Unit Title: Earth and Its Environment

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3rd Grade

Aligned Standards: 3-LS4-1, 3-LS4-4, 3-5 EST1-2

NGSS Standards:
3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. (NGSS)
3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

CCSS ELA:
RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.
RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.
RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect.
W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons.

CCSS Math:
3.MD.B.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. (CCSS MA)
MP.4 Model with mathematics. (CCSS MA)

IL-Social Studies:
SS.IS.1.3-5: Develop essential questions and explain the importance of the questions to self and others. (IL SS)
SS.IS.2.3-5: Create supporting questions to help answer essential questions in an inquiry. (IL SS)
SS.IS.3.3-5: Determine sources representing multiple points of view that will assist in answering essential questions. (IL SS)
SS.IS.7.3-5: Identify a range of local problems and some ways in which people are trying to address these Problems. (IL SS)

Enduring Understandings	Essential Questions

* Statements summarizing important ideas and core processes that are central to a discipline and have lasting value beyond the classroom. • Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. 3-LS4-1 • Populations live in a variety of habitats, and change in those habitats affects the organisms living there. 3-LS4-4. • Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)	* A good essential question: ● How does studying fossils help us understand our environment? (3-LS41) ● How does environmental changes affect a habitat's plant and animal population? (3-LS4-4 ● How can researching a problem help determine how well it performs in the design solution? (3-5 EST1-2)

Transfer Goals

(Will be some or all of the skills listed below, plus any additional ones the groups feels important.)

- Asking questions (for science) and defining problems (for engineering) EST 1-2
- Developing and using models
- Planning and carrying out investigations
- Analyzing and interpreting data (LS4-1)
- Using mathematics and computational thinking
- Constructing explanations (for science) and designing solutions (for engineering)
- Engaging in argument from evidence (LS4-1, LS4-4)
- Obtaining, evaluating, and communicating information

Learning Objectives

*Students will be able to… OR I can…

- I can use a chart to organize data about animal or plant fossils that includes: the type, size and type of land that on which they were found
- I can use information gathered to determine the relative ages of fossils.
- I can use data to describe the relationship that some fossils that lived long ago have no modern counterparts. (or relative animals that are the same. I.e. dinosaurs)
- I can describe that fossils provide evidence of animals or plants lived long ago but have become extinct.
- I can use information gathered to determine where fossilized animals and plants currently live and where they lived before. (On land or ocean) (LS4-1)
- I can Describe* the purpose of the investigation, which includes finding possible failure points or difficulties to identify aspects of a model or prototype that can be improved.
- I can describe* the evidence to be collected, including:
    - How well the model/prototype performs against the given criteria and constraints.

Specific aspects of the prototype or model that do not meet one or more of the criteria or constraints (i.e., failure points or difficulties).
    - Aspects of the model/prototype that can be improved to better meet the criteria and constraints. 3-5 EST1-2
- I can describe how plants and animals live in an environment before it changes.
- I can describe a change in an environment.
- I can describe how the change in the given environment causes a problem for the existing plants and animals that live there.
- I can describe the effect of the solution on the plants and animals within the environment.
- I can describe the resulting changes to plants and animals living within that changed environment, after the solution has been implemented. (LS4-4)

- I can draw a graph to represent data (3.MD.B.3)
- I can solve how many more and how many less problems (3.MD.B.3)
- I can write an opinion piece on topics or texts. (W.3.1)

*Suggestions for differentiation for the following student demographics. ELL, IEP, or enriched students:

- ❑ Articles can be in translated into students own language , or pair students with a non-ELL student for clarification.
- ❑ Texts may need to be modified or read to for IEP students
    - ❑ Rubric may be modified, Primary Source analysis tool may have examples
    - ❑ Notes may be provided for students that have writing goals
    - ❑ Final assessment may have fewer questions or be multiple choice
    - ❑ Possible solutions may be listed
- ❑ Enrichment may include for the project, student could compare their solution to what is currently being used and write a paper comparing the two.

* Prior Knowledge needed for to complete unit:

- ❑ Students should understand and fully been trained on how to pair share, appropriate questions to ask each other and how to actively listen.
- ❑ Proper computer usage and appropriate websites.
- ❑ Students need to understand that there are different environments, animals and plants around the world and other places don't look like ours.
- ❑ No prior knowledge is needed for fossils lesson, all knowledge will be gained through the lesson.

Library of Congress: Primary Sources	**Materials/Supplies/Resources**
• http://cdn.loc.gov/service/pnp/cph/3c30000/3c30000/3c30200/3c30207v.jpg	• Fossils • Science notebooks • Book- Fossils Tell of Long Ago (Aliki)

• (fossil skull with teeth) • https://www.loc.gov/item/2015634463/ (picture of the remains of a forest in Virginia being destroyed)	• small bowls • plaster • wet wipes • videos- see below • Science notebooks • Listed websites • Claim- Evidence- Reasoning Organizer • Trade books or other resources • Computers/ • Poster board • Crayons/makers
Evidence of Learning	
Example Performance Tasks	**Example Evidence**
• What are the parameters of the performance tasks? **Teacher can give assessment questions below.** What is a fossil? How would you explain the formation of fossils? How would you organize fossils to show the environment from which they came? What is the relationship between fossils and life today? What inferences can you make about life long ago compared to life today? Why is it important to learn about fossils? What can fossils tell us about our environment? (LS4-1) Students could also come up with a plan that could be implemented to save their ecosystem. Teacher could pose the following question: What do you or your family do every day that could cause problems to an ecosystem. Create a plan that you could do to be a solution to the	• What does the final project look like? (LS4-1) Students should have an understanding of the following. • What fossils are and how they help us understand animals and plants in our environment and environments of the past. • How to classify fossils and where they once lived and their current counterparts. (LS4-4) • Create a plan that their family could do as a possible solution to a problem in our ecosystem. • Explain a given problem in an ecosystem with possible solutions to solve the problem.

growing problems in our ecosystem. Teacher could create or have students create a family/community pledge. (LS4-4)	

Aligned Lesson Plan 1

(LOC Science Lesson for Unit 2: Earth and Its Environments)

Lesson Plan: Fossils 3-LS4-1	**Lesson Length: 3-4 days**
Grade Level: 3rd	**Related Unit: Earth and Its Environment**
Enduring Understandings	**Essential Questions**
Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. 3-LS4-1	How does studying fossils help us understand our environment? (3-LS41)

Transfer Goals

Asking questions (for science) and defining problems (for engineering)
Developing and using models
Planning and carrying out investigations
Analyzing and interpreting data (LS4-1)
Using mathematics and computational thinking
Constructing explanations (for science) and designing solutions (for engineering)
Engaging in argument from evidence (LS4-1)
Obtaining, evaluating, and communicating information

Learning Objectives

- I can use a chart to organize data about animal or plant fossils that includes: the type, size and type of land that on which they were found
- I can use information gathered to determine the relative ages of fossils.
- I can use information gathered to determine where fossilized animals and plants currently live and where they lived before.
- I can use data to describe the relationship that some fossils that lived long ago have no modern counterparts. (or relative animals that are the same. I.e. dinosaurs)
- I can describe that fossils provide evidence of animals or plants lived long ago but have become extinct.

- I can use information gathered to determine where fossilized animals and plants currently live and where they lived before. (On land or ocean)

Library of Congress: Primary Sources	Materials/Supplies/Resources
• http://cdn.loc.gov/service/pnp/cph/3c30000/3c30000/3c30200/3c30207v.jpg (fossil skull with teeth) https://www.loc.gov/resource/cph.3c30207/	• Fossils • Science notebooks • Book- Fossils Tell of Long Ago (Aliki) • small bowls • plaster • wet wipes • videos- see below

Lesson Plan

Engage: How can I get students interested in this?

- Describe how the teacher will capture students' interest.
- Include what kind of questions the students can ask themselves to further engage with the material?
- Identify the Primary Source(s) that can be used to observe and make connections.
- Approximate how long this portion of the lesson should take.

Teacher will display examples of fossils using the Smart Board or Elmo (Library of Congress photos)
Using the Primary Source tool, students will write down and share their observations. (* included in the folder) ***Science Engineering Practice**

As a class, discuss to try to identify the imprint using the characteristics, and students background knowledge. Teacher will pose the following questions as students view the pictures.

What (animal, fish, insect, etc.) do you think it is? Why?
What environment do you think it came from?
How did the bones stay together?
Is there another animal that the bones remind you of? If so, what?

Teacher can read: **Fossils Tell of Long Ago (by Aliki)**. Teacher will write the following questions on the board that students will answer in their Science notebooks.

1. What is a fossil?
2. Have you ever seen one? If so, where and how do you know it was a fossil? If not, where do you think you could find one?

3-D learning will occur in this section

***This part of the lesson should take 1 hour to 2 hours**.

Explore: What tasks/questions can I offer to help students puzzle through this?

- Describe what hands-on/minds-on activities students will be doing.
- Include some probing questions teachers could possibly pose to encourage and/or focus students' on exploring and gathering more information related to the essential question(s).
- Approximate how long this portion of the lesson should take.

Students will discover how fossils are made doing a hands on activity. This part of the lesson I suggest doing it in a small group. Students will create their own fossil.

*Teacher may use different objects to represent animals , plants, footprints, droppings and bones to show how paleontologist use these materials to understand how life was in the past and the history on earth. (teacher may use items from the dollar story like toy dinosaurs, sticks to represent bones, rocks, or raisins to represent droppings, plants or flowers.)

1. Give each group a basket of plastic objects to make fossils with, small paper bowls, and a container of wet wipes. Students are not to touch anything until instructed.
2. Explain to students that you are going to put some plaster in the bottom of their bowl.
3. They will then choose one of the plastic objects to create a fossil with, and press it into the plaster. Once a good impression has been made they can remove the object. Try not to spill or touch the plaster. Do not touch the plaster until it has time to dry.
4. Wet wipes will be used to clean up the plastic object or any messes. Later, the students can peel the bowl off of their plaster fossil after it has dried.

Ask students to make observations about the following:

1. What their fossil looks like…
2. How they made it…
3. What can you learn from what you just made?
4. What could another person learn from looking at your fossil? (list 3 things)

Once students have answered the question above in their science journal teacher can play video from YouTube: https://www.youtube.com/watch?v=TVwPLWOo9TE

In science journals students will take notes of the different types of fossils. (Fossil types include:) * all information is in video.

1. Trace fossil
2. Mold fossil
3. Resign fossil
4. Body fossil (teeth and bone that has turned into stone)

Teacher will pose the question: What can fossils tell us? Teacher will break students into partners or keep them in the same groups. (If technology is limited teacher can show websites to small groups while the other students are looking at picture books on fossils. (consult neighborhood library to increase class selection)

Peer partner/group activity and exploration: research using computers. Students will explore the following websites to discover different kinds of fossils, how they were made, and what can be learned from a fossil: www.fossilsforkids.com and http://www.onegeology.org/extra/kids/fossils.html

Move around the room while students are exploring the websites. Stop and talk to each pair/ group. Make sure students are focused and on task, guide as necessary. Ask questions about the fossils students are looking at.

Ask students to write down their thoughts about classifying a fossil on fossil classification chart. (chart is in folder)
Things to consider:

- What animals look familiar to you?
- Are there any animals present that you have never seen before? (What could have happened to those animals?

3-D learning will occur in this section
1 ½ to 2 hours

Explain: How can I help students make sense of their observations?

- Have the students reflect upon their experiences and the Primary Source(s).
- Have the students write down questions they wondered about and want more information on.
- Include questions* and/or strategies teachers can utilize to help students connect their experiences to the essential question(s) and enduring understanding(s).
- Approximate how long this portion of the lesson should take.

***Questions should be of higher order, to encourage student explanations and support of claims and/or evidence.**

Teacher will refer to the lesson from the previous day. (At this point the fossils should be dry). Students will observe the fossils that they made the previous day and discuss what type of fossil that they made and why. (students may refer to their notebooks for types.)

Teacher will direct students back to the Library of Congress photos. As students preview the photo students will discuss the types of fossils that is in the picture.

Teacher will begin class discussion:
Talk with class as a whole about their exploration experience, thoughts, and what they have discovered.

Define and discuss new vocabulary - extinct, sediment, fossil, and paleontologist
Link new vocabulary to findings and experience. Students can define these words in their science journal. * other vocabulary may be added as students are exploring. Teacher can direct vocabulary by creating an anchor chart were student can add to it words as they are working through the unit or teacher can direct vocabulary by providing a specified list at the beginning of the unit or as you go along.

Play the following video about the different kinds of fossils, how they form, and what fossils tell us about how and where things lived long ago.
https://www.youtube.com/watch?v=sPFiwW8J3sY

*3-D learning will occur during this section
1 to 2 hours

Extend/Elaborate: How can my students apply their new knowledge to other situations?

- Describe how the students will apply their new knowledge to new or similar situations.
- Include how the teacher can help the students make relevant connections to their observations, address misconceptions, and extend students' learning.
- Approximate how long this portion of the lesson should take.

Teacher can extend the lesson by allowing students to pretend they are a paleontologist.

Using the two websites used previously in class teacher will pass out paper and pencils and have students draw a 2 row X 2 column chart. Choose two images and have students use the chart to compare similarities and differences between the two fossils. * teacher can have some students choose plants and some choose an animal and share out findings.

(**Teacher guided questions**)
What do fossils have in common? How are they different? What does examining fossils tell us about common ancestry and diversity?

Elaborate
Chose two more fossil images. Hold a class discussion about identifying the fossil, what it may be, and where it might have come from. What parts of the animal become fossilized? Do you think all animals or things can become fossilized? Have students describe animals, insects, etc. around today that resemble the fossil animals and why. Point out how some animals today may resemble fossil animals, while others are no longer found. Note that impressions of plants and teeth have also been fossilized.

Extend
* Teacher can extend this to types of plants and allow students to continue to research using the same platform and questions from above.
*Students could create a presentation of the information in the form of a poster, or digital format.
* Students could also write a narrative from a fossils point of view their process of life to a fossil.

*Disciplinary Core Idea and Cross-cutting concepts covered in this section

This part of the lesson could take 1-2 days

Evaluate: How can I help my students self-evaluate and reflect on the learning?

- Identify how students and the teacher can assess understanding.
- Describe how the lesson activities can help students demonstrate achievement of the learning objectives.
- Include examples (or descriptions) of evidence related to each learning objective.
- Approximate how long this portion of the lesson should take.

Teacher can give assessment questions below.

1. What is a fossil?
2. How would you explain the formation of fossils?
3. How would you organize fossils to show the environment from which they came?
4. What is the relationship between fossils and life today?
5. What inferences can you make about life long ago compared to life today?

6. Why is it important to learn about fossils?
7. What can fossils tell us about our environment?

* Disciplinary Core idea covered in this section

This part of the lesson can take 1 hour or less.

Aligned Lesson Plan 2

(LOC Science Lesson for Unit 2: Earth and Its Environments)

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. *

3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

Lesson Plan: Changes in the Ecosystems	**Lesson Length: 4-7 days**
Grade Level: 3rd	**Related Unit: Earth and Its Environment**
Enduring Understandings	**Essential Questions**
• Populations live in a variety of habitats and change in those habitats affects the organisms living there. 3-LS4-4. • Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)	• How do environmental changes affect a habitat's plant and animal population? (3-LS4-4) • How can researching a problem help determine how well it performs in the design solution? (3-5 EST1-2)
Transfer Goals	
Developing and using models 3-5 EST1-2 Planning and carrying out investigations Analyzing and interpreting data 3-LS4-4 Using mathematics and computational thinking Constructing explanations (for science) and designing solutions (for engineering)3-LS4-4, 3-5 EST1-2	

Engaging in argument from evidence 3-LS4-4
Obtaining, evaluating, and communicating information 3-5 EST1-2

Learning Objectives

- I can describe how plants and animals live in an environment before it changes.
- I can describe a change in an environment.
- I can describe how the change in the given environment causes a problem for the existing plants and animals that live there.
- I can describe the effect of the solution on the plants and animals within the environment.
- I can describe the resulting changes to plants and animals living within that changed environment, after the solution has been implemented. 3-LS4-4
  - I can describe* the evidence to be collected, including:
    - How well the model/prototype performs against the given criteria and constraints.
      Specific aspects of the prototype or model that do not meet one or more of the criteria or constraints (i.e., failure points or difficulties).
    - Aspects of the model/prototype that can be improved to better meet the criteria and constraints. 3-5 EST1-2

Library of Congress: Primary Sources	**Materials/Supplies/Resources**
• https://www.loc.gov/item/2015634463/ (picture of the remains of a forest in Virginia being destroyed)	• Science notebooks • Listed websites • Claim- Evidence- Reasoning Organizer • Trade books or other resources • Computers/ • Poster board • Crayons/makers

Lesson Plan

Engage: How can I get students interested in this?

Ask students to share what they know about where things live? (They may say ponds, forests, yards, aquariums). **Ask: What are some natural events that have major effects on the physical characteristics of a place? (possible answers: fires, tornadoes, hurricanes, tsunamis, floods) Ask: How do these events change a place? Possible answers: (Tornadoes can rip trees from the ground. Tsunamis and floods can wash away and drown plant and animal life. Fires burn and destroy trees and other plants and can clear large areas of land. What kind of fossils might you find in these areas? (have students discuss all options.**

What can we learn from the natural event and the fossils that were found there?
***This may be done on an anchor paper as a T-chart and can be added to as the unit continues.**
During engage have students talk to a shoulder partner or as a group. Question could also could be done in a science notebook as a start to a KWL-

Share out to encourage healthy disagreements and encourage curiosity.
***3-D learning occurs**
***This part of the lesson could take 1 class period or 60-90 mins**

Explore: What tasks/questions can I offer to help students puzzle through this?

- Teacher will show Library of Congress photo (remains of a forest) and ask some probing questions to encourage exploration. **Ask: What living things to you see in the picture? What non-living things do you see? Do you see anything that was once living, but is not anymore? Ask students what do they think happened to this forest?** Remind students about the previous lesson on fossils. What could happen to the non-living things?

- Have students share their observations.

- Students will view study jams video- (changes in ecosystems). Have students note what changes they noticed.

- Students will work with a partner/ or small group to research different ecosystems using following website:
- http://www.kidsgeo.com/geography-for-kids/0164-ecosystems.php (Have students focus on a particular ecosystem) Tundra, Desert, Grassland, Tropical Rain Forest, Deciduous Forest, Coniferous Forest.

- Have students note the following for their assigned ecosystem

    1. Type of Climate
    2. Location

3. Animals present
4. Plants present
5. Possible threats to the ecosystem

Using the following website have students answer the following questions. Teacher may start with reading the first section: So What if the Earth gets a bit warmer?
https://climatekids.nasa.gov/climate-change-evidence/

1. Why is the Earth getting warmer, does this affect your ecosystem? If so, how?
2. What could happen if t sea level rises due to warmer conditions? Could this affect your ecosystem? If so, then how?
3. How could the possible problems above affect the plants and animals in your ecosystem? Give at least one example of each from your ecosystem.
4. List two ways you could help save your ecosystem? How could you make sure other people were aware of ways to help?

Students may also use trade books or other websites/resources to find out more information about their ecosystem.

* A good movie to show would be Ice Age to show the relationship between animals and plants and the change that occurs to an environment.

*3-D learning occurs in this section

*This part of the lesson could take 1-3 days

Explain: How can I help students make sense of their observations?

- Have the students reflect upon their experiences and the Primary Source(s).
- Have the students write down questions they wondered about and want more information on.
- Include questions* and/or strategies teachers can utilize to help students connect their experiences to the essential question(s) and enduring understanding(s).
- Approximate how long this portion of the lesson should take.

- Students can create a poster/PowerPoint explaining their findings from the explore section.
- Have students present posters/ PowerPoints to the class. Use rubric to grade (this could also be their final evaluation to show understanding. *Rubric included in folder
- Draw students back to the LOC picture and have students identify what ecosystem it is. (the group that presented this one may have more information.)
- Using a Claim- Evidence-Reasoning graphic organizer, have students list possible issues that

could have caused the destruction of the ecosystem. *Claim Evidence Reasoning graphic Organizer included in folder

- Discuss a class
- Teacher can either give the real explanation or have students continue researching to find out.

***Disciplinary Core Ideas and Cross Cutting Concepts learning occurs**

*This part of the lesson could take 1-3 days

Extend/Elaborate: How can my students apply their new knowledge to other situations?

- Describe how the students will apply their new knowledge to new or similar situations.
- Include how the teacher can help the students make relevant connections to their observations, address misconceptions, and extend students' learning.
- Approximate how long this portion of the lesson should take.

- Have students extend the lesson by researching what happened to the destroyed forest (the original picture from the engage section of the lesson LOC picture) Students could report out for extra credit or as another part of their learning.
- Have students discuss what possible solutions could have prevented the destroyed ecosystem.

- Students could extend their research to other ways we hurt ecosystems. Have students use the following website to note the problem humans cause and how they can prevent it. https://climatekids.nasa.gov/acid-ocean/ (students could also use the tabs on the side of the website to further their research).
    1. Students can create a T-chart (see below) showing their research.
    2. Students could write a research paper
    3. Students could create a presentation to share with other classrooms or a pamphlet that could be distributed in their community.

Problem human cause	What we could do instead.

* This part of the lesson could be take 1 to 2 days.

*3-D learning occurs in this section

Evaluate: How can I help my students self-evaluate and reflect on the learning?

- Identify how students and the teacher can assess understanding.
- Describe how the lesson activities can help students demonstrate achievement of the learning objectives.
- Include examples (or descriptions) of evidence related to each learning objective.
- Approximate how long this portion of the lesson should take.

The evaluation part can be identified by the presentation in the explain section.

Students could also come up with a plan that could be implemented to save their ecosystem.

Teacher could pose the following question: What do you or your family do every day that could cause problems to an ecosystem. Create a plan that you could do to be a solution to the growing problems in our ecosystem. Teacher could create or have students create a family/community pledge.

*This could take 2 class periods, 2 hours, or longer depending on how extensive you want them to be.

*3-D learning occurs in this section