CityAdapt - Building Climate Resilience of Urban Systems Through Ecosystem-Based Adaptation (EbA) in the Latin America and Caribbean Region

CLIMATE CHANGE ADAPTATION AND NATURE- BASED SOLUTIONS TOOLKIT

JAMAICA

HIGH SCHOOL STUDENTS GRADE 7-9

December 2023

CONTENT

INTRODUCTION

Welcome to an exciting journey of discovery and learning with our "Climate Change Adaptation and Nature-based Solutions Toolkit" designed especially for primary students in Grades 7 to 9.

This toolkit is an integral part of the City Adapt project, initiated by the Global Environment Facility (GEF) and spearheaded by the United Nations Environment Programme (UNEP). It was also created in collaboration with local entities including The Forestry Department, The Nature Conservancy, and the Jamaica 4-H Clubs.

As our world continues to evolve rapidly, the Latin America and Caribbean (LAC) region, including Kingston, Jamaica, is witnessing significant urban expansion. This growth, while promising, brings challenges, particularly in adapting to climate change and preserving our precious natural resources. Understanding these challenges and learning to address them is crucial for our future, and it starts with you and our young learners.

Our toolkit is a result of extensive research and consultation, including a gap analysis that reviewed existing educational resources and practices. We've tailored this toolkit to fill these gaps, ensuring it aligns seamlessly with your current curriculum. It's designed for educators, not just to help teach about climate change and nature-based solutions but to also inspire students to become active participants in creating a sustainable future.

Inside, you will find a range of engaging activities, interactive projects, and resources that make learning about climate change and nature-based solutions not only educational but also fun and memorable. These include hands-on projects, technology-based learning, and interactive games, all created to stimulate your curiosity and encourage critical thinking.

Our approach is holistic and multidisciplinary, aiming to integrate these crucial topics into various subjects already being taught. We believe that by understanding the interconnectedness of our environment, urban development, and climate change, kids will develop a deeper appreciation and a lifelong commitment to sustainable practices.

So, let's embark on this learning adventure together! As you work through this toolkit, remember that each child plays a vital role in shaping our world. Their ideas, actions, and voices are essential in adapting to and mitigating the impacts of climate change. We are excited to see how you, and young environmental stewards, will use this knowledge to make a difference in your communities and beyond.

Happy Learning!

CLIMATE CHANGE ADAPTATION AND NATURE-BASED SOLUTIONS TOOLKIT OUTLINE HIGH SCHOOL STUDENTS GRADE 7-9

DEFINITION OF KEY TERMS INTRODUCTION

In this essential section, we embark on a journey to demystify some crucial concepts that form the backbone of learning about the environment.

The key terms presented are structured in a progressive hierarchy of understanding, meaning that each definition builds upon the previous one, creating a cohesive and comprehensive learning experience for the children. This approach ensures that as your students' knowledge expands through the lessons, new terms are introduced in a manner that reinforces and deepens their understanding.

We've chosen simple, accessible language for the definitions to ensure that children easily grasp the concepts. It's important to remember that not all terms will be introduced at once. Instead, you, as the educator, will have the flexibility to bring in new terms at the right moments in the learning journey, ensuring that each new concept is introduced at an appropriate stage in the students' developing comprehension.

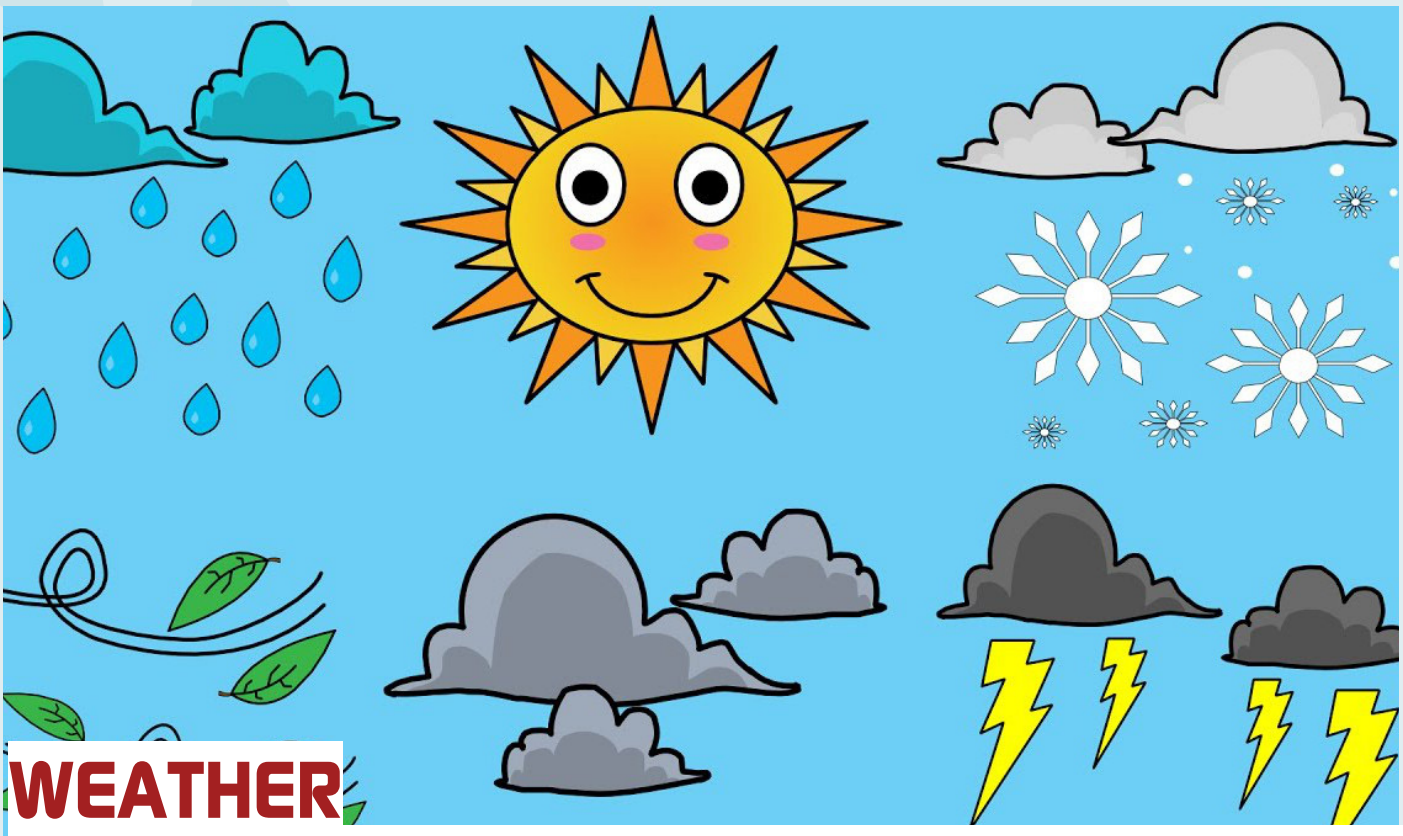
This methodical and gradual introduction of terms is designed to foster a robust and thorough understanding of climate change adaptation and nature-based solutions among your young learners

DEFINITIONS

1. Climate (Overall Weather Trend): The average weather conditions in a place over many years.
2. Weather (Daily Weather): The conditions outside on a particular day, such as sunny, cloudy, rainy, or snowy.
3. Pollution (Environmental Harm): Harmful substances released into our air, water, or land that can damage our health and the environment.
4. Climate Change (Shifting Weather Patterns): Long-term changes in temperature and typical weather for a place.

Climate

The average weather conditions in a place over many years.

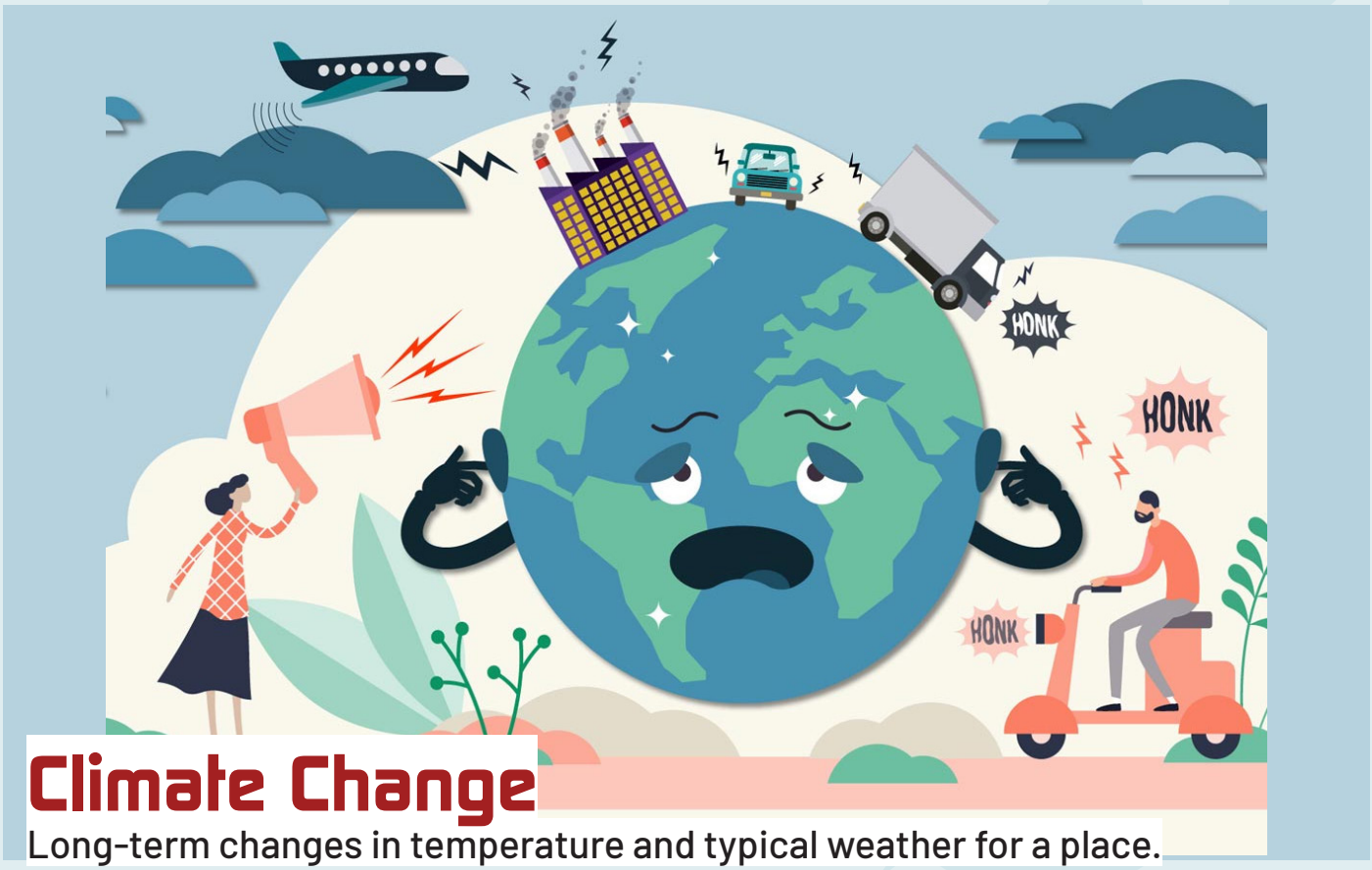


WEATHER

The conditions outside on a particular day, such as sunny, cloudy, rainy, or snowy.

Pollution

Harmful substances released into our air, water, or land that can damage our health and the environment.



Climate Change

Long-term changes in temperature and typical weather for a place.

How Humans Contribute To Climate Change

Smoke from Factories
Factories release smoke and gases that trap heat in our atmosphere, making the Earth warmer. This is like wrapping our planet in a thick blanket which keeps it hot.

Gases from Cars and Trucks
Cars and trucks emit gases like carbon dioxide when they burn fuel. These gases act like a heat trap, trapping heat in the earth's atmosphere and raising the Earth's temperature.

Cutting Down Trees
Trees absorb carbon dioxide, a greenhouse gas which traps heat on earth. When we cut down trees, less carbon dioxide (CO2) is absorbed, and so more of this gas is left in the atmosphere to trap more heat on earth. So trees help to cool the earth, and we cut them down earth loses its coolants.

Too Much Trash
Waste, especially when not properly managed, releases methane and CO2. These gases contribute to heating up the Earth. Reducing waste helps in cooling down our planet."

How Humans Contribute To Climate Change

High Energy Use in Homes and Buildings

Using a lot of electricity, especially from non-renewable sources like coal and gas, releases greenhouse gases. Turning off lights and using energy-efficient appliances helps reduce this impact.

Agriculture and Livestock Farming

Farming, especially with a lot of livestock, produces methane, a potent greenhouse gas. Also, using fertilizers in large quantities can release harmful gases.

Emissions from Air Travel

Airplanes burn a lot of fuel, which releases CO2 and other greenhouse gases. Reducing air travel can lower these emissions.

Deforestation for Urban Expansion

Clearing forests to build cities and infrastructure reduces the Earth's ability to absorb CO2. Protecting forests is crucial for maintaining our planet's health.

Plastic Pollution

Producing and disposing of plastic contributes to greenhouse gas emissions. Reducing, reusing, and recycling plastic can help combat climate change.

Excessive Water Use and Pollution

Overusing water in agriculture and polluting water bodies affect the natural climate balance. Conserving water and preventing pollution are key steps.

DEFINITIONS

Climate Change Mitigation (Weather Change Solutions):

Doing things to make sure our weather patterns doesn't change too much, and our
earth doesn't get too hot

Examples Of Climate Change Mitigation

I. Planting Trees:

Trees are natural carbon sinks, meaning they absorb carbon dioxide, a significant greenhouse gas. Initiating tree-planting activities in schoolyards, communities, or at home can combat climate change. Trees play a crucial role in regulating climate, and their importance in urban areas, especially for reducing heat islands, is immense. Discussing deforestation's impact on climate change can also provide valuable insights.

II. Recycling and Reducing Waste:

Recycling helps reduce the need for extracting and processing raw materials, which is energy-intensive and emits greenhouse gases. Students can learn about the lifecycle of products and the importance of reducing waste and choosing minimal packaging. This understanding helps lower their carbon footprint and fosters responsible consumption habits.

III. Protecting our Oceans:

The ocean absorbs nearly 90% of carbon dioxide, hence conserving and preserving it is crucial if we are to mitigate against climate change.

Examples Of Climate Change Mitigation

IV. Using Less Electricity:

Understanding different electricity sources and their environmental impacts is key. Students can explore renewable and non-renewable energy sources, their regional energy mix, and the related environmental consequences. Promoting energy-saving habits and the use of energy-efficient appliances, as well as conducting energy audits at home or school, can be practical and educational.

V. Walking or Riding Bikes:

Promoting sustainable transportation like biking, walking, or public transit helps reduce the carbon footprint associated with personal vehicle use. Discussing the broader benefits of sustainable transportation, including healthier lifestyles and reduced traffic congestion, can be impactful. Introducing concepts of urban planning that support sustainable transportation, such as bike lanes and pedestrian-friendly infrastructure, encourages students to think about long-term environmental solutions.

VI. Supporting Renewable Energy:

Encourage students to learn about renewable energy sources like solar, wind, and hydroelectric power. Discuss how these energy sources reduce reliance on fossil fuels, which are major contributors to greenhouse gas emissions. Students can explore how they can support renewable energy in their community, such as participating in local green energy programs or advocating for renewable energy policies.

VII. Sustainable Eating Habits:

Discuss the impact of food choices on the environment. Emphasize how consuming locally-sourced, plant-based foods can reduce the carbon footprint associated with food production and transportation. Understanding the environmental impact of meat production, especially beef, can encourage students to make more sustainable dietary choices."

VIII. Green Building and Design:

Introduce the concept of green buildings and sustainable architecture. Explain how energy-efficient design, sustainable materials, and green spaces in buildings can

Examples Of Climate Change Mitigation

reduce energy consumption and environmental impact. Students can research green building practices and consider how they can be implemented in their school or community projects.

IX. Promoting Public Transit and Carpooling:
Highlight the benefits of using public transportation and carpooling over individual car use. Discuss how these methods can significantly reduce greenhouse gas emissions, decrease traffic congestion, and improve air quality. Encourage students to research and advocate for improved public transit options in their area and consider organizing a carpooling system for school or extracurricular activities.

DEFINITIONS

Climate Change Adaptation (Preparing for Change):
Making changes to our lifestyles or surroundings to handle the effects of climate change better.

Difference between Climate Change Mitigation and Adaptation
While Mitigation focuses on preventing or slowing down climate change, Adaptation prepares us to live with the effects of the changes.

CLIMATE ADAPTATION EXAMPLES

Climate Change Adaptation Examples (Weather Adjustments):

A. **Coastal Erosion Management:** Discuss the impact of climate change on coastal erosion. Students can learn about the importance of mangroves and coral reefs in protecting shorelines and study methods to prevent coastal erosion, such as planting mangroves or constructing sea walls. This can be linked to geography and environmental science topics.

B. **Heat-Resistant Building Design:** Explore how buildings can be designed or modified to stay cooler in increasingly hot temperatures. This includes understanding the principles of passive cooling, using reflective materials, and effective ventilation. This topic can be integrated into physics and design technology classes.

C. **Sustainable Fishing Practices:** With climate change affecting marine life, sustainable fishing becomes crucial. Students can study the impact of overfishing and climate change on marine ecosystems and learn about sustainable fishing methods. This can be part of biology and environmental studies.

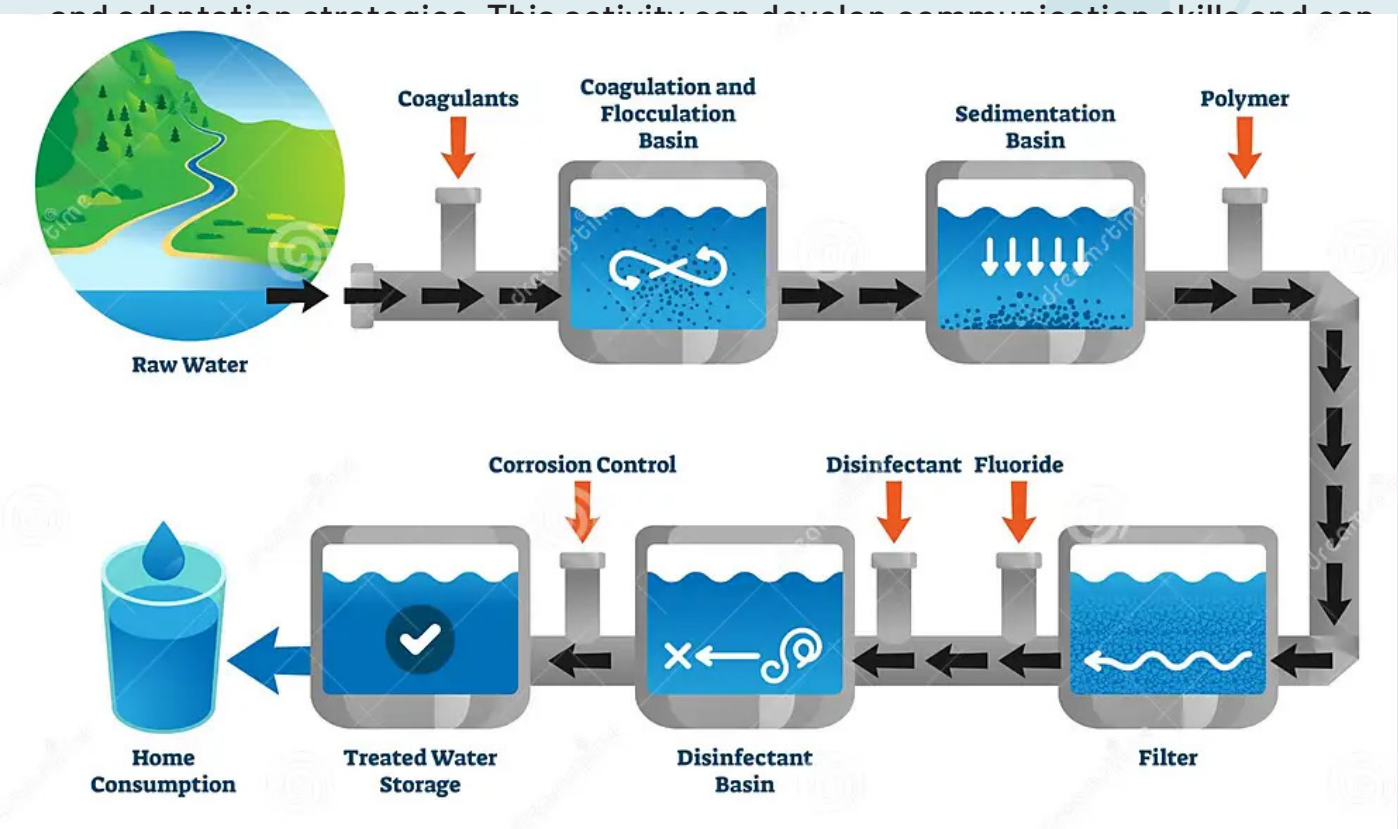
D. **Disaster-Resilient Agriculture:** In areas prone to extreme weather, learning about disaster-resilient agricultural practices is vital. This could involve understanding crop rotation, intercropping, and the use of weather-resistant crop varieties. These concepts can be incorporated into agricultural science courses.

CLIMATE ADAPTATION EXAMPLES

E. Renewable Energy Projects: Encourage students to explore and participate in renewable energy projects, such as solar panel installations or small-scale wind energy projects. This hands-on experience can be part of physics and technology education, helping students understand alternative energy sources and their role in combating climate change. Energy systems play a crucial role in climate adaptation because they can be designed to be more resilient to climate change impacts, thereby ensuring reliable access to energy in the face of extreme weather events and changing climate conditions.

F. Water Conservation Techniques: Teach about advanced water conservation techniques, like greywater recycling and efficient irrigation methods. This can be part of a broader discussion in science classes about water resources management and its importance in a changing climate.

G. Community Awareness Campaigns: Students can initiate or participate in community awareness campaigns to educate others about climate change impacts



DEFINITIONS

Biodiversity Loss (Vanishing Wildlife):

The decrease or loss of various species of plants and animals in an environment.

Ecosystem Services (Nature's Bene its):

The valuable functions nature provides, such as clean air, clean water, and food.

Nature-Based Solutions (Nature's Solutions):

Strategies that use the natural environment to address societal challenges.

Examples of Nature-Based Solutions

A. Mangrove Restoration:

a. Full Explanation: Mangroves are exceptional carbon sinks, meaning they absorb and store a significant amount of CO2 from the atmosphere. They also provide strong natural barriers against storm surges and coastal erosion, which are exacerbated by climate change.
b. Connection to Subjects: Geography (coastal management), Biology (ecosystems and carbon cycle), Environmental Science (climate change mitigation).

B. Community Rain Gardens:

a. Full Explanation: Rain gardens help manage stormwater, reducing urban runoff and soil erosion. They enhance local biodiversity and contribute to cooling urban environments, which is crucial as cities often experience higher temperatures due to climate change.
b. Connection to Subjects: Botany (plant biology and soil interaction), Urban Planning (sustainable urban design), Earth Science (water cycle and urban heat island effect).

C. Agroforestry Practices:

a. Full Explanation: By integrating trees into agricultural practices, agroforestry enhances biodiversity, improves soil health, and increases carbon storage. This helps in mitigating climate change by reducing atmospheric CO2 levels and enhancing the resilience of agricultural systems to climate extremes.
b. Connection to Subjects: Agricultural Science (sustainable farming), Biology (biodiversity and carbon sequestration), Environmental Studies (land use and climate change adaptation).

Examples of Nature-Based Solutions

D. Urban Green Spaces:

a. Full Explanation: Urban green spaces absorb CO2 and help mitigate the urban heat island effect, leading to cooler urban environments. They also improve air quality and provide recreational spaces, enhancing overall urban resilience to climate change. They also provide water quality, pollination, biodiversity enhancement, infiltration capacity to prevent flooding, etc.
b. Connection to Subjects: Urban Studies (city planning and ecology), Social Studies (public health and environment), Environmental Science

DI. Coral Reef Conservation:

a. Full Explanation: Coral reefs play a crucial role in carbon cycling and marine biodiversity. Protecting and conserving coral reefs helps maintain healthy ocean ecosystems, which are vital in regulating the Earth's climate.
b. Connection to Subjects: Marine Biology (reef ecosystems), Environmental Science (ocean's role in climate regulation), Geography (coastal systems).

DII. Bioengineering for Erosion Control:

a. Full Explanation: Bioengineering methods use plants and natural materials to stabilize soils and prevent erosion, crucial in maintaining landscapes and preventing land degradation, which can be intensified by climate change-induced weather events.
b. Connection to Subjects: Biology (plant-root systems and soil stabilization), Geography (landforms and erosion), Engineering (sustainable and eco-friendly construction).

G. Water Harvesting and Conservation:

a. Full Explanation: Rainwater harvesting reduces dependence on traditional water sources and enhances water security, which is increasingly under threat due to climate change. Conserving water also reduces the energy used in water treatment and distribution.
b. Connection to Subjects: Environmental Science (water resource management), Physics (principles of water harvesting systems), Geography (climate patterns and water scarcity).

DEFINITIONS

Green Infrastructure (Nature-Designed Areas): Natural areas in cities, like parks and gardens, which provide benefits like clean air and places for people to relax.

Resilience (Bouncing Back): The ability to recover and adapt after problems or disasters.

Adaptive Capacity (Ability to Adapt): The capability of a system to adjust and modify itself to changing conditions.

Blue Carbon (Sea Plant Power): Carbon that's stored by ocean plants, which helps in keeping our atmosphere balanced.

Carbon Sequestration (Trapping Carbon): The process by which plants and other systems remove carbon dioxide from the air and store it.

Ecological Restoration (Nature Recovery): Repairing and restoring damaged parts of nature to their natural state.

Regenerative Agriculture (Sustainable Farming): Farming that improves the land's health and its ability to store carbon.

Managed Retreat (Planned Relocation): Strategically moving away from areas at high risk due to climate changes, like rising sea levels.

Climate Refugees (Climate-Displaced People): Individuals who must leave their homes due to the effects of climate change.

ENGAGING ACTIVITIES AND PROJECTS

INTRODUCTION

Welcome to the vibrant and hands-on world of "Engaging Activities and Projects"! In this lively section of our toolkit, we aim to bring the concepts of climate change adaptation and nature-based solutions to life for our young learners. Our objective here is clear and purposeful: to provide a series of hands-on, interactive experiences that not only reinforce students' understanding of these crucial topics but also ignite their curiosity and enthusiasm for learning.

As educators, you know that the most impactful lessons are those where students can actively participate and apply their learning in practical ways. This section is designed to do just that, through a variety of dynamic and enjoyable activities. We've divided the section into three main categories, each offering a unique approach to engaging young minds:

Fun Research Activities: Here, students will embark on mini-explorations and investigations, turning them into young researchers. These activities are crafted to be both informative and enjoyable, encouraging students to delve deeper into the topics of climate change and nature-based solutions in a way that resonates with their natural curiosity and creativity.

Games and Interactive Learning: Learning through play is a powerful tool, and this subsection leverages that by introducing a range of games and interactive learning experiences. These activities are designed to reinforce key concepts while keeping students engaged and motivated. Whether it's a board game, a digital interactive, or a role-playing scenario, each game provides a fun and memorable way to understand and internalize important environmental lessons.

STEM Activities: Focusing on Science, Technology, Engineering, and Mathematics (STEM), this section offers activities that blend environmental education with critical thinking and problem-solving skills. From building models to conducting simple experiments, these activities help students see the practical applications of what they learn, fostering a deeper appreciation for how science and innovation can be harnessed to address environmental challenges.

ENGAGING ACTIVITIES AND PROJECTS

Through these engaging activities and projects, we aim to foster not just knowledge, but a sense of excitement and passion for environmental stewardship among our young learners. Let's inspire the next generation of climate change adaptors and nature-based solution innovators!

RESEARCH & INNOVATION ACTIVITIES

RESEARCH & INNOVATION ACTIVITIES

Environmental Solutions Challenge

Objective:
For high school students in Grades 7-9 to identify environmental challenges and develop innovative solutions, particularly focusing on Climate Change Adaptation strategies.

Activity Design for Teachers:

Preparation:
- Compile a list of significant environmental challenges, both global and local to Jamaica, such as rising sea levels, plastic pollution, and deforestation.
- Gather resources and materials that can aid in understanding these challenges and brainstorming solutions.
- Prepare a structure for students to present their solutions, which could include a written proposal, a model, or a presentation.

Environmental Solutions Challenge

Instructions for Students:

1. **Identifying Challenges:**
   - Start with a discussion session on various environmental challenges, emphasizing the impact of climate change.
   - Assign students (individually or in groups) to select one challenge they are particularly passionate about addressing.
2. **Research and Development:**
   - Guide students to research their chosen challenge, understanding its causes, impacts, and current mitigation efforts.
   - Encourage them to think creatively and come up with an innovative solution or adaptation strategy that could realistically be implemented.
3. **Solution Proposal:**
   - Instruct students to create a detailed proposal for their solution. This could include a written report, diagrams, or even a prototype model.
   - Proposals should clearly outline the problem, the proposed solution, the feasibility of implementation, and the expected impact.
4. **Presentation and Feedback:**
   - Organize a session where students present their solutions to the class.
   - Facilitate a feedback and discussion session after each presentation, encouraging constructive input and collaborative thinking.
5. **Reflection:**
   - Encourage students to reflect on the exercise, what they learned about environmental challenges, and the importance of innovative thinking in solving these issues.

Materials Needed:

- Research materials (books, articles, online resources)
- Presentation materials (paper, craft supplies, digital tools)
- Prototype materials (if applicable)

Environmental Solutions Challenge

Assessment Criteria:

- **Innovation and Creativity:** Originality and practicality of the proposed solution.
- **Research Quality:** Depth of understanding of the chosen environmental challenge.
- **Presentation Skills:** Clarity and effectiveness in communicating the solution.
- **Collaborative Engagement:** Participation in discussion and feedback sessions.

Teaching Tips:

- Encourage students to explore solutions that have a realistic application in their local context.
- Provide guidance and resources to support the research and development process.
- Foster an environment where creative thinking and problem-solving are value

ENVIRONMENTAL SOLUTION CHALLENGE!

Today, we're going to focus on an activity called the Environmental Solutions Challenge. This is a list of significant environmental challenges, both globally and locally here in Jamaica. Your task is to select one of these challenges and develop an innovative solution, particularly focusing on Climate Change Adaptation strategies. You'll work either individually or in groups to research your chosen challenge and come up with a practical and creative solution."

List of Environmental Challenges:

1. **Global Warming and Rising Sea Levels:** How it's impacting coastal communities and ecosystems worldwide and in Jamaica.
2. **Plastic Pollution:** The effects on oceans, wildlife, and the environment.
3. **Deforestation:** Its impact on biodiversity, climate, and ecosystems.
4. **Water Scarcity:** Challenges related to droughts and clean water supply.
5. **Air Pollution:** Effects on health and the environment.
6. **Soil Erosion and Degradation:** Its impact on agriculture and land stability.
7. **Loss of Biodiversity:** The decline of species and ecosystems.
8. **Urban Sprawl and Loss of Green Spaces:** The impact on urban ecosystems and quality of life.
9. **Coral Reef Degradation:** Particularly in the Caribbean Sea, affecting marine life and tourism.
10. **Overfishing:** The impact on marine ecosystems and food supply.

Instructions for the Activity:

1. **Select a Challenge:** Choose one of the listed environmental challenges that you feel passionate about addressing.
2. **Research:** Conduct thorough research on your chosen challenge, focusing on its causes, impacts, and current solutions being implemented.
3. **Develop a Solution:** Brainstorm and develop an innovative solution or adaptation strategy. This could involve new technology, community initiatives, policy proposals, or education campaigns.
4. **Prepare a Proposal:** Create a proposal for your solution. This should include a detailed explanation of the problem, your proposed solution, how it could be implemented, and the potential impact it could have.

ENVIRONMENTAL SOLUTION CHALLENGE!

5. **Presentation: Y**ou will present your proposal to the class. This can be in the form of a written report, a PowerPoint presentation, a poster, or even a model or prototype if applicable.
6. **Discussion:** Participate in a class discussion about each proposal, offering constructive feedback and ideas.

****Remember,** the goal is to think creatively and realistically about how we can tackle these environmental challenges, especially in the context of our local environment here in Jamaica. Let's see what innovative solutions we can come up with!"

RESEARCH & INNOVATION ACTIVITIES

ENVIRONMENTAL DYNASTIES - DEBATE ACTIVITY

Objective:
To engage high school students in Grades 7-9 in critical thinking and discussions through organized debates on various environmental topics, such as climate change, ecosystem restoration, conservation, and sustainable practices.

Activity Design for Teachers:

Preparation:
- Select a range of debate topics relevant to environmental issues, ensuring they are suitable for the understanding level of students in Grades 7-9.
- Prepare guidelines for the debate format, including time limits, structure of arguments, and rules of conduct.
- Organize students into teams, ensuring a balanced skill set in each group.
- Provide resources for students to research their debate topics.

ENVIRONMENTAL DYNASTIES - DEBATE ACTIVITY

Instructions for Students:

1. **Topic Assignment and Team Organization:** You will be divided into teams and assigned a topic for debate related to environmental issues. Each team will represent either the 'pro' or 'con' side of the argument.
2. **Research and Preparation:** Your team will need to research your topic thoroughly. This includes understanding both sides of the argument, even though you will be debating for one side.
3. **Debate Structure:** Each team will have an allocated time to present their arguments, followed by a rebuttal session. Ensure your arguments are clear, well-structured, and supported by facts.
4. **Presentation and Conduct:** During the debate, present your arguments confidently and respectfully. Listen carefully to the opposing team and respond thoughtfully during rebuttals.
5. **Judging and Feedback:** Debates will be judged based on the clarity of your arguments, how well you've researched your topic, and your ability to engage in respectful dialogue. Constructive feedback will be provided after each debate.
6. **Re lection Session:** After the debates, we will have a reflection session where you can share what you've learned and how you think these issues could be addressed in the real world.

Materials Needed:

- Resources for researching debate topics
- Timer for managing debate segments
- Score sheets for judges (if applicable)

Assessment Criteria:

- **Content Knowledge:** Understanding and accuracy of the information presented.
- **Argument Quality:** Clarity and persuasiveness of arguments.
- **Rebuttal Effectiveness:** Ability to respond to opposing arguments.

ENVIRONMENTAL DYNASTIES - DEBATE ACTIVITY

- **Presentation Skills:** Confidence and respectfulness during the debate.

Teaching Tips:

- Encourage students to look at their topics from various perspectives to build a well-rounded argument.
- Monitor the debates to ensure a respectful and constructive environment.
- Use the reflection session to highlight the importance of informed discussions in addressing environmental issues.

ENVIRONMENTAL DEBATE TOPICS FOR HIGH SCHOOL STUDENTS (GRADES 7-9)

1. **Ban on Single-Use Plastics:**
   Resolved: The Jamaican government should enforce a total ban on single-use plastics to protect the environment."
2. **Coral Reef Conservation vs. Tourism Development:**
   Resolved: Protecting coral reefs should take precedence over tourism development in the Caribbean."
3. **Renewable Energy Transition:**
   Resolved: Caribbean nations should invest heavily in renewable energy sources, even if it means significant changes in current economic structures."
4. **Mangrove Restoration vs. Coastal Development:**
   Resolved: Mangrove restoration is more important than coastal development for the protection of Caribbean ecosystems."
5. **Climate Change Education in Schools:**
   Resolved: Climate change education should be mandatory in all Jamaican and Caribbean schools."
6. **Deforestation for Agriculture:**
   Resolved: The economic benefits of expanding agricultural land in Jamaica justify deforestation."
7. **Fishing Regulations to Protect Marine Life:**
   Resolved: Strict fishing regulations are necessary to preserve marine biodiversity in the Caribbean Sea."
8. **Use of Pesticides in Farming:**
   Resolved: The use of pesticides in farming should be significantly reduced to protect the environment in Jamaica."
9. **Eco-Tourism vs. Traditional Tourism:**
   Resolved: Eco-tourism should be the primary focus of tourism development in the Caribbean."

ENVIRONMENTAL DEBATE TOPICS FOR HIGH SCHOOL STUDENTS (GRADES 7-9)

10. Public Transportation and Pollution:
Resolved: Improving public transportation is the most effective way to reduce pollution in major Jamaican cities."

These topics are designed to be thought-provoking and relevant to the Jamaican and Caribbean context, encouraging students to explore and debate both sides of environmental issues. They cover a range of topics, from policy and conservation to economic development and education, providing ample opportunity for balanced arguments and critical discussions.

GAMES AND INTERACTIVE LEARNING

GAMES AND INTERACTIVE LEARNING

ESCAPE ROOM CHALLENGE

Objective:

To engage high school students in Grades 7-9 in an interactive escape room experience, focusing on solving environmental puzzles and challenges related to climate change and ecosystem protection. The activity aims to raise awareness about these issues in an immersive and engaging way.

Activity Design for Teachers:

Preparation:

- Design a series of environmental puzzles and challenges that students must solve to "escape" the room. These can be based on topics like renewable energy, recycling, biodiversity, etc.
- Set up a classroom or a designated area as the escape room, with different stations for each challenge.
- Ensure that each puzzle is educational yet solvable within a reasonable timeframe.
- Gather any necessary materials or props for the puzzles, ensuring they are safe and age-appropriate.

ESCAPE ROOM CHALLENGE

Instructions for Students:

1. **Introduction to the Escape Room:** Explain the concept of the escape room and its environmental theme. Emphasize teamwork, problem-solving, and critical thinking.
2. **Challenge Briefing:** Brief the students on the rules, the objective of each puzzle, and the time limit for the entire challenge.
3. **Team Formation and Start:** Divide students into teams. Start the clock and let them begin tackling the challenges.
4. **Monitor and Assist:** Monitor the teams as they progress, offering hints if necessary but encouraging independent problem-solving.
5. **Debrief and Discussion:**
   - Once the challenge is completed or time is up, gather the students for a debriefing session.
   - Discuss the solutions to each challenge and relate them to real-world environmental issues and solutions.
6. **Reflection:** Encourage students to reflect on what they learned about climate change and ecosystem protection, and how they can apply this knowledge in their daily lives.

Materials Needed:

- Props and materials for environmental puzzles and challenges
- Timers or clocks to keep track of the time

Assessment Criteria:

- Problem-Solving Skills: Ability to work through the puzzles effectively.
- Teamwork and Collaboration: Cooperation and communication within the teams.
- Understanding of Environmental Concepts: Demonstrated knowledge of climate change and ecosystem protection.

ESCAPE ROOM CHALLENGE

Teaching Tips:

- Ensure that the escape room is both challenging and fun, keeping students engaged and motivated.
- Provide clear instructions and objectives for each puzzle.
- Tailor the difficulty of the puzzles to suit the age and skill level of the students.

This Escape Room Challenge is designed to be an interactive and immersive way for students to learn about and engage with environmental issues. By solving puzzles related to real-world challenges, they deepen their understanding of these critical topics in a memorable and enjoyable way.

Escape Room Challenge: Climate Adaptation and Nature-Based Solutions

Objective:

Solve eight multiple-choice questions related to climate change adaptation and nature-based solutions. Each correct answer provides a digit for the 8-digit combination to unlock the escape room door.

Puzzle Design:

1. **Mangrove Restoration:**
   Question: What is a key benefit of mangrove restoration?
   (1) Enhances beach beauty
   (2) Reduces coastal erosion
   (3) Increases land value.
   Correct Answer: (2) Reduces coastal erosion.

2. **Rainwater Harvesting:**
   Question: Rainwater harvesting helps to adapt to climate change by:
   (1) Reducing dependence on groundwater
   (2) Providing filtered drinking water
   (3) Cooling the air
   Correct Answer: (1) Reducing dependence on groundwater.

3. **Coral Reef Protection**
   Question: Coral reefs combat climate change by:
   (1) Attracting tourists
   (2) Providing habitat for fish
   (3) Absorbing carbon dioxide.
   Correct Answer: (3) Absorbing carbon dioxide.

Escape Room Challenge: Climate Adaptation and Nature-Based Solutions

4. Sustainable Agriculture:
Question: Cover cropping in agriculture helps by:
(1) Reducing soil erosion
(2) Decreasing crop yield
(3) Saving water.
Correct Answer: (1) Reducing soil erosion.

5. Solar Energy Use:
Question: Solar panels contribute to climate change adaptation by:
(1) Reducing fossil fuel use
(2) Generating jobs
(3) Heating the ocean
Correct Answer: (1) Reducing fossil fuel use.

6. Coastal Barrier Planting:
Question: Planting which species can help protect coastlines?
(1) Bamboo
(2) Sea Grape
(3) Hibiscus.
Correct Answer: (2) Sea Grape.

7. Ecosystem-Based Disaster Risk Reduction:
Question: Which ecosystem approach helps reduce disaster risk?
(1) Building sea walls
(2) Creating artificial reefs
(3) Restoring wetlands.
Correct Answer: (3) Restoring wetlands.

Escape Room Challenge: Climate Adaptation and Nature-based Solutions

8. Urban Green Spaces:
Question: Increasing urban green spaces helps by:
(1) Beautifying cities
(2) Providing recreation
(3) Reducing urban heat islands.
Correct Answer: (3) Reducing urban heat islands.

9. Final Escape Challenge - Lock Combination:
Combination: The correct combination from the answers: 21311233.
Objective: Enter the correct combination to unlock the door and escape the room.

These questions are designed to be slightly complex, focusing on climate change adaptation and nature-based solutions, relevant to the Jamaican and Caribbean context. Solving these questions allows students to "escape" the room while reinforcing their knowledge of practical environmental solutions.

GAMES AND INTERACTIVE LEARNING

Jamaica's Green Future: Urban Planning Simulation

Objective:
To engage high school students in Grades 7-9 in an interactive urban planning simulation, emphasizing the importance of integrating green spaces into urban development for environmental sustainability.

Activity Design for Teachers:

Preparation:

- Prepare materials: large paper sheets (representing land plots), colored pencils, markers, cutouts or stickers of trees, buildings, farms, roads, and water bodies.
- Create a brief guide on urban planning principles, focusing on the integration of green spaces.
- Develop a set of criteria for evaluating the students' urban designs.

Jamaica's Green Future: Urban Planning Simulation

Instructions for Students:

1. **Introduction to Urban Planning:** Introduce the concept of urban planning and its significance in sustainable development and combating climate change.
2. **Designing the Urban Area:**
   - Divide the class into small groups and provide each group with their materials.
   - Instruct them to design an urban area on their plot of land, considering the placement of buildings, roads, farms, and especially green spaces.
   - Emphasize that at least 30% of their land must remain green with parks, forests, green roofs, etc.
3. **Presentation and Discussion:**
   - Have each group present their urban design to the class.
   - Guide them to explain their choices, focusing on their nature-based solutions.
   - Facilitate a discussion with questions like why they positioned green spaces in certain areas and how these spaces help combat climate change.
4. **Reflective Learning:** Conclude with a reflection on the challenges and importance of balancing urban development with environmental preservation.

Materials Needed:

- Large paper sheets
- Colored pencils and markers
- Cutouts or stickers of urban elements

Assessment Criteria:

- **Design Creativity and Practicality:** How creatively and effectively students incorporate green spaces into their urban design.
- **Understanding of Environmental Concepts:** Knowledge of the role of green spaces in climate change mitigation.
- **Presentation Skills:** Clarity and persuasiveness in presenting their urban design.

Teaching Tips:

- Encourage creativity while ensuring that the designs are realistic and practical.
- Provide examples or case studies of urban areas that successfully integrate green spaces.

Jamaica's Green Future: Urban Planning Simulation

- Use the activity to foster a deeper understanding of how urban planning can contribute to environmental sustainability.

This activity provides a hands-on learning experience in urban planning, allowing students to creatively explore the integration of nature-based solutions in urban settings. It aims to enhance their understanding of sustainable development and the importance of green spaces in combating climate change.

GAMES AND INTERACTIVE LEARNING

Peer-to-Peer Climate Advocacy

Activity: "Walk in My Shoes" Role-play Workshop

Objective:
To encourage high school students in Grades 7-9 to develop empathy and a deeper understanding of the various stakeholders affected by climate change through a role-play workshop.

Activity Design for Teachers:

Preparation:

- Identify and create character profiles for various stakeholders in the climate change conversation, such as a Jamaican farmer facing drought, a policymaker, a coastal fisherman dealing with coral reef bleaching, a local business owner, and an environmental activist.
- Prepare scenario cards that describe specific climate-related challenges each character faces.
- Arrange a classroom or outdoor space conducive to group discussions and role-playing activities.

Peer-to-Peer Climate Advocacy

Instructions for Students:

1. **Introduction to Climate Change Stakeholders:**
   - Introduce the concept of diverse perspectives in the climate change dialogue.
   - Discuss the importance of understanding different viewpoints to find holistic solutions.
2. **Role Assignment:**
   - Assign each student or groups of students a specific character role.
   - Distribute scenario cards to each student or group, outlining the challenges their character faces due to climate change.
3. **Role-play and Discussion:**
   - Guide students to assume their roles and discuss the climate topic from their assigned perspective.
   - Encourage them to think about how climate change affects their character and what solutions their character would advocate.
4. **Group Sharing:**
   - After the role-play, have each group or individual share their character's perspective with the class.
   - Facilitate a discussion where students reflect on what they learned from each other's roles.
5. **Reflection and Empathy Building:**
   - Conclude with a reflection session on how role-playing has helped them understand the multifaceted impacts of climate change on different sections of society.
   - Discuss the importance of empathy in addressing climate change and developing inclusive solutions.

Materials Needed:

- Character profiles and scenario cards
- Space for role-playing and discussion

Peer-to-Peer Climate Advocacy

Assessment Criteria:

- **Role-Playing Engagement:** How effectively students assume and portray their characters.
- **Understanding of Perspectives:** Insight into their character's challenges and viewpoints.
- **Participation and Discussion:** Active involvement in the role-play and group discussions.

Teaching Tips:

- Encourage students to research their characters beforehand to better understand their perspectives.
- Guide discussions to ensure all voices are heard and respected.
- Use this activity to highlight the complexity of climate change and the need for diverse perspectives in creating solutions.

This activity aims to foster empathy and awareness among students about the wide-ranging effects of climate change. By stepping into the shoes of different stakeholders, students gain a more comprehensive understanding of the issue, which is crucial for effective advocacy and solution-building.

GAMES AND INTERACTIVE LEARNING

Character Profiles and Scenario Cards for "Walk in My Shoes" Role-play Workshop

1. **Jamaican Farmer Facing Drought:**
   - **Profile:** A farmer from a rural area in Jamaica, primarily growing crops like yams and bananas.
   - **Scenario Card:** "You're experiencing the worst drought in years, which is threatening your crop yield and livelihood. How do you cope with water scarcity, and what solutions can you propose to adapt to these changing weather patterns?"

2. **Policymaker:**
   - **Profile**: A member of the Jamaican Ministry of Environment and Climate Change.
   - **Scenario Card:** "You are tasked with developing policies to combat climate change impacts on the island. What strategies would you implement to balance economic growth with environmental protection, especially in the agricultural sector?"

Character Profiles and Scenario Cards for "Walk in My Shoes" Role-play Workshop

3. **Coastal Fisherman Dealing with Coral Reef Bleaching:**
   - **Profile:** A fisherman from a coastal community dependent on fishing around the coral reefs.
   - **Scenario Card:** "Coral bleaching is devastating the fish populations that your livelihood depends on. Discuss the impacts on your community and what measures you think could help protect and restore the coral reefs."

4. **Local Business Owner:**
   - **Profile:** Owner of a small eco-tourism business in a beach town.
   - **Scenario Card:** "As a business owner, you're witnessing the effects of climate change on tourism. How do you adapt your business to be more sustainable, and what role can you play in promoting environmental awareness among tourists?"

5. **Environmental Activist:**
   - **Profile:** An activist working with a local NGO focused on environmental conservation.
   - **Scenario Card:** "You're leading campaigns to raise awareness about climate change impacts in Jamaica. What are your main areas of focus, and how do you engage the community and policymakers in your efforts?"

Character Profiles and Scenario Cards for "Walk in My Shoes" Role-play Workshop

- **6. Local Manufacturer:**
- **Profile**: A manufacturer and owner of a small factory that produces plastic goods, employing local workers in a Jamaican town.

- **Scenario Card**: "Recent climate change adaptation measures and nature-based solutions, such as banning single-use plastics, are impacting your business negatively. You are facing the challenge of adapting your business model to comply with new environmental regulations while ensuring your factory remains profitable and your employees keep their jobs. Discuss how these changes affect your business and what steps you can take to adapt to an increasingly eco-conscious market without compromising your business's viability."

GAMES AND INTERACTIVE LEARNING

ECOSYSTEM RESCUE MISSION

Objective:

To encourage critical thinking and decision-making skills in students in Grades 7-9 by engaging them in a scenario where they must develop a plan to rescue and restore an ecosystem threatened by climate change.

Activity Design for Teachers:

Preparation:

- Create a detailed scenario that describes an ecosystem in danger due to climate change. This could be a coral reef experiencing bleaching, a coastal area facing erosion, or a rainforest suffering from abnormal weather patterns.
- Prepare background information and resource materials about the chosen ecosystem, focusing on its components, the impacts of climate change, and potential restoration methods.
- Develop guidelines for students to create their rescue plans, outlining key considerations such as environmental impact, feasibility, and sustainability.

ECOSYSTEM RESCUE MISSION

Instructions for Students:

1. **Introduction to the Scenario:**
   - Present the ecosystem scenario to the class, explaining the challenges it faces due to climate change.
   - Discuss the importance of the ecosystem and what could happen if it's not protected.
2. **Research and Plan Development**:
   - Divide the class into small groups and assign each group the task of researching the specific ecosystem.
   - Guide them to develop a rescue plan that addresses the issues presented in the scenario. Plans could include conservation strategies, pollution reduction, or habitat restoration.
3. **Presentation of Plans:**
   - Have each group present their plan to the class, explaining their strategies and how they would implement them.
   - Encourage creativity in presentations, whether through posters, slideshows, or models.
4. **Class Discussion and Feedback:**
   - After each presentation, facilitate a discussion where classmates can ask questions and provide feedback.
   - Discuss the feasibility and potential impact of each plan.
5. **Reflection and Extension:**
   - Lead a reflection session where students consider what they learned and how these strategies could be applied in real-world situations.

Materials Needed:

- Background information and resources on the chosen ecosystem
- Materials for creating presentations (poster board, art supplies, access to digital tools)

Assessment Criteria:

- **Research and Understanding:** Depth of research and understanding of the ecosystem and climate change impacts.

ECOSYSTEM RESCUE MISSION

- **Quality of Plan:** Creativity, feasibility, and environmental sensitivity of the rescue plan.
- **Presentation Skills:** Clarity and effectiveness in presenting the plan.
- **Participation and Collaboration:** Active participation in group work and class discussions.

Teaching Tips:

- Ensure the scenario and resources provided are age-appropriate and relevant to the Jamaican/Caribbean context.
- Support students in their research, guiding them towards understanding complex environmental concepts.
- Encourage students to think creatively and consider various aspects of ecosystem restoration.

Through the Ecosystem Rescue Mission activity, students will engage in a hands-on learning experience that enhances their understanding of ecosystems, the impacts of climate change, and the importance of environmental conservation. This activity promotes collaborative learning, critical thinking, and practical application of environmental knowledge.

SAMPLE SCENARIO FOR ECOSYSTEM RESCUE MISSION: THE COMMUNITY PARK IN JAMAICA

Scenario Title: "Reviving Our Community Park"

Background for Teachers to Present: "Imagine our community park here in Jamaica, once full of life and greenery, now facing problems due to recent weather changes. The park's trees are not as green, the flowers are wilting, and the small pond is drying up. These changes are happening because of the hotter weather and less rain, effects of climate change. Our birds, butterflies, and other small creatures are losing their home. It's our mission to bring life back to our park!"

T**he Challenge**: "We need to come up with a plan to revive our community park. Let's think about how we can help the plants and animals and make the park a happy place again. Our actions, even as students, can make a big difference in fighting against the impacts of climate change on our local environment."

Tasks for Students:

1. **Research:**
   - Learn about the types of plants and animals that live in our park.
   - Find out what plants and animals need to thrive and how the weather affects them.
2. **Developing the Rescue Plan:**
   - Brainstorm ideas to help the park's plants and animals, like planting new trees, creating bird feeders, or starting a small garden.
   - Think of ways to save water for the pond and keep the park clean.
3. **Presentation of Your Plan:**
   - Use drawings, models, or any creative way to show your plan to revive the park.
   - Share why your plan will help and why it's important to take care of our park.

Reflection:

- Discuss how taking care of our local park helps not just the plants and animals, but also our community. Reflect on how everyone, including children, can contribute to making our environment better.

This scenario is tailored to be accessible and actionable for students in Grades 7-9. It encourages them to engage in environmental stewardship within their own community, demonstrating that even small, local actions can contribute positively to combating the broader effects of climate change.

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GAMES AND INTERACTIVE LEARNING

COMMUNITY ACTION PROJECT

Objective:

To empower students in Grades 7-9 to identify local environmental issues in their Jamaican community and design actionable projects to address them. This involves hands-on activities such as organizing clean-up drives, promoting recycling initiatives, or planting resilient species.

Activity Design for Teachers:

Preparation:

- Facilitate a brainstorming session to help students identify local environmental issues such as littering, lack of recycling, or the need for more green spaces.
- Prepare a guide on how to plan and execute community projects.
- Gather information on local resources and organizations that could support or collaborate on these projects.

COMMUNITY ACTION PROJECT

Instructions for Students:

1. **Identifying Local Environmental Issues:**
   - Guide students to discuss and identify key environmental issues in their local community.
   - Encourage them to think about the problems they see around their school, neighborhood, or town.
2. **Designing Community Projects:**
   - Instruct students to work in groups to come up with a project that addresses one of the identified issues.
   - Examples of projects include organizing a beach or community clean-up, starting a school recycling program, or planting trees and resilient plant species in the community.
3. **Project Planning:**
   - Assist students in developing a plan for their project, including goals, required materials, and steps for implementation.
   - Encourage them to think about how to involve other community members and local organizations.
4. **Execution and Participation:**
   - Support students in carrying out their projects, ensuring they have the neces sary resources and guidance.
   - Encourage them to document the process through photos, videos, or written logs.
5. **Re lection and Presentation:**
   - After completing the project, have students reflect on their experiences and the impact of their work.
   - Arrange for students to present their projects and findings to the class or school, sharing their successes and lessons learned.

Materials Needed:

- Materials for project execution (clean-up supplies, recycling bins, plants, etc.)
- Tools for documenting the project (camera, journal)

COMMUNITY ACTION PROJECT

Assessment Criteria:

- **Project Design and Relevance**: Creativity and practicality in addressing a local environmental issue.
- **Execution and Teamwork:** Effectiveness in project implementation and collaboration among team members.
- **Impact and Awareness:** Contribution to environmental improvement and raising awareness in the community.

Teaching Tips:

- Provide continuous support and guidance throughout the project.
- Encourage students to be creative and take initiative.
- Help students understand the broader impact of their actions on the environment and community.

This activity not only educates students about environmental stewardship but also instills a sense of responsibility and community involvement, showing them how their actions can make a real difference in their local environment.

STEM ACTIVITIES

STEM ACTIVITIES

Climate Model Simulation

Objective:

To help high school students in Grades 7-9 understand the impact of greenhouse gases on global temperatures and predict future climate conditions using a climate model simulation. This activity integrates science, technology, engineering, and math (STEM) to offer insights into the reasons behind climate change and the necessity for adaptive strategies.

Activity Design for Teachers:

Preparation:

- Research and select a simple, user-friendly climate modeling software or online tool appropriate for high school students.
- https://serc.carleton.edu/NAGTWorkshops/complexsystems/edgcm.html
- Develop a lesson plan that explains the greenhouse effect and the role of different greenhouse gases.
- Prepare a worksheet or guide for students to document their observations and calculations.

Climate Model Simulation

Instructions for Students:

1. **Introduction to Climate Modeling:**
   - Start with a brief lesson on the greenhouse effect and how greenhouse gases influence global temperatures.
   - Explain the purpose and functionality of the climate modeling software or tool.
2. **Exploring the Software:**
   - Guide students through the initial setup of the climate model simulation.
   - Demonstrate how to adjust various parameters related to greenhouse gas concentrations.
3. **Conducting Simulations:**
   - Instruct students to run simulations by adjusting parameters to observe changes in global temperatures.
   - Encourage them to experiment with different scenarios, such as increasing CO2 levels or deforestation rates.
4. **Data Analysis and Graphing:**
   - Task students with analyzing the results of their simulations.
   - Have them graph their findings and calculate percentage increases or decreases in temperature based on different scenarios.
5. **Discussion and Re lection:**
   - Facilitate a class discussion on the outcomes of their simulations.
   - Encourage students to reflect on what these predictions mean for the future of the planet and the importance of climate change adaptation strategies.
6. **Presentation:**
   - Optionally, have students present their findings and predictions to the class, explaining the implications of their simulated scenarios.

Materials Needed:

- Access to climate modeling software or online tool
- Computers or tablets
- Worksheets for data documentation and graphing

Climate Model Simulation

Assessment Criteria:

- **Understanding of Concepts:** Clarity in explaining the greenhouse effect and the role of greenhouse gases.
  Simulation Execution: Ability to effectively use the climate model tool and adjust parameters.
- **Data Analysis Skills:** Accuracy in analyzing and graphing the simulation results.
- **Reflective Thinking:** Depth of reflection on the implications of climate change and the need for adaptation.

Teaching Tips:

- Ensure the software or tool used is accessible and understandable for students.
- Provide clear instructions and support throughout the simulation process.
- Use this activity to emphasize the real-world application of STEM skills in understanding and addressing climate change.

This activity is designed to engage students in a hands-on learning experience, deepening their understanding of climate change and its potential future impacts. It encourages critical thinking and problem-solving, highlighting the significance of scientific knowledge in developing effective climate adaptation strategies

STEM ACTIVITIES

DIY SOLAR OVEN: CLIMATE CHANGE MITIGATION ACTIVITY

Objective:
To teach students in Grades 7-9 about renewable energy by building a functional solar oven, demonstrating how solar energy can be harnessed for everyday uses.

Explanation of Experiment

- In the DIY Solar Oven experiment, students build their own mini oven using a cardboard box, aluminum foil, plastic wrap, and black paper.
- The aluminum foil reflects sunlight into the box, while the black paper at the base absorbs heat.
- The plastic wrap on top traps this heat inside, creating a warm environment like an oven.
- When we put this oven in the sun, the trapped heat can "cook" simple foods, like s'mores.
- This experiment shows how we can use the sun's energy, a renewable resource, to do everyday things, helping us understand how using solar power can help reduce our impact on the environment.

Activity Design for Teachers:

Preparation:

- Collect materials needed for each student or group: a cardboard box, aluminum foil, plastic wrap, black paper, and tape.
- Prepare a simple, step-by-step instruction guide for building the solar oven.
- Plan a safe outdoor area where the ovens can be placed in direct sunlight.
- Gather simple food items for "cooking," such as s'mores ingredients.

Materials Needed:

- Cardboard boxes
- Aluminum foil
- Plastic wrap
- Black paper
- Tape
- S'mores ingredients or other simple food items

DIY SOLAR OVEN: CLIMATE CHANGE MITIGATION ACTIVITY

Instructions for Students:

1. **Introduction to Renewable Energy:**
   - Begin with a discussion about renewable energy, focusing on solar power and its benefits in mitigating climate change.
2. **Building the Solar Oven:**
   - Guide students through the steps to build their solar oven:
   - a. Line the inside of the cardboard box with aluminum foil to reflect sunlight.
   - b. Place black paper at the base of the box to absorb heat.
   - c. Cover the opening of the box with plastic wrap to trap the heat inside.
   - d. Secure all materials with tape.
3. **Solar Cooking Experiment:**
   - Take the ovens outside and place them in a spot with direct sunlight.
   - Place food items inside the oven and observe how the sun's energy cooks the food.
4. **Observation and Discussion:**
   - Encourage students to observe and note the temperature changes and cooking progress.
   - After the experiment, discuss how solar ovens work and their potential as a re newable energy source.
5. **Reflection on Climate Change Mitigation:**
   - Reflect on how using solar energy can reduce our carbon footprint and help combat climate change.

Assessment Criteria:

- Construction Skills: Ability to follow instructions and build the solar oven.
- Observational Skills: Accuracy in observing and noting temperature changes and cooking effects.
- Understanding of Concepts: Comprehension of how solar energy works and its role in climate change mitigation.

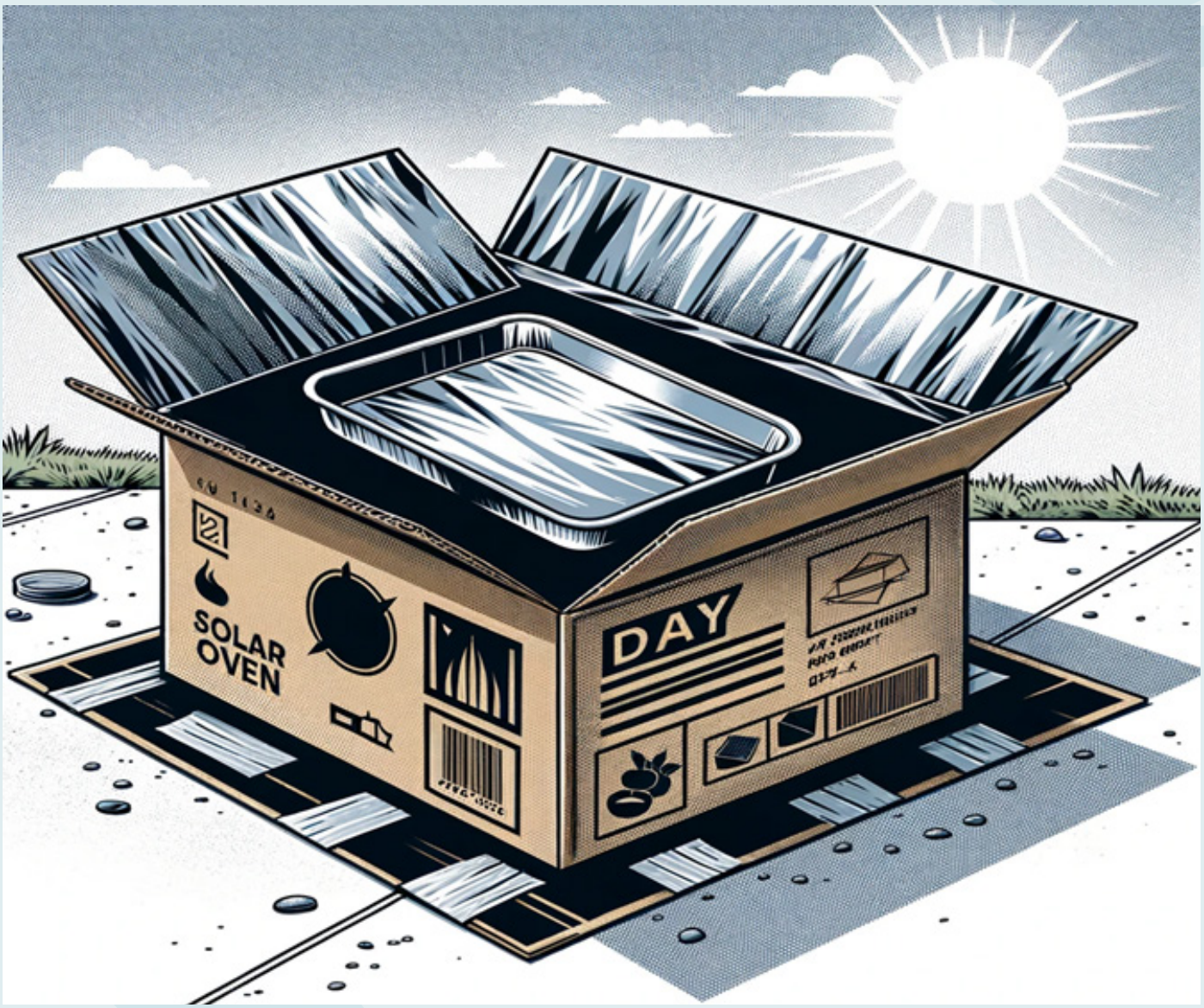
Teaching Tips:

- Ensure safety, especially when students are handling the solar oven in direct sunlight.

DIY SOLAR OVEN: CLIMATE CHANGE MITIGATION ACTIVITY

- Provide assistance and guidance as needed during the construction process.
- Use the discussion to connect the activity to broader concepts of renewable energy and sustainability.

This hands-on project not only educates students about renewable energy and its importance in combating climate change but also engages them in a practical application of science, enhancing their understanding and interest in sustainable practices



STEM ACTIVITIES

DESIGN AND BUILD A SUSTAINABLE HOME MODEL

Objective:
For high school students in Grades 7-9 to design and build a model of a sustainable home, emphasizing the use of renewable resources and minimizing energy consumption. This activity challenges students to innovate structures that adapt to and positively contribute to the environment, using nature-based solutions.

Activity Design for Teachers:

Preparation:
- Compile resources on sustainable building materials, energy-efficient home designs, and renewable energy sources.
- Gather materials for model building, such as cardboard, recycled materials, fabric, and craft supplies.
- Prepare a basic template for designing the home layout and guidelines for incorporating sustainable features.

DESIGN AND BUILD A SUSTAINABLE HOME MODEL

Instructions for Students:

1. **Introduction to Sustainable Home Concepts:**
   - Discuss the principles of sustainable architecture, focusing on energy efficiency, use of renewable resources, and minimizing environmental impact.
2. **Research and Design Phase:**
   - Instruct students to research various sustainable home features like solar panels, green roofs, rainwater harvesting systems, and efficient insulation.
   - Guide them to design their sustainable home on paper, planning the layout and integrating the researched sustainable features.
3. **Model Building:**
   - Provide students with materials to build a physical model of their designed sustainable home.
   - Encourage creativity in using recycled or eco-friendly materials to construct their models.
4. **Sustainability Calculations:**
   - Have students estimate the energy efficiency of their design, potential water savings, and overall environmental impact.
   - Guide them in calculating cost-effective solutions and potential energy savings.
5. **Presentation and Peer Review:**
   - Organize a session where students present their sustainable home models to the class.
   - Encourage peer review, where students discuss the sustainability features and effectiveness of each design.
6. **Reflection:**
   - Conclude with a reflection on the importance of sustainable living and how architectural design can contribute to environmental conservation.

Materials Needed:

- Drawing and design materials (paper, pencils, rulers)
- Model building supplies (cardboard, recycled materials, craft supplies)
- Research resources on sustainable home features

DESIGN AND BUILD A SUSTAINABLE HOME MODEL

Assessment Criteria:

- Design Creativity and Practicality: How creatively and effectively students incorporate sustainability into their home design.
- Model Quality: Craftsmanship and representation of sustainable features in the model.
- Understanding of Sustainable Concepts: Depth of knowledge demonstrated in the design and presentation.
- Engagement and Collaboration: Active participation in the building process and peer review sessions.

Teaching Tips:

- Provide clear instructions on the expectations for the home design and model building.
- Encourage students to think about local environmental conditions and how homes can be adapted to these.
- Use this activity to foster skills in research, design, and hands-on creativity, while emphasizing the importance of sustainable living practices.

This project offers a hands-on learning experience for students, allowing them to creatively explore sustainable architecture and its role in addressing climate change challenges. It promotes critical thinking and problem-solving in a real-world context.

DESIGN AND BUILD A SUSTAINABLE HOME MODEL

LOCAL CASE STUDIES

LOCAL CASE STUDIES

EROSION AT HELLSHIRE BEACH

Objective:

To help students in Grades 7-9 understand coastal erosion through the case study of Hellshire Beach in Portmore, Jamaica, and explore the role of mangroves as a nature-based solution.

Activity Design for Teachers:

Preparation:

- Gather before-and-after photos of Hellshire Beach to show the extent of erosion over time.
- Prepare a simple, child-friendly story or background information about Hellshire Beach and its challenges.
- **Story: Once a wide beach with soft white sand, Hellshire Beach in Portmore has been severely eroded over the years. Many believe this erosion is due to human activities like sand mining, combined with natural factors like rising sea levels.**
- Research basic facts about mangroves and their role in coastal protection to share with the students.
- Develop a worksheet or guide for the research activity on mangroves.

EROSION AT HELLSHIRE BEACH

Instructions for Students:

1. **Storytelling and Visual Presentation:** Share the story of Hellshire Beach, showing the before-and-after photos to illustrate the changes. Explain the factors contributing to its erosion, including both human activities and natural factors like rising sea levels.
2. **Research Activity on Mangroves**: Ask students to research the role of mangroves in preventing coastal erosion. Provide guiding questions: "How could mangroves have helped Hellshire Beach?" and "Can mangroves be a solution to the beach's erosion?"
3. **Class Discussion:** After the research activity, facilitate a discussion on their findings. Encourage students to share their thoughts on how mangroves could act as a nature-based solution to the beach's erosion problem.
4. **Creative Reflection:** Encourage students to draw or write about what they learned, imagining Hellshire Beach with a healthy mangrove ecosystem.

Materials Needed:

- Before-and-after photos of Hellshire Beach
- Research materials on mangroves
- Art supplies for creative reflection activity

Assessment Criteria:

- Understanding of Erosion: Ability to comprehend and discuss the erosion issue at Hellshire Beach.
- Research Skills: Quality of research and understanding of the role of mangroves in coastal protection.
- Creative Expression: Clarity and creativity in their drawings or writings about mangroves and coastal protection.

Teaching Tips:

- Use simple language to explain erosion, its causes, and the importance of mangroves.

EROSION AT HELLSHIRE BEACH

- Assist students in research by providing age-appropriate resources or guiding them to suitable materials.
- Encourage a supportive environment where students feel comfortable sharing their ideas and findings.

Through this activity, students will gain a real-world understanding of coastal erosion and the importance of conserving natural barriers like mangroves. It provides an opportunity to connect classroom learning to local environmental issues, fostering a sense of connection and responsibility towards their natural surroundings

LOCAL ENVIRONMENTAL STUDIES

Erosion at Negril's Seven Mile Beach

Objective:
To educate students in Grades 7-9 about coastal erosion using the case of Negril's Seven Mile Beach in Jamaica. The activity involves a virtual exploration to understand the causes of erosion and to discuss potential solutions.

Activity Design for Teachers:

Preparation:
- Gather photographs and videos that show the changes in Negril's Seven Mile Beach over time, focusing on the erosion aspects.
- Research and prepare background information about coastal erosion, including natural processes and human activities that contribute to it.
- Compile resources on potential erosion mitigation solutions like dune restoration or breakwaters.

Instructions for Students:

1. **Introduction to Coastal Erosion:**
   - Start with a discussion about what coastal erosion is and why it's a problem, especially for beach areas like Negril's Seven Mile Beach.
2. **Virtual Field Trip:**
   - Show the collected photographs and videos of the beach, highlighting the changes in its width and landscape over time.
   - Guide students in observing signs of erosion and discussing what factors might be causing these changes.
3. **Research and Discussion on Erosion Causes:**
   - Have students research both the natural processes and human activities that lead to coastal erosion.
   - Facilitate a class discussion on their findings, linking them back to the changes observed in the virtual field trip.

Erosion at Negril's Seven Mile Beach

4. **Exploring Solutions:**
   - Introduce potential solutions for coastal erosion.
   - Engage students in a brainstorming session to come up with ideas on how to mitigate erosion at Negril's Seven Mile Beach.
5. **Presentation and Reflection:**
   - Assign students to present their findings and solutions.
   - Reflect on the importance of protecting coastal areas and the role everyone can play in it.

Materials Needed:
- Photographs and videos of Negril's Seven Mile Beach over time
- Research materials on coastal erosion and mitigation solutions

Assessment Criteria:
- Understanding of Erosion: Ability to identify and understand the factors contributing to coastal erosion.
- Creativity in Solutions: Innovation and practicality in proposed solutions for erosion mitigation.
- Engagement and Participation: Active participation in discussions and presentations.

Teaching Tips:
- Ensure that the materials used for the virtual field trip are age-appropriate and clearly show the erosion process.
- Encourage critical thinking by asking open-ended questions during discussions.
- Support students in making connections between the local example of Negril's beach and broader environmental concepts.

This activity aims to foster an understanding of environmental issues in a local context, encouraging students to think critically about natural phenomena and human impacts, and to consider practical solutions for environmental challenges.

LOCAL ENVIRONMENTAL STUDIES

THE COCKPIT COUNTRY: NATURE'S OWN SOLUTION TO CLIMATE CHANGE

Objective:

To help students in Grades 7-9 understand the role of Cockpit Country in Jamaica as a crucial nature-based solution for climate change mitigation and the significance of preserving biodiversity.

Activity Design for Teachers:

Preparation:

- Gather information and resources about Cockpit Country, focusing on its unique trees, plants, and wildlife.
- Prepare a list of various trees and plants found in Cockpit Country for students to choose from.
- Collect drawing paper, craft materials, and any other resources needed for creating "Nature Hero Cards."

THE COCKPIT COUNTRY: NATURE'S OWN SOLUTION TO CLIMATE CHANGE

Instructions for Students:

1. **Introduction to Cockpit Country:**
   - Begin with a discussion about Cockpit Country, its biodiversity, and its role in capturing greenhouse gases.
   - Explain the threats to this area, like mining, and how they impact climate change.
2. **Research and Selection:**
   - Have each student choose one tree or plant from Cockpit Country.
   - Guide them to research their chosen tree or plant, focusing on its environmental benefits and role in climate change mitigation.
3. **Creating Nature Hero Cards:**
   - Instruct students to create a "Nature Hero Card" for their selected tree or plant using drawing paper and craft materials.
   - The card should include a drawing or representation of the plant, along with information on how it helps capture greenhouse gases.
4. **Class Discussion:**
   - Once the cards are complete, have students present their "Nature Hero Cards" to the class.
   - Facilitate a discussion on the importance of preserving places like Cockpit Country as nature-based solutions for climate change.
5. **Reflection:**
   - Conclude with a reflection on how biodiversity in areas like Cockpit Country plays a vital role in maintaining a healthy planet.

Materials Needed:

- Informational resources on Cockpit Country
- List of trees and plants from Cockpit Country
- Drawing paper and craft materials for "Nature Hero Cards"

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Assessment Criteria:

- Research Quality: Depth of understanding shown about the chosen plant and its environmental benefits.
- Creativity in Card Creation: Artistic and informative presentation of the "Nature Hero Card."
- Engagement in Discussion: Participation in class discussions about conservation and nature-based solutions.

Teaching Tips:

- Ensure the resources provided are age-appropriate and engaging.
- Encourage creativity in the design of the "Nature Hero Cards."
- Guide students to make connections between local biodiversity and global environmental issues.

This activity combines research, creativity, and discussion to help students understand the critical role of ecosystems like Cockpit Country in combating climate change and the importance of conserving such areas.

RESOURCES AND REFERENCES

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