المرحلة الرابعة لقسم الهندسة البيئية
مدة المحاضرة	ساعتان الكترونيا باستخدام منصة Google Meet
استراتيجيات التعليم	• استخدام العصف الذهني • المناقشات الجماعية • القاء المحاضرة باستعمال العروض التقديمية • استخدام الوسائط المتعددة
الوسائل التعليمية	• العروض التقديمة على الشاشة • السبورة • الحاسوب المحمول • الاوراق و الاقلام

تصميم المحاضرة

وصف المحاضرة	تتناول المحاضرة التعريف بمفهوم التغير المناخي و اسبابه و اثاره على البيئة . و التحديات التي من الممكن التعرض لها نتيجة له. كذلك التطرق الى اهم الاتفاقيات و المؤتمرات العالمية بخصوص التغيرات المناخية.
مسار المحاضرة	• مراجعة المحاضرة السابقة و ربطها بالمحاضرة الحالية • استعراض اهداف المحاضرة و اعطاء مقدمة بسيطة عنها • شرح مكونات المحاضرة الاساسية (يتخللها عصف ذهني و انشطة صفية) • استعراض الاسئلة التقويمة بشكل مناقشة جماعية • الخاتمة
التقويم و التقييم	• الانشطة الصفية • المهام و الواجبات البيتية • الامتحانات التحريرية • الاسئلة الشفهية المباشرة

الهدف الوسيط
General objective

Understanding the concept of climate change, its causes, effects, and ways to control its effects.

الاهداف السلوكية
Behavioral objectives

At the end of this lecture the student should be able to:

- Define climate change
- Explain the causes of climate change
- Explain the effects of climate change
- Explain ways to mitigate climate change
- Explain international conferences and agreements related to climate change

Outlines

- Introduction
- Definition of Climate change
- The causes of climate change
- The Effects of climate change
- Mitigating the climate change
- The international conferences and agreements on climate change
- Evaluation questions
- Conclusion

Introduction

One of the most dangerous environmental challenges facing our planet in recent years is the phenomenon of climate change resulting from increasing levels of greenhouse gases in the atmosphere. Therefore, understanding these changes, their causes and effects is very important to reduce the negative effects of this phenomenon.

Definition

Climate change: is the long-term alterations in temperature, precipitation patterns, and other atmospheric conditions on Earth. It is primarily driven by human activities that release greenhouse gases (GHGs) into the atmosphere, leading to the enhanced greenhouse effect.

The causes of climate change

❖ **Natural Factors**

- Volcanic eruptions
- Solar radiation variations

❖ **Human Activities**

- Burning Fossil Fuels
- Industrial Processes
- Agricultural Practices
- Land Use Changes
- Poor Waste Management
- Transportation
- Deforestation

The Effects of climate change

1. Changes in Precipitation Patterns
2. Sea Level Rise
2. Loss of Biodiversity
3. Extreme Weather
4. Ocean Acidification
6. Health Impacts
7. Loss of Food Security

Mitigating the climate change

1. Reduce Greenhouse Gas Emissions
2. Promote Sustainable Practices
3. Support Renewable Energy
4. Protect and Restore Ecosystems
5. Developing and implementing adaptation strategies
6. Implementation of policies and regulations
7. Raising awareness about climate change

Activity 14-1

What practices can you, as an individual, follow in order to reduce the effects of climate change?

Scan the QR code and send the answer

The international conferences and agreements on climate change

- **United Nations Framework Convention on Climate Change (UNFCCC):** Adopted in 1992, the UNFCCC is a foundational international treaty that aims to stabilize greenhouse gas concentrations in the atmosphere to prevent dangerous anthropogenic interference with the climate system.

The international conferences and agreements on climate change

- **Paris Agreement:** Agreed upon in 2015 at the 21st Conference of the Parties (COP 21), the Paris Agreement is a landmark international treaty that aims to limit global warming to well below 2 degrees Celsius above pre-industrial levels, with efforts to limit it to 1.5 degrees Celsius.

The international conferences and agreements on climate change

- **COP Meetings:** The Conference of the Parties (COP) is the supreme decision-making body of the UNFCCC, where the 197 countries and territories that have signed the Framework Convention, participate in this conference. The Conference of the Parties (COP) has met annually since 1995.

Evaluation questions

For Discussion

Q1/ Define climate change?
Q2/ What are the causes of climate change?
Q3/ What are the effects of climate change?
Q4/ What are the ways to mitigate climate change?
Q5/ What are the international conferences and agreements related to climate change?

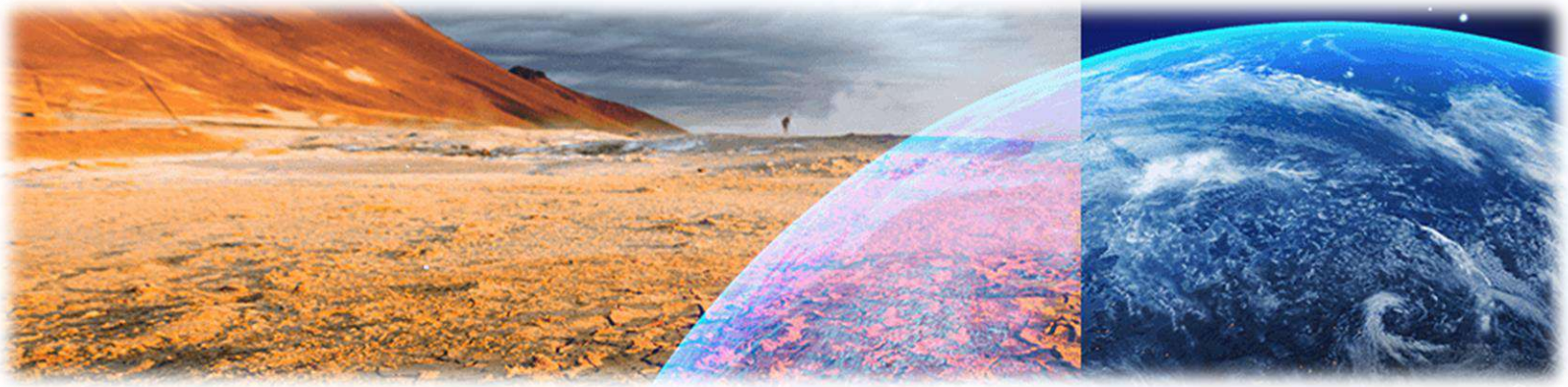
Assignment 14-1

H.W// Mention other international agreements in the field of climate change that were not mentioned in the lecture? What was its role in protecting the environment?

Scan the QR code and send the answer

Conclusion

Climate change is a civilizational challenge that requires international cooperation and joint efforts to preserve our planet and ensure the sustainability of the lives of future generations.

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Lecture Fifteen

Final Exam

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تصميم المحاضرة

عنوان المحاضرة	امتحان نهاية الفصل الدراسي
الفئة المستهدفة	طلبة المرحلة الرابعة لقسم الهندسة البيئية
مدة المحاضرة	ثلاث ساعات حضوريا في القاعة الامتحانية
الهدف من المحاضرة	• الهدف من اجراء الامتحان النهائي هو تقييم مدى تحقيق الطلاب للأهداف التعليمية والمعايير الأكاديمية التي تم تحديدها للمادة خلال فترة الفصل الدراسي بأكمله و يمكّن استاذ المادة من تقييم و قياس مستويات الطلبة بشكل نهائي.
طريقة اداء الامتحان	• يؤدى الامتحان حضوريا في القاعات الامتحانية و تكون الاجابة باستخدام الورقة و القلم لتجنب حالات الغش و اعطاء تقييم حقيقي للطلبة.

أدناه نموذج من أسئلة امتحان نهاية الفصل الدراسي