SOIL STORIES OF EXPLORATION – THE AGE OF EXPLORATION AND COLONISATION THROUGH THE LENS OF SOIL

Feedback form link & QR code:
https://ecolise.eu/curiosoil-lesson-plan-form-EN

Subject: **History/environmental science integration**
Duration: 45 minutes (can be much more if more time is allowed for discussions)
Age group: secondary school students (ages 14–16)
Topic: The age of exploration and colonisation: environmental and soil impact focus
Connection to Curiosoil tools: Depository of soil images

LEARNING OUTCOMES

Knowledge
- Understand the key timeline and motivations of European colonisation and its impact on local and enslaved population (15th–18th centuries)
- Identify major crops and agricultural practices exchanged during the Columbian Exchange
- Recognize the environmental and soil consequences of colonial plantation agriculture
- Understand the connection between soil health and sustainable vs. exploitative farming practices

Skills
- Analyse primary and secondary historical sources related to colonial agriculture
- Compare and contrast pre-colonial and colonial land use practices and acknowledge indigenous land stewardship.
- Evaluate the long-term environmental consequences of historical events
- Create visual representations of complex historical-environmental relationships

Competences
- Critical thinking about the interrelatedness of human history and environmental change
- Historical empathy and understanding of multiple perspectives, giving visibility to non-western ways of thinking and becoming aware of the damage caused by colonisation.
- Environmental consciousness and understanding of soil as a living ecosystem and a non-renewable resource
- Collaborative problem-solving and creative presentation skills

LEARNING OBJECTIVES ALIGNED WITH SOIL COMPETENCE AREAS

1. Soil life and functions
Indicators: Students can explain how soil hosts diverse ecosystems (the soil food web), supports plant growth, water regulation, and carbon storage.
Descriptors: Students will understand how colonial monoculture disrupted natural soil functions and led to degradation.

2. Soil diversity
Indicators: Students can identify different soil types and explain how soil characteristics vary by region and climate.
Descriptors: Students will compare soil types in Europe vs. the Americas and understand how different crops were adapted to different soils and climate, and how the introduction of new crops and management practices changed soils in their turn.

3. Soil threats

Indicators: Students can identify historical and contemporary threats to soil health.
Descriptors: Students will analyse how plantation agriculture, deforestation, and intensive monoculture led to soil erosion, nutrient depletion, and long-term degradation.

4. Soil solutions
Indicators: Students can propose solutions for soil protection and restoration.
Descriptors: Students will contrast exploitative colonial practices with indigenous sustainable farming methods and modern conservation techniques.

LESSON STRUCTURE

Activity 1: Opening hook
Duration: 8 minutes

Description
Students examine different soil samples/images from the Curiosoil depository – for example sand, forest soil (including the cover/litter), arable soil, soil close to a river or lake and degraded/contaminated soil. They make observations and predictions about what might have caused the differences.

Materials
- Clear containers with different soil samples or images if actual soil is unavailable
- Magnifying glasses
- Observation worksheets

Setup instructions
Place soil samples/printed images at stations around the room. Divide class into pairs.

Step-by-step process
1. Students observe soil samples, noting colour, texture, visible organic matter.
Questions: What do you think caused the differences between these soil samples? Which soil do you think would be better for growing crops? Why?

2. Students record hypotheses about what caused the differences.

3. Quick gallery walk where pairs share one observation.

4. Teacher reveals how this connects to colonial history and introduces lesson objectives.

Recording
Students complete observation chart comparing soil characteristics.

Characteristic	What I see	What I think this means
Colour		
Texture (rough, smooth, crumbly)		
Visible organic matter (leaves, roots, etc.)		
Moisture level		
Other observations		

Activity 2: The great exchange mapping game
Duration: 15 minutes (can be much more if there is time for discussions)

Description
Interactive floor mapping activity where students physically move around representing crops, soil nutrients, and colonial impacts across continents.

Materials
- Large world map projected/drawn on floor. If that is technically not possible, use a printed map and chess pieces or project the map on a white board and use magnets.
- Coloured cards representing crops
- Soil tokens
- Character role cards
- Movement tracking sheets

Setup instructions
Clear space for floor map or prepare projecting the map. Prepare role cards and crop cards. Assign students to different continents as starting positions.

Step-by-step process
1. Students receive roles and starting positions on map.

2. Exchange Round 1 - Students move crops between continents following teacher's historical timeline.

3. Exchange Round 2 - Students now move soil tokens, showing where intensive agriculture depleted soil.

4. Students in role discuss impacts from their character's perspective.

5. Debrief positioning – where did soil tokens end up?

Recording
Students mark their movement paths and final soil token distribution on individual maps.

Reflection questions
Where did most soil degradation occur? Why?
Which crops caused the most soil problems?
How did your character feel about these changes?

Age of exploration & soil impact historical timeline

1492 Columbus reaches the Americas
Soil impact: Beginning of large-scale land use changes

1493-1500 Columbian exchange begins
Crops to Europe: Potatoes, tomatoes, maize, beans
Crops to Americas: Sugar cane, coffee, rice, wheat
Soil impact: Introduction of non-native crops

1500-1550 Spanish conquistadors establish colonies
Soil impact: Destruction of indigenous terracing systems, large-scale mining disrupts landscapes

1550-1600 Plantation system develops

Cash crops: Sugar in Caribbean, tobacco in Virginia
Soil impact: First major soil degradation from monoculture

1600-1650 Atlantic slave trade intensifies
Agricultural knowledge: Africans bring rice and farming techniques
Soil impact: Intensive plantation agriculture expands

1650-1700 Sugar plantations dominate Caribbean
Environmental effect: Massive deforestation
Soil impact: Severe erosion and nutrient depletion

1700-1750 Tobacco plantations expand in North America
Agricultural practice: Continuous tobacco cultivation
Soil impact: Tobacco exhausted lands abandoned

1750-1800 Cotton gains major importance in American South
Technology: Cotton gin increases production
Soil impact: Cotton monoculture destroys soil across the South

Printable materials

Soil tokens (print on green and brown paper - cut out)

🌱 HEALTHY SOIL 🌱
Rich in nutrients
Supports diverse crops
Holds water well

⚠️ DEGRADED SOIL ⚠️
Nutrients depleted
Erosion problems
Poor crop yields

Crop exchange cards (Print on yellow paper - cut out)

🥔 POTATO
From: Americas
To: Europe
Impact: Improved nutrition, excessive dependence on potato in Ireland and the Irish Potato famine

🍅 TOMATO
From: Americas
To: Europe
Impact: New cuisine

🌽 MAIZE/CORN
From: Americas
To: Europe & Africa
Impact: Population growth

🍬 SUGAR CANE
From: Europe to Americas

Impact: Plantation system, food preservation (jams), decreased dental health
Soil effect: DEGRADATION

🚬 TOBACCO
From: Americas to Europe
Impact: Cash crop economy
Soil effect: SEVERE DEGRADATION

☕ COFFEE
From: Africa/Arabia to Americas
Impact: Plantation system
Soil effect: EROSION

Character role cards (print enough for all students, distribute randomly)

INDIGENOUS FARMER - AMERICAS

Your role: Taíno/Aztec/Inca farmer (Pre-1492)

Your farming methods:
- Three sisters farming (corn, beans, squash together)
- Crop rotation to maintain soil health
- Terracing on hillsides to prevent erosion
- Using natural fertilizers

Your perspective:
- Land is sacred and must be preserved
- Farming works WITH nature, not against it
- Soil health = community health
- Sustainable practices passed down generations

During the activity:
- Start with HEALTHY SOIL tokens
- Explain how your methods protect soil
- Show concern when colonists arrive

EUROPEAN COLONIST - PLANTATION OWNER

Your role: Spanish/Portuguese/English/French/Dutch Colonist (1500s-1600s)

Your goals:
- Find gold and valuable crops
- Establish profitable colonies
- Send wealth back to Europe
- Exploit indigenous peoples and slaves brought from Africa.

Your farming approach:
- Large plantations for single crops
- Quick profits more important than soil health
- Use enslaved labour for intensive agriculture
- Clear forests for farmland

During the activity:
- Take HEALTHY SOIL tokens and exchange for DEGRADED ones

- Focus on moving valuable crops to Europe
- Justify actions based on economic needs

ENSLAVED AFRICAN FARMER

Your role: Enslaved person on colonial plantation (1600s-1700s)

Your background:
- Brought agricultural knowledge from Africa
- Forced to work on sugar/tobacco/cotton plantations
- Understand sustainable farming but can't practice it
- Want to grow food for your family

Your situation:
- Must follow plantation owner's orders
- Know the land is being damaged
- Try to grow your own food in small, often inadequate plots sustainably
- Pass on traditional knowledge in secret

During the activity:
- Observe soil degradation happening
- Remember sustainable practices from Africa
- Limited power to change farming methods

EUROPEAN MERCHANT

Your role: Portuguese/Spanish/French/Dutch/English trading company representative

Your focus:
- Maximize profits from colonial trade
- Connect European markets with colonial products
- Invest in most profitable crops
- Expand trading networks

Your priorities:
- Quick returns on investment
- Large quantities of valuable crops
- Low production costs
- Market demand in Europe

During the activity:
- Focus on moving high-value crops
- Less concerned with soil health
- Drive demand for plantation agriculture

Movement tracking sheet

Round 1: Crop movement (1492-1600)
Track your movements on the map.

Time period	Crop/Item	From	To	Why?
1492-1520				
1520-1550				

1550-1600				

Round 2: Soil health changes (1600-1750)
Track soil token movements.

Location	Start of changes	End of changes	Reason for change
Caribbean Islands			
North America			
South America			
Europe			

Activity 3: Plantation vs. indigenous agriculture debate prep
Duration: 12 minutes (can be much more)

Description
Students work in teams to prepare arguments comparing colonial plantation agriculture with indigenous farming methods, focusing on soil impact.

Materials
- Research fact cards about plantation agriculture (ANNEX)
- Research fact cards about indigenous three sisters farming, terracing, etc. (ANNEX)
- Debate preparation templates (ANNEX)
- Flip chart paper and markers

Setup instructions
Divide class into 4 teams: 2 teams research plantation impacts, 2 teams research indigenous methods

Step-by-step process
1. Teams receive research materials and role assignments.
2. Teams research and prepare key arguments about soil impact.
3. Teams create visual aids showing their farming method's soil effects.
4. Quick practice round within teams.

Recording
Teams complete argument preparation sheets with evidence and visual representations

Research fact cards

PLANTATION AGRICULTURE FACT CARDS

SUGAR PLANTATION FACTS

Environmental impact:
Required clearing entire forests
Used slash-and-burn agriculture
Caused massive soil erosion on hillsides
Polluted water sources with processing waste

Soil degradation:
Continuous sugar cane depleted nitrogen
No crop rotation practiced
Topsoil washed away in tropical rains
Many Caribbean islands still recovering today

Scale of destruction:
Barbados lost 95% of its forests
Haiti's mountains still show erosion scars
Soil productivity dropped 70% in 100 years

TOBACCO PLANTATION FACTS

Agricultural practices:
Tobacco planted in same fields year after year
Required 18 months of intensive cultivation
Used slash-and-burn to clear forests
No fertilizer or soil conservation used

Soil impact:
Tobacco is a "soil-exhausting" crop
Depletes nutrients faster than most plants
Caused severe erosion on Virginia hillsides
Farmers abandoned "worn-out" fields

Historical evidence:
Thomas Jefferson noted soil degradation
George Washington tried crop rotation
Many plantations moved west for fresh soil

COFFEE PLANTATION FACTS

Environmental changes:
- Replaced diverse rainforests with single crop
- Removed shade trees that protected soil
- Created monoculture plantations
- Used intensive chemical processing

Soil consequences:
- Increased erosion without forest cover
- Reduced biodiversity in soil
- Chemical processing polluted waterways
- Soil compaction from heavy machinery

Modern connections:
- Same problems continue today
- Fair trade coffee promotes soil health
- Shade-grown coffee protects soil better

INDIGENOUS FARMING FACT CARDS

THREE SISTERS FARMING

The system

Corn: Provides tall stalks for beans to climb
Beans: Fix nitrogen in soil to feed corn and squash
Squash: Large leaves shade soil and prevent weeds

Soil benefits:
- Nitrogen fixation naturally fertilizes soil
- Ground cover prevents erosion
- Diverse root systems improve soil structure
- No need for external fertilizers

Sustainability:
- System can continue indefinitely
- Improves soil over time
- Used for over 1,000 years by indigenous peoples
- Modern organic farmers now copy this method

ANDEAN TERRACING

Engineering marvel:
- Inca built terraces on steep mountain slopes
- Stone walls held soil in place
- Irrigation channels brought water to crops
- Different crops at different altitudes

Soil conservation:
- Prevented erosion on hillsides
- Created new agricultural land
- Improved water retention
- Built rich, deep soil over generations

Long-term success:
- Many terraces still used today (500+ years later)
- Soil remains fertile and productive
- Supports diverse crop varieties
- Model for modern sustainable agriculture

MAYAN FOREST GARDENS

Integrated system:
- Combined trees, shrubs, and ground crops
- Mimicked natural forest structure
- Included fruit trees, medicinal plants, and food crops
- Maintained forest biodiversity

Soil health:
- Leaf litter and animal manure provided natural fertilizer
- Tree roots prevented erosion
- Diverse plants supported soil microorganisms
- No soil degradation over centuries

Modern relevance:
- One of the main sources of inspiration for modern sustainable farming movements such as "permaculture"
- More productive than monoculture (economies of diversity vs economies of scale)
- Supports biodiversity and soil health

- Climate change resilient

DEBATE PREPARATION TEMPLATE

Team: _____ Position: _____

Our main argument:

Evidence supporting our position:

Fact #1:

Source: _____
Fact #2:

Source: _____
Fact #3:

Source: _____

Our farming method	Soil impact	Evidence
	Positive:	
	Negative:	
	Long-term:	

Counter-arguments we expect:

Our response: _____

Our response: _____
Visual aid plan:
What will we draw/show?

Speaking roles:
Opening argument: _____
Evidence presenter: _____
Visual aid explainer: _____
Closing argument: _____

<u>Activity 4: Soil stories gallery walk & mini-debates</u>
Duration: 8 minutes (can be much more)

Description
Teams present their findings through gallery walk format, followed by mini-debates about sustainable vs. exploitative agriculture.

Materials
- Presentation materials from previous activity
- Voting dots for peer assessment

- Evaluation rubrics

Setup instructions
Set up gallery walk stations around room perimeter

Step-by-step process
1. Gallery walk - students view all team presentations
2. Mini-debate format – plantation teams vs. indigenous farming teams present key arguments
3. Class votes on most compelling evidence and discusses relevance to modern agriculture

Recording
Peer evaluation forms and reflection on most convincing arguments (ANNEX)

GALLERY WALK & DEBATE EVALUATION

Team presentations evaluation

Team 1 - Plantation agriculture:

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs work (1)
Historical accuracy	☐	☐	☐	☐
Soil impact evidence	☐	☐	☐	☐
Visual aid quality	☐	☐	☐	☐
Clear presentation	☐	☐	☐	☐

Best point made: _____

Team 2 - Indigenous farming:

Criteria	Excellent (4)	Good (3)	Fair (2)	Needs work (1)
Historical accuracy	☐	☐	☐	☐
Soil impact evidence	☐	☐	☐	☐
Visual aid quality	☐	☐	☐	☐
Clear presentation	☐	☐	☐	☐

Best point made: _____

Debate evaluation:

Most convincing argument overall:

☐ Plantation agriculture team ☐ Indigenous farming team

Why? _____

Most surprising fact I learned:

Connection to modern agriculture:

Self-reflection:
My participation level today: ☐ Excellent ☐ Good ☐ Fair ☐ Poor

One thing I contributed to my team:

One thing I learned about soil and history:

One question I still have:

Activity 5: Modern connections & wrap-up
Duration: 5 minutes

Description
Quick brainstorm connecting historical soil lessons to contemporary environmental challenges

Step-by-step process
1. Students write one modern parallel to colonial soil degradation
2. Share examples and preview next lesson connections

Assessment

Formative assessment
- Observation during soil sample examination and hypothesis formation
- Participation in mapping game and role-playing activities
- Quality of arguments developed during debate preparation
- Collaboration and engagement during group activities

Summative assessment
- Completed movement maps showing understanding of Columbian Exchange impacts
- Team presentation quality and historical accuracy
- Individual reflection connecting historical and modern soil challenges
- Exit ticket: "How did colonial agriculture change soil health, and what can we learn from this today?"

Differentiation strategies

For advanced learners
- Provide additional primary source documents about colonial agriculture

- Challenge them to research specific plantation crops and their unique soil impacts
- Ask them to lead mini-presentations during gallery walk
- Extension research on modern sustainable agriculture solutions

For struggling learners
- Provide visual aids and simplified fact cards
- Pair with stronger partners during collaborative activities
- Offer sentence starters for debate preparation
- Focus on concrete observations rather than abstract connections

For students whose first language is not the language of instruction
- Provide key vocabulary list with visual supports before lesson
- Include more visual and kinaesthetic activities (mapping game, gallery walk)
- Allow collaboration with bilingual peers
- Offer multilingual resources for extension activities

Extension activities

Immediate extensions
- Create a timeline showing soil degradation acceleration during colonial periods
- Research one specific colonial crop and its environmental impact
- Design an infographic comparing indigenous vs. colonial farming methods

Home learning
- Interview family members about traditional farming practices in their regions
- Research current soil conservation efforts in their local area
- Create a "soil story" comic strip showing the journey from healthy to degraded soil during colonial times

Health and safety considerations
- Ensure soil samples are safe for handling
- Provide hand sanitizer after soil observation activity
- Clear pathways for floor mapping activity to prevent falls
- Monitor group dynamics during debate activities to ensure respectful discourse

Syllabus content reference

This lesson addresses:
- European exploration and expansion (15th-18th centuries)
- Columbian Exchange and its impacts
- Colonial economic systems and their environmental consequences
- Introduction to environmental history concepts
- Cross-curricular connections with environmental science

Teacher's preparation notes

- Printing instructions
- Soil tokens: 20 green, 20 brown tokens
- Character role cards: 6-8 of each role (adjust for class size)
- Crop cards: 15-20 of each crop type
- Worksheets: one per student
- Fact cards: 2 sets of each card for team research