

# Palm Oil - The Environmental Impact

## OVERVIEW

*Special thanks to Eyes of the World Films for footage from In the Land of Palm Oil. Learn more about the film at [www.inthelandofpalmoil.org](http://www.inthelandofpalmoil.org)*

### ESSENTIAL QUESTION

How have palm oil plantations impacted indigenous communities in Indonesia and the global climate as a whole, and how have activists and musicians spread awareness about the issue?



Screenshot from *In the Land of Palm Oil*, Courtesy of Eyes of the World Films

### OVERVIEW

*In this lesson, students will investigate the role the cultivation of palm oil plays in climate change by examining scientific reports and calculating the amount of soil organic carbon (SOC) in the Indonesian peatlands. They will also investigate the ways indigenous activist Emmanuela Shinta and the band Navicula raise awareness about the damage palm oil plantations are doing to indigenous communities and the global environment. Finally, students evaluate possible solutions to harvesting palm oil in a more sustainable and ecological way by reading scientific reports and discovering the work of activists.*

In 2015, mass fires on the Indonesian island of Kalimantan (also known as Borneo) led to rampant pollution, decimated plant and wildlife, and released millions of tonnes of carbon dioxide into the atmosphere. The cause of the fires had partly to do with natural El Niño weather patterns, but human activity contributed to their severity.

Kalimantan holds the largest percentage of tropical peatlands in the world. These wetland ecosystems are characterized by peat, a marshy mixture of plant material that, due to the concentration of water, decay very slowly.

The tropical peatlands of Kalimantan produce soil rich in carbon, making them attractive for agricultural development. Today, Kalimantan is dominated by palm oil plantations, which comprise over 13 million hectares of the island. The global demand for palm oil – an inexpensive, healthy vegetable oil with a long shelf-life – has incentivized private interests to develop palm oil plantations in Kalimantan. In 2016, Forbes identified that 14 of the 32 billionaires in Indonesia are in the palm oil business.

These palm oil companies regularly act unethically, clearcutting or burning tropical forest land that often belongs to the indigenous Dayak people of Kalimantan. In 2022, palm oil tycoon Surya Darmadi was brought to trial for bribing government officials and illegally cutting down tropical forestland on the Indonesian island of Sumatra. It was one of the largest corruption cases in the country's history.

The environmental impact of the palm oil plantations is devastating. Native plants and animals such as the orangutan are being displaced as their habitats are being destroyed. Water is drained from natural peatlands in order to create the plantations, drying them out and making them more prone to fires. In 2021, floods in Kalimantan were likely exacerbated by palm oil development, which have eradicated natural watersheds that would help limit the amount of flooding from rivers and other bodies of water.

Thankfully, efforts to preserve the environment in Kalimantan are ongoing. The Dayak people are organizing and demanding the Indonesian government conduct more oversight over palm oil plantation operations. Activists such as Emmanuela Shinta are building international awareness about the issue, and many national and international environmental organizations are advocating for more sustainable methods of palm oil cultivation. And bands such as Navicula are spreading environmental awareness through their music. These combined efforts, with help from consumer demand and awareness, will hopefully lead to a future where palm oil is fairly and sustainably harvested.

## OBJECTIVES

Upon completion of this lesson, students will:

### 1. KNOW (KNOWLEDGE):

- That the creation of palm oil plantations can add carbon dioxide into the atmosphere by burning and eradicating natural peat bogs
- The creation of palm oil plantations have disrupted the economy and culture of Indigenous communities in Indonesia
- Indigenous communities in Indonesia have been on the forefront of preventing peat bogs from being replaced with palm oil plantations
- The scientific measurement of soil organic carbon
- The activist Emmanuela Shinta, and how she is raising awareness about palm oil plantations
- The band Navicula, and how they spread awareness about environmental issues

### 2. MASTERY OBJECTIVE

- Students will be able to identify the environmental effects large palm oil plantations have on indigenous communities in Indonesia and the global climate by calculating the amount of soil organic carbon in Indonesian peatlands.

## ACTIVITIES

### MATERIALS NEEDED

- Students should individually have a device with access to the internet (Chromebooks, etc.)

## MOTIVATIONAL ACTIVITY

1. Play **Clip 1, Navicula, “Kembali ke Akar” by Navicula**. Explain that Navicula is a popular band in Indonesia. Encourage students to try to discern what the song is about based on the visuals of the music video alone. Then ask students:
  - Which imagery in the video stuck out to you?
  - What did you notice about the setting of the video?
  - What did you notice about the costumes?
  - Considering everything you saw in the video, what might you guess the song is about?
2. Display **Image 1, “Kembali ke Akar” Lyrics**. Instruct students to read the lyrics translated from Indonesian to English. Then ask students:
  - Based on the lyrics, what might this song be about? Which lyrics specifically give you a clue to the meaning of the song?
  - What might the title “Kembali ke Akar” mean? (*Hint: examine the final line of the lyrics.*)
  - Do you feel the lyrics of the song support the visuals of the video? Why or why not?
3. Show **Image 2, Map of Indonesia**. Inform students that Indonesia is a country in Southeast Asia made up of over 17,000 islands. Explain to students that Navicula is a band from the island of Bali, and they often focus on environmental issues in their music.
4. Explain that one of the many environmental issues in Indonesia is the growth of palm oil plantations. Harvested from palm trees, palm oil has a long shelf life, is high in nutrition, and relatively inexpensive. For that reason, it is one of the most popular vegetable oils used in a variety of products, and there is a huge global demand for it.
5. Display Show **Image 3, Common Products with Palm Oil**. Ask students:
  - Based on this image, have you used a product with palm oil today? This week?
  - What product did you use?
6. Inform students that while palm oil is useful, harvesting it can be hazardous to the environment. Explain that in class they will be investigating the environmental impact of palm oil plantations and the ways palm oil might be more sustainably harvested.

## PROCEDURE:

1. Distribute **Handout - “NASA pinpoints cause of Earth’s recent record carbon dioxide spike,” NASA Earth Observatory** (*Teacher’s Guide available here*). Read the handout individually, or together as a class, then ask students to answer the questions on the handout individually or in groups. Review the answers as a class.
  - What is “soil organic carbon”? (*It is the carbon that is captured and held within the soil.*)
  - How does carbon enter into the soil? (*Plants capture CO<sub>2</sub> in the atmosphere through photosynthesis. When leaves or other organic matter from plants fall to the ground, the carbon is absorbed by the soil.*)
  - What happens to the carbon once it is in the soil? (*Some stays in the soil, some is released back into the atmosphere, and some moves into the ocean.*)
2. Play **Clip 2, Introducing Emmanuela Shinta**. Ask students:
  - Where does this clip take place?
  - Who is the narrator of this clip? What is her background? (*Inform students that the narrator of the video is Emmanuela Shinta, an activist who is part of the Dayak indigenous group in Kalimantan, the Indonesian portion of the island of Borneo.*)
3. Display on the board the Global Soil Organic Carbon Map website (<http://54.229.242.119/GSOCmap/>), created by the Food and Agricultural Organization of the United Nations. Zoom in on Kalimantan by typing “Kalimantan” in the search bar on the upper left corner, and inform students that this is the region that will be discussed in class.
4. Explain that the dark dots all over the island represent the density of organic carbon in the soil. Play **Clip 3, “Soil Organic Carbon – The Treasure Beneath Our Feet.”** Then ask students:
  - According to the clip, what is “soil organic matter?” (*It is the organic elements and molecules contained within soil.*)
  - Why is soil organic matter helpful? (*It provides nutrients to plants and increases soil porosity, which allows the soil to hold more water.*)
5. Distribute **Handout - Soil Organic Carbon Comparison Worksheet**. Instruct students to go to the Global Soil Organic Carbon Map on their personal devices. As a class, go over the handout, and allow time for students to create their individual bar graphs.
6. Ask students to share their findings from the handout with the class. Then ask:
  - Based on what was shared in class, how does the soil organic carbon density in Kalimantan compare with the rest of the world? Would you say in general that Kalimantan has more, less, or an average amount of soil organic carbon density?
7. Explain to students that Kalimantan has high soil organic carbon density because the island has a large percentage of peatlands. Show **Clip 4, Peatlands Definition**. Then ask students:
  - How would you describe the soil of peatlands? (*It is full of organic material that didn’t decompose.*)
  - Why do peatlands have such a high density of organic carbon? (*Because the*

*organic matter doesn't decompose and it holds a lot of carbon.)*

- According to the clip, what happens to peatlands when the water is used to irrigate plantations? (*The soil becomes dry because the water is siphoned off.*)
- What is the threat of dry peatlands? (*They catch on fire more easily.*)
- What are the global ramifications of peatlands being on fire? (*CO<sub>2</sub> is released into the atmosphere.*)
- What are some of the effects of peatlands burning for local indigenous people? (*Pollution, the destruction of local plants and animals.*)

8. Play **Clip 5, Indigenous Resistance to Palm Oil Plantations**. Then ask students:

- What are some of the ways people in Kalimantan are fighting for a better environment?
- In the clip, who might Emmanuela Shinta be speaking to? Do you think she was spreading the message in Indonesia, or somewhere else? (*She was speaking to a class in City College in New York City.*) Why might such presentations be important to her work?
- What were the young people's demands in the clip?
- Who were they making demands of?
- How did they fight for their demands?
- What was the result of their activism?

## SUMMARY ACTIVITY

1. Show **Clip 6, "Soil Organic Carbon – The Treasure Beneath Our Feet," Part 2**. Then ask students:

- According to this video, is it possible to continue to cultivate food while keeping carbon in the soil? What are some ways this can be done?

2. Distribute Handout - Excerpt from the IUCN Report, "Oil palm and biodiversity" to all students. Then split students into group. Ask groups to follow the directions on the handout. Then, reconvene as a class and discuss each group's summary of the article. Then ask the class:

- According to this report, is it possible to cultivate palm oil while minimizing environmental damage? What are some methods of doing this?
- Recall what the activists in the previous video were demanding. Were any of the demands similar to what is being proposed in this scientific report? If so, which demands?

3. Display **Image 1, "Kembali ke Akar" Lyrics** again. Ask students:

- How might Navicula's lyrics align with efforts to harvest palm oil more sustainably?

## EXTENSION ACTIVITIES

1. Request a classroom viewing of the full documentary In the Land of Palm Oil here: <https://www.inthelandofpalmoil.org/>.
2. Research one of the following organizations. Write a short summary of the organization which includes it's history, general goals, and what it is doing to approach the issue of palm oil.
  - Roundtable on Sustainable Palm Oil ([rspo.org/who-we-are/](https://rspo.org/who-we-are/))
  - Conservation International ([www.conservation.org/projects/sustainable-palm-oil](https://www.conservation.org/projects/sustainable-palm-oil))
  - Tropical Conservation Fund (<https://www.tropicalconservationfund.org/palmoil.html>)
  - Orangutan Foundation International (<https://orangutan.org/palmoil/>)
  - Forest People's Programme (<https://www.forestpeoples.org/en/work-themes/global-finance-trade-private-sector/palm-oil-rspo>)
  - Audubon Nature Institute (<https://audubonnatureinstitute.org/sustainable-palm-oil>)



## NEXT GENERATION SCIENCE STANDARDS

### *MS.Matter and Energy in Organisms and Ecosystems*

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

### *MS.Weather and Climate*

MS-ESS3-5. Ask questions to clarify evidence of the factors that have caused the rise in global temperatures over the past century.

### *MS.Human Impacts*

MS-ESS3-2. Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

## COMMON CORE STATE STANDARDS

### *College and Career Readiness Reading Literature for Grades 6-8*

CCSS.ELA-Literacy.RL.6.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

CCSS.ELA-Literacy.RL.6.2 Determine a theme or central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.

CCSS.ELA-Literacy.RL.6.7 Compare and contrast the experience of reading a story, drama, or poem to listening to or viewing an audio, video, or live version of the text, including contrasting what they “see” and “hear” when reading the text to what they perceive when they listen or watch.

CCSS.ELA-Literacy.RL.7.1 Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

CCSS.ELA-Literacy.RL.7.2 Determine a theme or central idea of a text and analyze its development over the course of the text; provide an objective summary of the text.

CCSS.ELA-Literacy.RL.7.7 Compare and contrast a written story, drama, or poem to its audio, filmed, staged, or multimedia version, analyzing the effects of techniques unique to each medium (e.g., lighting, sound, color, or camera focus and angles in a film).

CCSS.ELA-Literacy.RL.8.1 Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.



### *College and Career Readiness Reading Informational Text for Grades 6-8*

CCSS.ELA-Literacy.RI.6.1 Cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

CCSS.ELA-Literacy.RI.6.2 Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.

CCSS.ELA-Literacy.RI.6.7 Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.

CCSS.ELA-Literacy.RI.6.9 Compare and contrast one author's presentation of events with that of another (e.g., a memoir written by and a biography on the same person).

CCSS.ELA-Literacy.RI.7.1 Cite several pieces of textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

CCSS.ELA-Literacy.RI.7.2 Determine two or more central ideas in a text and analyze their development over the course of the text; provide an objective summary of the text.

CCSS.ELA-Literacy.RI.7.9 Analyze how two or more authors writing about the same topic shape their presentations of key information by emphasizing different evidence or advancing different interpretations of facts.

CCSS.ELA-Literacy.RI.8.1 Cite the textual evidence that most strongly supports an analysis of what the text says explicitly as well as inferences drawn from the text.

CCSS.ELA-Literacy.RI.8.2 Determine a central idea of a text and analyze its development over the course of the text, including its relationship to supporting ideas; provide an objective summary of the text.

### *College and Career Readiness Anchor Standards for Speaking and Listening for Grades 6-8*

CCSS.ELA-Literacy.SL.6.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.6.2 Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

CCSS.ELA-Literacy.SL.6.4 Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.



CCSS.ELA-Literacy.SL.7.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 7 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.7.2 Analyze the main ideas and supporting details presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how the ideas clarify a topic, text, or issue under study.

CCSS.ELA-Literacy.SL.7.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with pertinent descriptions, facts, details, and examples; use appropriate eye contact, adequate volume, and clear pronunciation.

CCSS.ELA-Literacy.SL.8.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

CCSS.ELA-Literacy.SL.8.2 Analyze the purpose of information presented in diverse media and formats (e.g., visually, quantitatively, orally) and evaluate the motives (e.g., social, commercial, political) behind its presentation.

CCSS.ELA-Literacy.SL.8.4 Present claims and findings, emphasizing salient points in a focused, coherent manner with relevant evidence, sound valid reasoning, and well-chosen details; use appropriate eye contact, adequate volume, and clear pronunciation.

### *College and Career Readiness Standards for Language for Grades 6-8*

CCSS.ELA-Literacy.L.6.4 Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 6 reading and content, choosing flexibly from a range of strategies.

CCSS.ELA-Literacy.L.7.4 Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 7 reading and content, choosing flexibly from a range of strategies.

CCSS.ELA-Literacy.L.8.4 Determine or clarify the meaning of unknown and multiple-meaning words or phrases based on grade 8 reading and content, choosing flexibly from a range of strategies.

## RESOURCES

### VIDEO RESOURCES

- Navicula, “Kembali ke Akar”
- *In the Land of Palm Oil* - Introducing Emmanuela Shinta
- Soil Organic Carbon – The Treasure Beneath Our Feet, Part 1
- *In the Land of Palm Oil* - Peatlands Definition
- *In the Land of Palm Oil* - Indigenous Resistance to Palm Oil Plantations
- Soil Organic Carbon – The Treasure Beneath Our Feet, Part 2

### HANDOUTS

- Handout - “NASA pinpoints cause of Earth’s recent record carbon dioxide spike,” NASA Earth Observatory
- Handout - “NASA pinpoints cause of Earth’s recent record carbon dioxide spike,” NASA Earth Observatory (Teacher’s Guide)
- Handout - Soil Organic Carbon Comparison Worksheet
- Handout - Excerpt from the IUCN Report, “Oil palm and biodiversity”.