SDG13: Climate Action

**Course Title: Climate Action (SDG 13) – Combating Climate Change**

**Unit 1: Introduction to Climate Change and SDG 13**

**Key Topics:**

* Lesson1: Overview of SDG 13: Taking urgent action to combat climate change and its impacts.
  + <https://youtu.be/YUzHBMaVSqQ?si=W6NPxISGuB7oCkj7>
* Lesson2: Causes of climate change: Greenhouse gases, fossil fuels, deforestation, industrial activities.
  + <https://youtu.be/G4H1N_yXBiA?si=uV33ax5o-wzAZ3Yi>
* Lesson3: Global consequences: Rising sea levels, extreme weather events, changing ecosystems.
  + <https://youtu.be/9GjrS8QbHmY?si=uMdV2uo5XzaQQDHa>
* Climate change in Egypt: Impact on agriculture, water scarcity, rising temperatures, and desertification.
  + <https://youtu.be/5TP3Ux8OMmQ?si=bIkBM4K-SvwIuH1->

**Activity:**

* **Interactive Data Exploration**: Using **NASA Earthdata Worldview**, students explore satellite imagery of Egypt to track changes in land use, deforestation, and urban expansion that contribute to climate change.
  + <https://sdgstoday.org/dataset/global-temperature-change>

**Assessment:**

* **Quiz**: Test students on the causes and effects of climate change, particularly in Egypt.

**1.** What is the primary goal of SDG 13?

* A) Promote affordable education for all
* B) Combat climate change and its impacts
* C) Provide clean water and sanitation
* D) Increase global trade

**Answer**: B) Combat climate change and its impacts

**2.** Which of the following is a major cause of climate change?

* A) Increased use of renewable energy
* B) Greenhouse gas emissions from fossil fuels
* C) Decreasing global temperatures
* D) Deforestation of urban areas

**Answer**: B) Greenhouse gas emissions from fossil fuels

**3.** What effect does climate change have on global weather patterns?

* A) Stabilizes temperatures worldwide
* B) Causes more frequent and severe weather events
* C) Reduces the frequency of natural disasters
* D) Decreases rainfall globally

**Answer**: B) Causes more frequent and severe weather events

**4.** How does climate change affect Egypt specifically?

* A) Egypt benefits from rising sea levels
* B) Increased desertification and impacts on agriculture
* C) Global cooling leads to better crops
* D) Lowering river levels improves water management

**Answer**: B) Increased desertification and impacts on agriculture

**5.** Which NASA tool can students use to explore the impact of climate change through satellite imagery?

* A) NASA Earth Observatory
* B) NASA Apollo Program
* C) NASA Curiosity Rover
* D) NASA Mars Mission

**Answer**: A) NASA Earth Observatory

**Unit 2: Climate Change Impacts and Egypt’s Vulnerability**

**Key Topics:**

* Lesson1: How climate change affects agriculture: Shifts in growing seasons, reduced crop yields, and increased desertification.
  + <https://youtu.be/SnDJA_1aV2I?si=1KiiURBpOzykkTFO>
* Lesson2: Water scarcity and its implications for Egypt: Impact on the Nile River, water shortages, and potential conflicts over water resources.
  + <https://youtu.be/Ituakqham4o?si=l4pOhTkPv-4rQIoo>
* Lesson3:Human health and climate change: Heatwaves, air pollution, and the spread of disease.
  + <https://youtu.be/T7fRYQeOS18?si=Kuaiu3NDO1nPv843>

**Activity:**

* **Case Study**: Students analyze a case study on how climate change has impacted the Nile River and Egypt’s agriculture. They use **SEDAC** data to assess the socioeconomic effects of water scarcity and reduced agricultural productivity.
  + <https://sedac.ciesin.columbia.edu/mapping/viewer/>

**Assessment:**

* **Group Project**: Students create a presentation on how climate change is affecting different sectors of Egypt’s economy, such as agriculture and water resources, and propose solutions for adaptation.
* **Quiz**: Focus on Egypt’s vulnerability to climate change and the importance of water resource management.

**1.** Which of the following sectors is most impacted by climate change in Egypt?

* A) Fashion industry
* B) Agriculture and water resources
* C) Entertainment industry
* D) Tourism

**Answer**: B) Agriculture and water resources

**2.** What is a key challenge for Egypt’s agriculture due to climate change?

* A) Increased crop yield
* B) Extended growing seasons
* C) Water scarcity and shorter growing seasons
* D) Flooding of desert areas

**Answer**: C) Water scarcity and shorter growing seasons

**3.** How does climate change exacerbate water scarcity in Egypt?

* A) It increases rainfall, causing water to overflow
* B) It affects the Nile River’s water flow and increases desertification
* C) It reduces the demand for clean water
* D) It improves water management practices

**Answer**: B) It affects the Nile River’s water flow and increases desertification

**4.** What is one impact of climate change on human health?

* A) Improved air quality
* B) Increased incidence of heatwaves and air pollution
* C) Lower risk of diseases
* D) Fewer extreme weather events

**Answer**: B) Increased incidence of heatwaves and air pollution

**5.** Which NASA resource provides socioeconomic data to analyze the impact of climate change on vulnerable populations?

* A) NASA Earthdata
* B) NASA Socioeconomic Data and Applications Center (SEDAC)
* C) NASA’s Mars Rover
* D) NASA Hubble Telescope

**Answer**: B) NASA Socioeconomic Data and Applications Center (SEDAC)

**Unit 3: Global and Local Solutions for Climate Action**

**Key Topics:**

* Lesson1:Global climate agreements: The Paris Agreement, COP meetings, and the role of international cooperation in combating climate change.
  + <https://youtu.be/Z5YvjG4lTpQ?si=M2YYn7p2ciyQYPcz>
* Lesson2:Egypt’s role in climate action: The country’s commitments to reducing carbon emissions, expanding renewable energy, and protecting vulnerable ecosystems.
  + <https://youtu.be/xyppVqVSxSs?si=YEwH5Z-r4SCnzmjM>
* Lesson3:Local initiatives in Egypt: Renewable energy projects (solar, wind), water conservation efforts, and afforestation programs.
  + Read

There are several local initiatives in Egypt, including programs that support the economy, education, and the environment:

* The Canada Fund for Local Initiatives – Egypt

This fund focuses on inclusive governance, women and youth participation, and economic growth for all.

* Upper Egypt Local Development Program (UELDP)

This program supports local health systems, preventive measures, and economic recovery.

* U.S.-Egypt Higher Education Initiative

This initiative provides scholarships and exchange opportunities to Egyptians from underserved communities.

* Hayah Kareema (Decent Life)

This initiative supports sustainable development in Egypt by empowering local communities and improving public service delivery.

* Community Development Programme (Egypt)

This program aims to improve living standards and employment opportunities for disadvantaged populations in urban areas.

* German-Arab Chamber of Industry and Commerce (AHK)

This chamber promotes economic relations between Germany and Egypt by facilitating trade, investment, and collaboration.

* Coptic Evangelical Organization for Social Services (CEOSS)

This registered social services organization serves Muslim and Christian communities.

* EduCamp

This project produced school kits on sustainable development, energy, water, agriculture, and biodiversity.

* Evangelistic Faith Missions

This locally led work includes 65 churches, a Bible college, community outreach programs, and broadcasting programs.

**Challenge Resources:**

**Activity:**

* **Simulation Exercise**: Students act as policymakers tasked with designing Egypt’s climate action plan for the next decade. Using data from **NASA Earth Observations Toolkit**, they focus on sustainable urban development, renewable energy, and adaptation strategies.
* <https://eotoolkit.unhabitat.org/>

**Assessment:**

* **Quiz**: Focus on global climate agreements and Egypt’s role in climate action.

**1.** What is the main goal of the Paris Agreement?

* A) Promote economic growth in developed nations
* B) Limit global warming to well below 2°C compared to pre-industrial levels
* C) Reduce education inequality
* D) Increase carbon emissions for industrial growth

**Answer**: B) Limit global warming to well below 2°C compared to pre-industrial levels

**2.** How is Egypt contributing to global climate action?

* A) By focusing on fossil fuel expansion
* B) By investing in renewable energy projects and reducing carbon emissions
* C) By decreasing its reliance on solar energy
* D) By building more coal plants

**Answer**: B) By investing in renewable energy projects and reducing carbon emissions

**3.** What is one example of a renewable energy project in Egypt?

* A) Benban Solar Park
* B) Nuclear power plant construction
* C) Coal-powered electricity plant
* D) Hydropower from the Mediterranean

**Answer**: A) Benban Solar Park

**4.** What global agreement focuses on reducing carbon emissions and mitigating climate change?

* A) The Paris Agreement
* B) The Kyoto Protocol
* C) The GATT Agreement
* D) The International Space Treaty

**Answer**: A) The Paris Agreement

**5.** Which NASA toolkit can be used to explore sustainable urban planning in relation to climate action?

* A) NASA Earth Observations Toolkit for Sustainable Cities
* B) NASA Mars Mission Toolkit
* C) NASA Apollo Program
* D) NASA Climate Toolkit

**Answer**: A) NASA Earth Observations Toolkit for Sustainable Citie

**Unit 4: Climate Action Technologies and Innovations**

**Key Topics:**

* Lesson1: Renewable energy technologies: Solar, wind, and hydropower as solutions for reducing reliance on fossil fuels.
  + <https://youtu.be/KyH8RJGtG6k?si=5tcCu1SOQ_ASdtsX>
* Lesson2: Carbon capture and storage (CCS): Techniques for capturing carbon emissions from the atmosphere and storing them underground.
  + <https://youtu.be/EyPI20h9kx0?si=dC2oaGBDCxcWnf2m>
* Lesson3: AI and satellite monitoring: How artificial intelligence and satellite data are used to monitor environmental changes, predict climate events, and optimize renewable energy use.
  + Read <https://news.climate.columbia.edu/2018/06/05/artificial-intelligence-climate-environment/>

**Challenge Resources:**

* **NASA ARSET**: Explore how Earth observation data and AI are used to monitor climate-related data, including emissions, temperature changes, and renewable energy projects.
* **European Space Agency (ESA) - EO4SD**: Learn about how Earth observation data supports sustainable development and climate action globally.

**Activity:**

* **Hands-On Workshop**: Students use **NASA ARSET** tools to analyze carbon emissions data from Egypt and propose technological innovations to reduce emissions. They design a carbon capture strategy for a specific region using AI-based data.
* <https://eo4sd.esa.int/>

**Assessment:**

* **Final Project**: Each student submits a report on a clean energy technology or climate solution that could help Egypt reduce its carbon footprint, backed by satellite data.

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* **Quiz**: Test students on the latest climate technologies and their potential to mitigate climate change in Egypt.

**1.** Which of the following is a clean energy technology that can help reduce carbon emissions?

* A) Coal power plants
* B) Solar energy
* C) Fossil fuel expansion
* D) Diesel engines

**Answer**: B) Solar energy

**2.** What is carbon capture and storage (CCS)?

* A) A method of producing more carbon for industrial use
* B) A technique for capturing and storing carbon emissions underground
* C) A way to release carbon back into the atmosphere
* D) A process to increase fossil fuel burning

**Answer**: B) A technique for capturing and storing carbon emissions underground

**3.** How can satellite data and AI help in climate action?

* A) By monitoring emissions and predicting extreme weather events
* B) By increasing fossil fuel production
* C) By controlling human behavior
* D) By replacing renewable energy

**Answer**: A) By monitoring emissions and predicting extreme weather events

**4.** Which of the following is a renewable energy source used to combat climate change?

* A) Solar energy
* B) Coal energy
* C) Oil extraction
* D) Natural gas

**Answer**: A) Solar energy

**5.** What resource can be used to monitor climate-related data such as emissions and temperature changes?

* A) NASA ARSET
* B) NASA SpaceX Program
* C) NASA Mars Mission
* D) NASA Lunar Landings

**Answer**: A) NASA ARSET