

CHOCOLATE & CACAO TREES ECOLOGY PROJECT

Real-World Applicability

Improve students' scientific
communication skills

Perfect for 6th, 7th, 8th
Grade



Print-and-go
ECOLOGY Project
where students
learn about
chocolate and
cacao trees
through a hands-on
research activity.

SCROLL
to take a look inside!



HOW THIS PROJECT WILL HELP YOU



- Saves planning time with a fully structured, ready-to-use project
- Supports differentiation through multiple student output options
- Meets standards easily with built-in science and literacy alignment
- Simply grading via rubric, exemplars, and teacher answer key

Chocolate Ecology Project: Cacao Trees, Ecosystems, and Human Impact

In this activity, you'll explore where chocolate comes from, how ecosystems support cacao trees, and how human activities threaten their survival. By reading, analyzing, and creating environmental science to one of the world's most popular products.

Part 1: Read how deforestation and climate change impact cacao trees and answer the comprehension questions that follow.

Cacao Trees and the Future of Chocolate

Chocolate begins its journey not in a factory, but in a tree. Cacao trees, which produce the cacao beans used to make chocolate, grow in warm, humid regions near the equator. These trees, which are native to Central and South America, have been cultivated for thousands of years, but today most cacao is grown in West Africa, Southeast Asia, and the Caribbean. Cacao trees have been cultivated for thousands of years, but today most cacao is grown in West Africa, Southeast Asia, and the Caribbean. Cacao trees have been cultivated for thousands of years, but today most cacao is grown in West Africa, Southeast Asia, and the Caribbean.

Cacao trees thrive in very specific environmental conditions: consistent rainfall, warm temperatures, rich soil, and beneath taller trees that protect it from direct sunlight. In an environment where cacao trees can produce cacao pods, if the environment is disrupted, cacao trees struggle to survive.

One major threat to cacao trees is **deforestation**. To make room for crops, large areas of rainforest are cleared for agriculture. When trees are cut down, cacao trees lose the shade and protection they need to survive. Deforestation also increases the risk of drought, as the trees that help maintain the water cycle are removed. In many areas, cacao is grown in monocultures. These systems may produce high yields, but they also make cacao trees more vulnerable to pests, disease, and environmental changes.

Deforestation also harms the many organisms that live in the rainforest. Fungi, and microorganisms all play important roles in the ecosystem. Without them, cacao flowers would not be able to produce fruit. When the ecosystem is disrupted, cacao yields drop, and the health of the ecosystem is threatened.

Another growing challenge for cacao trees is **climate change**. As the Earth's climate warms, rainfall patterns and the frequency of extreme weather events are changing. Scientists predict that many current cacao-growing regions will become less suitable for cacao trees in the future. To ensure a sustainable future for chocolate, we must take action to protect the ecosystems that cacao depends on.

Part 2: Chocolate Ecology Learning Artifact

You will create a **learning artifact** explaining how chocolate production is impacted by ecosystems and how human activities affect cacao trees.

Student Task

- Using the article and additional research, explain:
- How cacao trees grow and what they need to survive
 - How ecosystems support cacao production
 - How human activities impact cacao trees
 - Why protecting ecosystems helps protect chocolate

Required Content (All Must Be Included)

- The Cacao Tree**
 - Where cacao trees grow
 - Climate and environmental conditions needed
 - Role of shade, soil, and biodiversity
- Ecosystem Connections**
 - How rainforests support cacao trees
 - Importance of pollinators and other organisms
 - How biodiversity helps cacao survive
- Human Impact**
 - Effects of deforestation
 - Effects of climate change
 - How farming practices can help protect cacao trees
- Conservation & Solutions**
 - Sustainable cacao farming methods
 - How protecting ecosystems protects cacao trees
 - One action people can take to help protect cacao trees
- Visuals & Science Communication**
 - Diagrams, maps, or labeled images
 - Clear headings and organized sections

Format Options

Students must choose **one** to display their learning.

1. Infographic

- Students design a one-page infographic (Canva.com) that includes:
- Where cacao grows
 - Human impacts (deforestation, climate change)
 - Cause-and-effect relationships
 - Conservation solutions



Chocolate Ecology Project – Rubric				
Criteria	4 – Exceeds	3 – Meets	2 – Approaches	1 – Beginning
Science Content Accuracy	All scientific information is accurate and clearly explained	Most information is accurate	Some inaccuracies present	Many inaccuracies
Understanding of Cacao & Ecosystems	Clearly explains how cacao trees depend on healthy ecosystems	Explains basic ecosystem connections	Limited or unclear explanation	Little or no understanding
Human Impact	Clearly explains deforestation and climate change impacts with cause-effect	Identifies human impacts	Mentions impacts with little explanation	Impacts missing or incorrect
Cause-and-Effect Reasoning	Strong, clear cause-effect relationships explained	Cause-effect mostly clear	Weak cause-effect links	No cause-effect
Solutions & Conservation	Multiple realistic solutions proposed and explained	At least one realistic solution	Solution vague or unrealistic	No solution
Use of Evidence	Uses evidence from reading/research effectively	Some evidence used	Limited evidence	No evidence
Communication & Organization	Information is clear, organized, and easy to understand	Mostly clear and organized	Some organization issues	Disorganized or unclear
Format Effectiveness	Format is used creatively and effectively	Format used correctly	Format use is weak	Format requirements not met
Effort & Completion	Shows strong effort; all parts completed	All required parts completed	Some parts missing	Incomplete
Collaboration (if applicable)	Actively contributes and supports group	Participates appropriately	Uneven participation	Does not participate

What you get inside

★ Student reading on cacao trees, ecosystems, and human impact

★ Text-based comprehension

questions with answer key

★ Student project directions with multiple format choices

★ Grading rubrics for all project options

★ Student exemplars (infographic, letter, PSA, action plan, gallery walk)

★ Teacher answer keys & implementation guidance

Chocolate Project: Cacao Trees, Ecosystems, and Human Impact

In this activity, you will explore where chocolate comes from and why cacao trees are at risk. You'll learn how ecosystems support cacao trees and how human activities like deforestation and climate change threaten their survival. By reading, analyzing, and creating a project, you'll connect real-world environmental science to one of the world's most popular foods.

Part 1: Read how deforestation and climate change put cacao (chocolate) trees at risk of decline and answer the comprehension questions that follow.

Cacao Trees and the Future of Chocolate
Chocolate begins its journey not in a factory, but in a tropical rainforest. The key ingredient in chocolate comes from the **cacao tree** (*Theobroma cacao*), a small tree that grows naturally in warm, humid regions near the equator. These trees are native to Central and South America, but today most cacao is grown in West Africa, Southeast Asia, and parts of Latin America. Cacao trees have been cultivated for thousands of years, but modern human activity is placing increasing pressure on the ecosystems that cacao depends on.

Cacao trees thrive in very specific environmental conditions. They grow best in tropical climates with consistent rainfall, warm temperatures, rich soil, and partial shade. In natural rainforests, they are often found beneath taller trees that protect them from direct sunlight. This layered forest structure provides the conditions cacao trees need to survive.

One major threat to cacao trees is deforestation. To make way for agriculture, large areas of rainforest are cut down, cacao trees are lost, and water cycles are disrupted. Pests, disease, and climate change also threaten cacao production.

Deforestation also hinders cacao trees' ability to reproduce. By removing the shade and habitat of pollinators, it reduces the chances of cacao trees producing healthy offspring, which can lead to a decline in the population over time.

Another growing concern is climate change. Rising global temperatures and changing rainfall patterns make it difficult for cacao trees to thrive. Scientists predict that by the end of the century, large parts of the world's current cacao-growing regions may become unsuitable for cacao production.

Understanding these threats is the first step in protecting cacao trees and the chocolate industry. By learning about the challenges cacao faces, we can work together to find solutions that protect the environment and support the livelihoods of cacao farmers.

Part 2: Chocolate Ecology Learning Artifact
Project Overview
You will create a **learning artifact** explaining how chocolate production depends on healthy ecosystems and how human activities affect cacao trees.

Student Task
Using the article and additional research, explain:
• How cacao trees grow and what they need to survive
• How ecosystems support cacao production
• How human activities impact cacao trees
• Why protecting ecosystems helps protect chocolate

What Must Be Included
Your learning artifact must include:
1. A clear explanation of how cacao trees grow and the environmental conditions needed for them to thrive.
2. A diagram or illustration showing the connections between cacao trees, ecosystems, and human activities.
3. A human impact section explaining how deforestation and climate change affect cacao trees and what can be done to protect them.

Grading Rubric
Your project will be evaluated based on the following criteria:
• **Problem Identification:** Clearly defined and accurate.
• **Explanation:** Strong explanation using science.
• **Proposed Solutions:** Multiple realistic solutions.
• **Expected Outcomes:** Clear, logical outcomes.
• **Use of Evidence:** Evidence supports plan.
• **Organization:** Clear, logical layout.

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Grading Rubric

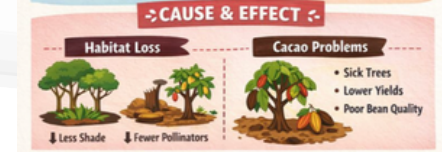
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- **Explanation:** Strong explanation using science.
- **Proposed Solutions:** Multiple realistic solutions.
- **Expected Outcomes:** Clear, logical outcomes.
- **Use of Evidence:** Evidence supports plan.
- **Organization:** Clear, logical layout.

Comprehension Questions - Answer Key

1. What is the cacao tree, and why is it important to humans?
The cacao tree is a tropical tree that produces cacao pods, which are used to make chocolate. It is important to humans because chocolate is a widely consumed food and provides income for millions of farmers around the world.
2. What environmental conditions do cacao trees need in order to grow successfully?
Cacao trees need warm temperatures, regular rainfall, rich soil, high humidity, and partial shade. They grow best in tropical regions near the equator.
3. Why do cacao trees grow best in rainforest environments rather than open farmland?
Rainforests provide shade from taller trees, stable temperatures, healthy soil, and strong water cycles. These conditions protect cacao trees from direct sunlight and environmental stress.
4. How does deforestation negatively affect cacao trees and chocolate production?
Deforestation removes the shade and protection cacao trees need, increases temperatures, reduces soil fertility, and disrupts water cycles. This makes it harder for cacao trees to survive and produce healthy cacao pods.
5. Why are pollinators important to cacao trees, and what happens when they lose their habitat?
Pollinators such as small insects help cacao flowers produce fruit. When forests are cleared, pollinators lose their habitat, which leads to fewer cacao pods and lower crop yields.
6. How does climate change threaten cacao trees and the regions where they are grown?
Climate change increases temperatures, changes rainfall patterns, and causes more extreme weather. These changes can make current cacao-growing regions unsuitable and reduce the quality and quantity of cacao produced.
7. Why can increased pesticide use harm cacao ecosystems even though it is meant to protect crops?
Pesticides can damage soil, water, and non-target organisms, including beneficial insects. This weakens ecosystems and can create long-term environmental problems.
8. According to the article, how can we protect cacao trees and the chocolate industry?
Protecting cacao trees and the chocolate industry involves several strategies: reforestation to restore habitats, sustainable farming practices that help protect cacao trees and soil, and supporting fair trade to ensure farmers receive fair prices for their crops.

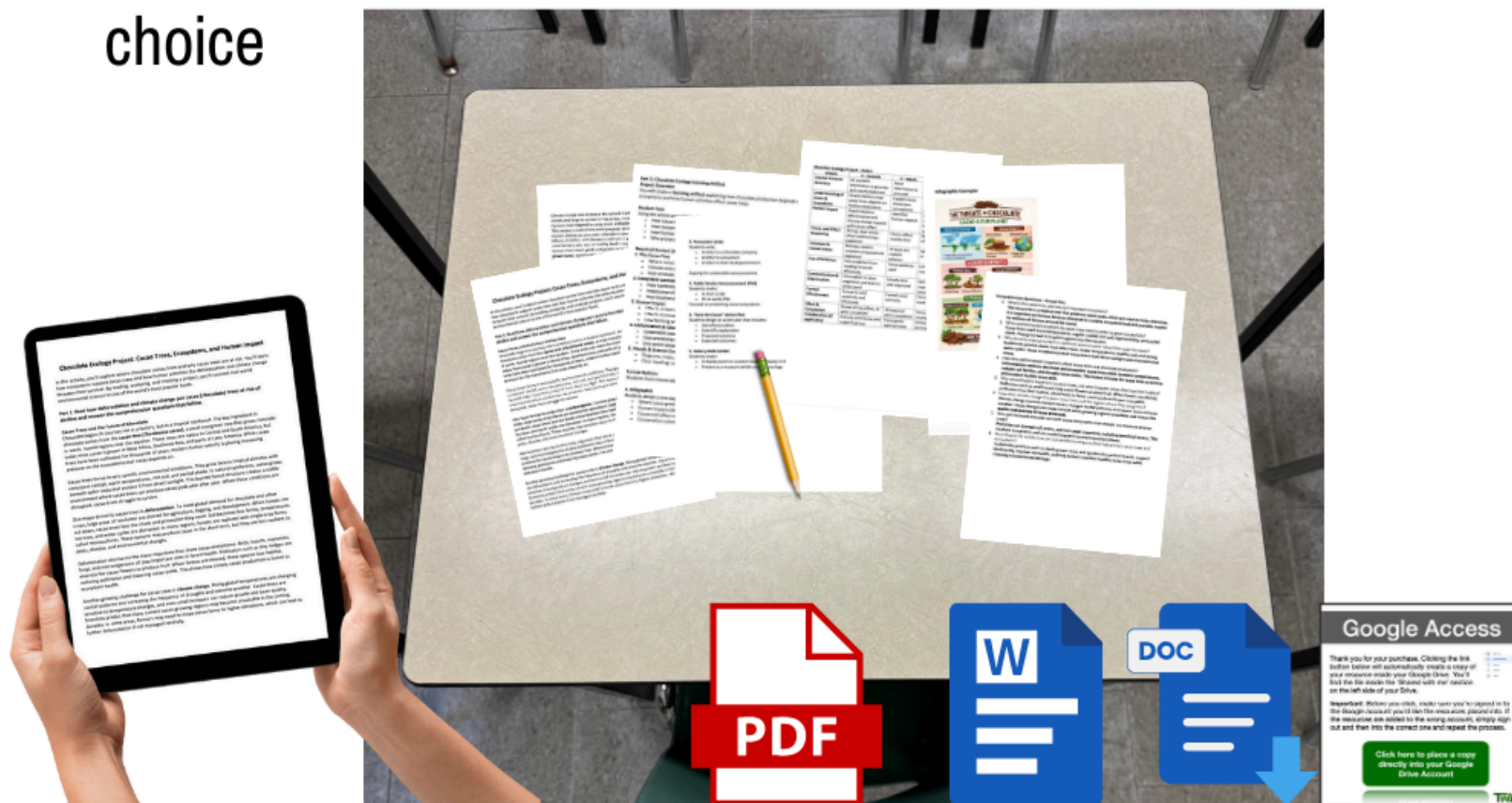
THE THREATS TO CHOCOLATE CACAO & OUR PLANET



Skills Your Students Will Learn/Improve

CLASSROOM READY

- **PRINT-AND-GO** — no prep or extra planning required
- Student-friendly reading and directions
- Clear structure and pacing
- Built-in scaffolds (questions, exemplars, rubric) support all learners - Print and Digital formats
- Flexible formats allow easy differentiation & student choice



- ✓ Scientific reading & comprehension
- ✓ Cause-and-effect reasoning in ecological systems
- ✓ Evidence-based explanation using scientific concepts
- ✓ Scientific communication through writing, visuals, or speaking
- ✓ Critical thinking & problem-solving around real-world issues
- ✓ Environmental literacy & conservation thinking

Your Project

NO-PREP. JUST PRINT TO GO!

WHAT YOU GET

Part 1 - Reading and Questions

Chocolate Ecology Project: Cacao Trees, Ecosystems, and Human Impact

In this activity, you'll explore where chocolate comes from and why cacao trees are at risk. You'll learn how ecosystems support cacao trees and how human activities like deforestation and climate change threaten their survival. By reading, analyzing, and creating a project, you'll connect real-world environmental science to one of the world's most popular foods.

Part 1: Read how deforestation and climate change put cacao (chocolate) trees at risk of decline and answer the comprehension questions that follow.

Cacao Trees and the Future of Chocolate
Chocolate begins its journey not in a factory, but in a tropical rainforest. The key ingredient in chocolate comes from the **cacao tree** (*Theobroma cacao*), a small evergreen tree that grows naturally in warm, humid regions near the equator. These trees are native to Central and South America. While cacao today most cacao is grown in West Africa, Southeast Asia, and parts of Latin America. While cacao trees have been cultivated for thousands of years, modern human activity is placing increasing pressure on the ecosystems that cacao depends on.

Cacao trees thrive in very specific environmental conditions. They grow best in tropical climates with consistent rainfall, warm temperatures, rich soil, and partial shade. In natural rainforests, cacao grows beneath taller trees that protect it from direct sunlight. This layered forest structure creates a stable environment where cacao trees can produce cacao pods year after year. When these conditions are disrupted, cacao trees struggle to survive.

One major threat to cacao trees is **deforestation**. To meet global demand for chocolate and other crops, large areas of rainforest are cleared for agriculture, logging, and development. When forests are cut down, cacao trees lose the shade and protection they need. Soil becomes less fertile, temperatures increase, and water cycles are disrupted. In many regions, forests are replaced with single-crop farms called monocultures. These systems may produce cacao in the short term, but they are less resilient to pests, disease, and environmental changes.

Deforestation also harms the many organisms that share cacao ecosystems. Birds, insects, mammals, fungi, and microorganisms all play important roles in forest health. Pollinators such as tiny midges are essential for cacao flowers to produce fruit. When forests are cleared, these species lose habitat, reducing pollination and lowering cacao yields. This shows how closely cacao production is linked to ecosystem health.

Another growing challenge for cacao trees is **climate change**. Rising global temperatures are changing rainfall patterns and increasing the frequency of droughts and extreme weather. Cacao trees are sensitive to temperature changes, and even small increases can reduce growth and bean quality. Scientists predict that many current cacao-growing regions may become unsuitable in the coming decades. In some areas, farmers may need to move cacao farms to higher elevations, which can lead to further deforestation if not managed carefully.

Part 2: Chocolate Ecology Poster or Presentation Project

Project Overview
You will create a **learning artifact** explaining how chocolate production depends on healthy ecosystems and how human activities affect cacao trees.

Student Task

Using the article and additional research, explain:

- How cacao trees grow and what they need to survive
- How ecosystems support cacao production
- How human activities impact cacao trees
- Why protecting ecosystems helps protect chocolate

Required Content (All Must Be Included)

- 1. The Cacao Tree**
 - Where cacao trees grow
 - Climate and environmental conditions needed
 - Role of shade, soil, and biodiversity
- 2. Ecosystem Connections**
 - How rainforests support cacao trees
 - Importance of pollinators and other organisms
 - How biodiversity helps cacao survive
- 3. Human Impact**
 - Effects of deforestation
 - Effects of climate change
 - How farming practices can help or harm ecosystems

- 4. Conservation & Solutions**
 - Sustainable cacao farming methods
 - How protecting ecosystems protects cacao
 - One action people can take to help (consumer or conservation choice)
- 5. Visuals & Science Communication**
 - Diagrams, maps, or labeled images
 - Clear headings and organized sections

Format Options

Students must choose **one to display their evidence of learning:**

1. Infographic

- Students design a one-page infographic (Canva.com is a good option) showing:
- Where cacao grows
 - Human impacts (deforestation, climate change)
 - Cause-and-effect relationships
 - Conservation solutions

✓ Cacao ecology reading - builds background knowledge of how ecosystems support cacao trees, how humans impact them, and why protecting these systems matters for the future of chocolate.

✓ Multiple project format options (poster, infographic, PSA, letter, action plan)

✓ Individual format rubric as well as Universal grading rubric for all project choices

✓ Exemplars to model high-quality work

✓ Complete teacher answer keys & guidance

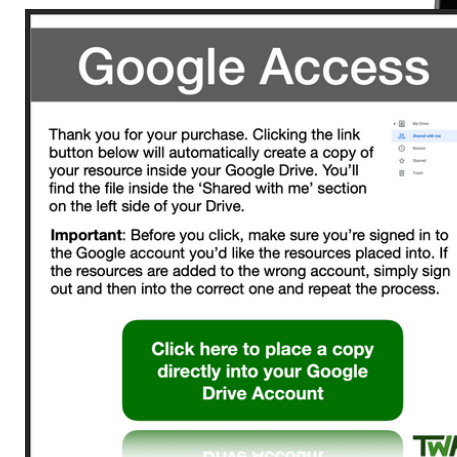
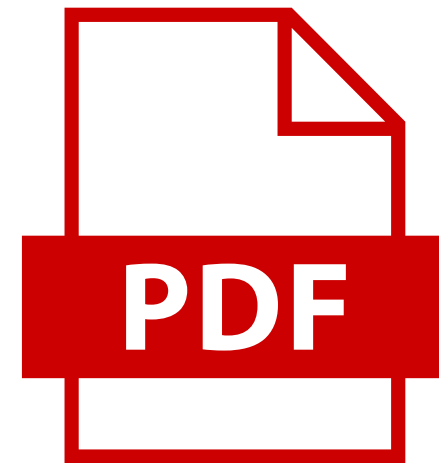
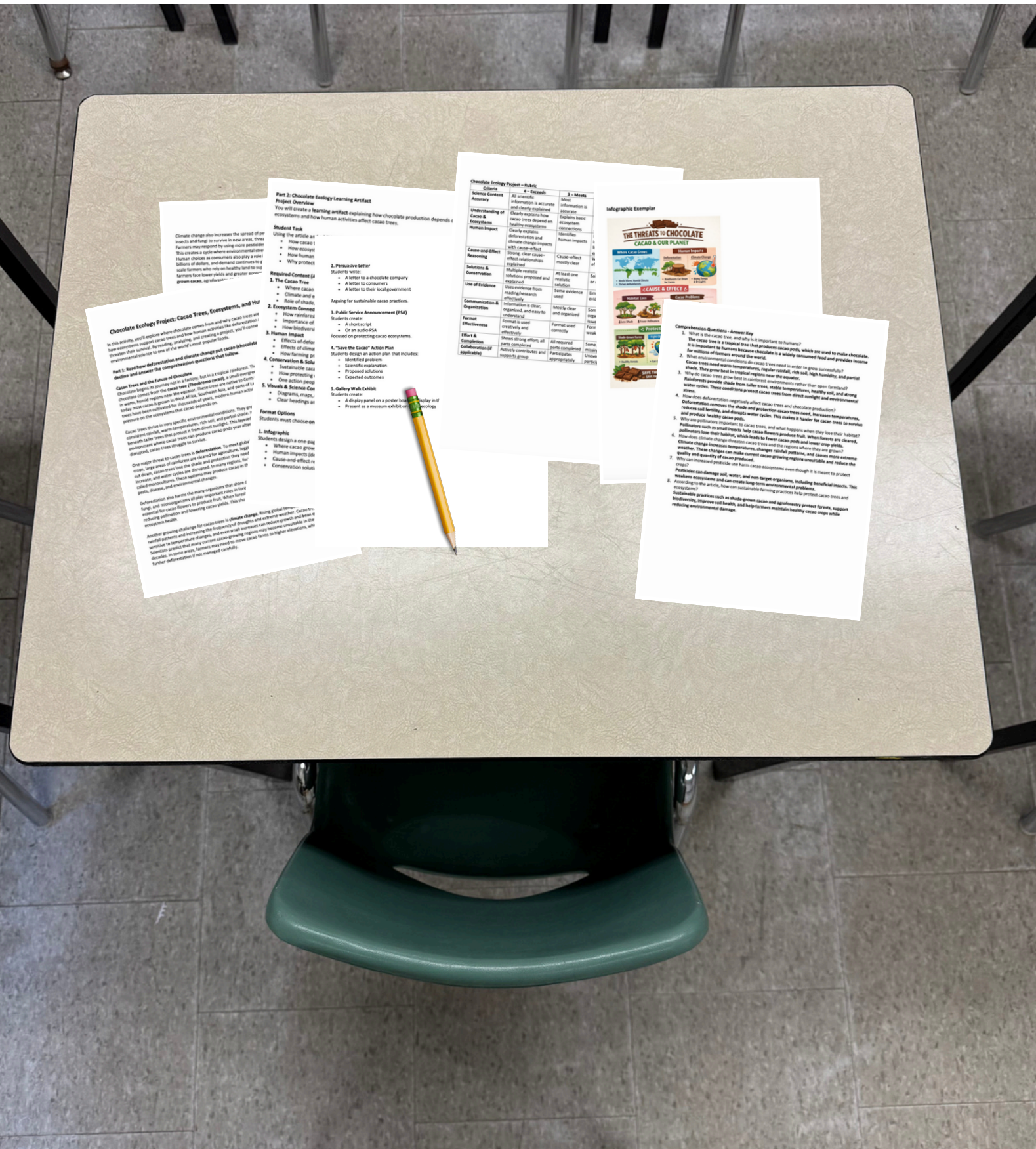


Chocolate Ecology Project - Rubric	4 - Exemplar	3 - Meets	2 - Approaches	1 - Beginning
Criteria				
Subject Content Accuracy	All content is accurate and clearly explained.	Most information is accurate.	Some inaccuracies present.	Many inaccuracies.
Understanding of Cause & Effect Relationships	Clearly explains how cacao trees depend on healthy ecosystems.	Explains basic connections.	Limited or unclear explanation.	Little or no understanding.
Human Impact	Clearly explains deforestation and climate change impacts on cacao trees.	Identifies human impacts.	Mentions impacts with little detail.	Impacts missing or incorrect.
Cause and Effect Reasoning	Strong, clear cause-effect relationships explained.	Clear-effect mostly clear.	Implication effect links.	No cause-effect.
Solutions & Communication	Multiple realistic solutions proposed and explained.	At least one realistic solution.	Solution vague or unrealistic.	No solutions.
Use of Evidence	Uses evidence from reading/research effectively.	Some evidence used.	Limited evidence.	No evidence.
Organization	Information is clear, organized, and easy to understand.	Mostly clear and organized.	Some organization.	Disorganized or unclear.
Format Effectiveness	Format is used creatively and effectively.	Format used correctly.	Format is a bit off.	Format requirements not met.
Effort & Completion	Shows strong effort; all parts completed.	All required parts completed.	Some parts missing.	Incomplete.
Collaboration (if applicable)	Actively contributes and supports group.	Participates.	Low-level participation.	Does not participate.

- Comprehension Questions - Answer Key**
1. What is the cacao tree and why is it important to humans?
The cacao tree is a tropical tree that produces cacao pods, which are used to make chocolate. It is important to humans because chocolate is a widely enjoyed food and provides income for millions of farmers around the world.
 2. What are the environmental conditions cacao trees need to grow?
Cacao trees need warm temperatures, regular rainfall, rich soil, high humidity, and partial shade. They grow best in tropical regions near the equator.
 3. Why do cacao trees grow best in tropical environments (other than just "tropical")?
Rainforests provide cacao trees with warm, stable temperatures, humidity, rich soil, and a long rainy season. These conditions protect cacao trees from direct sunlight and environmental stress.
 4. How does deforestation negatively affect cacao trees and chocolate production?
Deforestation removes the shade and protection cacao trees need, increases temperatures, reduces soil fertility, and disrupts water cycles. It makes it harder for cacao trees to survive and produce healthy cacao pods.
 5. Why are pollinators important to cacao trees, and what happens when they lose their habitat?
Pollinators such as small insects help cacao flowers produce fruit. When forests are cleared, pollinators lose their habitat, which leads to fewer cacao pods and lower crop yields.
 6. How does climate change threaten cacao trees and the regions where they are grown?
Climate change increases temperatures, changes rainfall patterns, and causes more extreme weather. These changes can make it hard for cacao to grow, reduce yields, and reduce the quality and quantity of cacao produced.
 7. Why do farmers and people who love cacao need to work together to protect it?
Farmers can develop well-managed, eco-friendly systems, including beneficial insects. This reduces pesticides and creates long-term environmental protection.
 8. According to the article, how can sustainable farming practices help protect cacao trees and rainforests?
Sustainable practices such as shade-grown cacao and agroforestry protect forests, support biodiversity, improve soil health, and help farmers maintain healthy cacao crops while reducing environmental damage.

At School or at Home

Fully digital and editable - can be done in class or through distance education/homeschool



Ways to Use this Resource

- 1. Stand-alone project for ecosystems, human impact, or Earth science units.**
- 2. Culminating assessment at the end of a climate change or ecology lesson.**
- 3. Project-based learning activity for independent or group work.**
- 4. Sub-friendly lesson or enrichment task with built-in structure and guidance.**

As a special bonus, I want to send you a few resources that you can use in your classroom tomorrow. Completely free and geared towards what you teach!



Just  **and then choose what you teach!**

thanks
**for your interest
in this resource!**

