

LESSON 1

There is no such place as “Away”

(A Lesson Series about Litter)
Grade Band: Elementary School (K-5)



photo by Evan Halleck

SERIES INTRO

This lesson series is anchored in the fundamental ecological principle of ecosystem interconnectedness, which offers a framework to support student inquiry into how human activity impacts the natural environment. The series also includes an assessment plan to check for student understanding at the culmination of the three lessons. The lesson series follows a trajectory centered on place-based learning, inquiry, and taking action: First, students define litter and explore the prevalence and impact of this phenomenon on a local ecosystem of their choosing. Second, students explore what happens to litter when it is properly and improperly disposed of and research how litter impacts the environment. Third, using data and information they gather, students identify a problem in their local context and take action toward a solution.

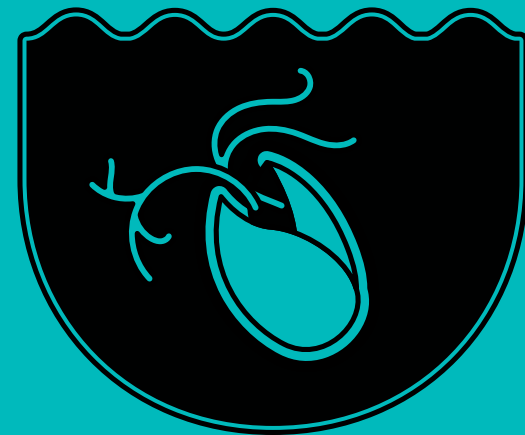
In Lesson 1, students learn what litter is and why it is problematic. In addition, students engage in place-based learning by conducting a FOD Walkdown or MOOP Walk to find and remove litter from a selected area. In Lesson 2, students explore what happens to litter, where it goes, and the impacts it has on different ecosystems. In Lesson 3, students identify a local litter problem and take action to help solve it.

Enduring Understanding(s):

This lesson supports student exploration of two questions: What is litter? Where does it come from? The lesson centers on making observations and collecting data. Students collect and map the location of all litter found in a selected area, such as a playground or park, and explore its characteristics.

Lesson 1 Summary Description:

In this first of three lessons, we start with the complex problem of litter. Students are introduced to fundamentals of environmental stewardship – conservation, ecosystem health, and sustainability – through an examination of the definition and origins of litter. Students identify an area to explore and then locate and remove all of the litter in that area and with help from the teacher, create a litter map.



Background Information for Teachers:

1 ***Ecosystems*** (*Kahn Academy*)

2 ***Litter*** (Wikipedia): definitions, characteristics, prevalence in the environment, sources, effects on the biosphere

3 ***Litter*** (Keep America Beautiful.org)

NGSS Standards: This lesson series is underpinned in general by ESS 3. This overarching standard is expressed differently in different grades. The two most directly applicable phrasings of this standard are housed in Kindergarten and in 5th grade. However, the concepts embedded in these two standards are also articulated in other grades and other Performance Expectations, generally in ESS 3-1 through ESS 3-4.

K-ESS3-1 – Students who demonstrate understanding can use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

DCI: ESS3.A – Human impacts on Earth Systems: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

Crosscutting Concept – Systems in the natural and designed world have parts that work together.

Science and Engineering Practices – Using a model to represent relationships in the natural world.

Observable features of the student performance by the end of the series:

Students can use a model to represent the relationship between the needs of different plants and animals (*including humans*) and the places they live. Specifically, this lesson series supports the following:

3.a.ii. (*Identifying Information*): Students identify evidence to support a claim about per-capita consumption of resources by humans in a given region or ecosystem over a given timespan.

5-ESS3-1 – Students who demonstrate understanding can obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment. (NOTE: This lesson centers on identifying and collecting data that could be used as evidence).

DCI: ESS3.C – Human impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth’s resources and environments.

Crosscutting Concept – A system can be described in terms of its components and their interactions.

Science and Engineering Practices – Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.

Observable features of the student performance by the end of the series: Students Obtain and combine information about ways individual communities use science ideas to protect the Earth’s resources and environment. Specifically, this lesson series supports the following:

2.a.ii. (*Evaluating Information*): Students provide and describe evidence about how individual communities can use scientific ideas and a scientific understanding of interactions between components of environmental systems to protect a natural resource and the environment in which the resource is found.

OBJECTIVES

1

Distinguish between natural and human-made features and objects in a geographical area.

2

Recognize and identify characteristics of litter and identify the characteristics that distinguish it from garbage or trash.

3

Gather data about the types and location of litter in a given geographical area *(e.g. on school grounds or in a local context).*

4

Analyze a collection of litter and litter data to identify patterns *(e.g. litter types, location.)*

MATERIALS

- 1** **Samples of trash – a few pieces per student**
(brought to school by students).
- 2** **Copies of a map of a given area** *(e.g. school grounds)* **that depicts major geographical features, such as buildings, fence lines, trees, etc., as well as the location of any trash and/or recycling receptacles.**
- 3** **Field notebook(s) to note the location and description of each piece of litter students find.**
- 4** **Bags - one per group to hold any litter appropriate for collection by students** *(e.g. pencil stubs, paper, plastic candy wrappers, etc.)*
- 5** **A camera** *(or cameras)* **to take image of litter not appropriate for collection by students** *(e.g. broken glass, anything that might be contaminated by bodily fluids (e.g. cigarette butts, syringes, etc.))*
- 6** **Latex gloves to protect children's hands .**
- 7** *(Optional)* **Magnifying glasses, scales, microscope, etc., to aid in examining individual pieces of litter**

TEACHING PLAN

The suggestions provided in the boxes below follow the **5E lesson format**.

PREPARATION

1. Prior to the lesson, the teacher asks students to sort through a trash receptacle at home and with help from a caregiver, **(1)** make some notes (*or make a few sketches if they are pre-literate*) about the things they find there, and **(2)** select a few pieces of trash to bring to class.

Alternatively, the teacher might help students sort through the trash in classroom and/or school trash cans at the beginning of the lesson (*the Engage phase*).

2. Prior to the lesson, the teacher makes a map of a given area (*e.g. school grounds*) that depicts major geographical features, such as buildings, fence lines, trees, etc., as well as the location of any trash and/or recycling receptacles. This will be used to mark the location of where students find litter during the Explore phase.

ENGAGE

Teacher begins by having students share their descriptions of the pieces of trash they brought (*or gathered from the trash receptacles at school*).

Teacher then poses the following open-ended questions for students to discuss:

- a. *What do all of the items of trash have in common?
How do the items differ?*
- b. *What do you think would happen to the trash if there was no such thing as trash cans*

Teacher then elicits responses from students to create a list of words or phrases that capture their thinking about the trash they brought in (*its characteristics and how litter might be defined*) **and how trash in a trashcan might differ from trash on the ground. The target ideas include:**

- (1) *Trash could be defined as something we no longer want or need that has been discarded.*
- (2) *Litter could be defined as trash (something that we no longer want or need) that has been discarded in an improper way.*

EXPLORE

With teacher guidance, students conduct a FOD walkdown of the selected area. A FOD walkdown is a procedure conducted on airstrips and aboard US Navy vessels with flight decks and hangars to find and remove all foreign object debris from the area to prevent aircraft engine damage. (*More information [here](#)*). In a FOD walkdown, everyone walks slowly shoulder-to-shoulder across an area, searching the ground for any objects or debris that doesn't belong. FOD walkdowns are often conducted in silence, and whenever someone finds a piece of debris, they hold it up in the air and a collector comes and retrieves it.

The same basic practice also has other names. At some music and art festivals, for example, attendees participate in MOOP Walks to clean up festival grounds, walking the grounds in search of matter out of place.

Before beginning the FOD walkdown (*or the MOOP walk*), teacher discusses what should count as a piece of FOD or MOOP, what shouldn't, and why. On the schoolyard, for example, a pebble or a stick would NOT be considered a piece of FOD or MOOP because it is a naturally occurring part of that particular environment and isn't out of place, whereas a discarded plastic straw would be a piece of FOD or MOOP. (*Tip: use examples and counter-examples and involve students in deciding which is which*)

Also, the teacher discusses particular kinds of FOD or MOOP that they should NOT pick up, such as cigarette butts, decaying organic material, sharp glass, etc.

Procedure:

- A** Select several students to fill the role of collector. The number of collectors will depend on the size of the class and the amount of litter the teacher anticipates students will find.
- B** Assemble students on one side of the area, shoulder to shoulder, with instructions to pick up FOD or MOOP only if it is directly in front of them.
- C** Have students begin slowly walking across the area. When a student finds a piece of FOD or MOOP, that student raises their hand. If it is deemed safe to pick up, the student picks it up and gives it to a collector. If it's not safe for students to pick up, the teacher collects it.
- D** For each piece of FOD or MOOP, the teacher notes its type and location on the map.
- E** Once the area is covered, the FOD walkdown or MOOP walk is complete.

The teacher then mediates a discussion about some of the litter students collected (*Tip: choose a commonly occurring type of litter as well as an uncommon piece of litter that suggests a particularly compelling 'origin story.'* This will allow the teacher to shape the discussion to include notions about trends as well as the ultimate source of litter, i.e. the use of discardable items in the first place.)

EXPLAIN

Teacher engages students in a discussion of the FOD/MOOP and its location on the litter map.

Guiding questions to support this discussion include:

- a. What kind of litter is common?*
- b. What kind of litter is uncommon?*
- c. Is the litter evenly distributed or are there any locations on the map where litter seems to be more common?
Can you think of reasons why or why not?*
- d. Where do you think various pieces of litter came from? Why?*

Target explanations (with examples drawn from the Explore phase):

- a. Litter is a waste product that has been discarded in an undesirable way, usually in a public location or a location used for a collective purpose.*
- b. Many things that become litter were made as single-use items.*
- c. Collecting and organizing information into a visual representation, such as a litter map of a given area, can often help scientists notice trends, make connections, suggest hypotheses, and support claims.*

EVALUATE

(including student self-assessment opportunities)

1

Using the class litter map, students - individually, in groups, or as a whole class - describe selected pieces of litter in terms that distinguish them as litter

Students - individually, in groups, or as a whole class - examine the class litter map to discuss the following:

2

- a. *Where various pieces of litter were found*
- b. *Characteristics of particular pieces of litter and what defines it as litter*
- c. *Trends and patterns about litter suggested by the map*

EXTEND / ELABORATE

Extend

1 Teacher provides instructions and support for students, with help from a caregiver, to create a litter map for a different location, such as their neighborhood or a favorite park.

Extend

2

Teacher invites school custodial staff/groundskeepers to class to share their experiences with litter. With teacher assistance and supervision, students engage with custodial staff/groundskeeper to formulate a plan for more extensive long-range data collection about the types and location of litter. For example, students might decide to ask groundskeeping staff to save all litter they pick up for a week, keeping litter found at specific locations (*e.g. the parking lot, the pick-up area, the softball field, the snack area, etc.*) in separate bags/containers. Students could then examine the litter from each area to look for trends.

Extend

3

Teacher and students share their litter map with other classes/schools, comparing and contrasting different maps. Students then articulate claims about litter (*type, origins, locations, etc.*) that might be supported by the map.

Elaborate

4

Teacher poses the following questions and mediates a discussion about them: What do you think happens to litter if it is not picked up and disposed of properly? Alternatively, what do you think might happen to litter if it is picked up and disposed of properly? What do you think might happen if we stopped making so many things that can only be used once?

Observable features of the student performance by the end of the series:

Students Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. Specifically, this lesson series supports the following:

2.a.ii. (Evaluating Information): Students provide and describe evidence about how individual communities can use scientific ideas and a scientific understanding of interactions between components of environmental systems to protect a natural resource and the environment in which the resource is found.



DIFFERENTIATION PLANS

In this space, include notes about how you will differentiate your instruction to meet the needs of any individual students in your class who may need particular adaptations or accommodations

[note: the categories below are offered merely as planning guides; it is acknowledged that the categories are neither complete nor discreet].

Cognitive:

Linguistic:

Behavioral:

Affective:

Other:

LESSON 2

What's the Story with Litter?

(A Lesson Series about Litter)
Grade Band: Elementary School (K-5)



photo by Evan Halleck

SERIES INTRO

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In Lesson 1, students learn what litter is and why it is problematic. In addition, students engage in place-based learning by conducting a FOD Walkdown or MOOP Walk to find and remove litter from a selected area. In Lesson 2, students explore what happens to litter, where it goes, and the impacts it has on different ecosystems. In Lesson 3, students identify a local litter problem and take action to help solve it.

Lesson 2 Enduring Understanding(s):

This lesson supports student exploration of two questions: “What happens to litter when we throw it away? How does litter impact ecosystems? Students examine the litter they collected and/or documented in lesson 1, identifying, to the extent possible, what it is made of and how amenable it is to reuse or recycling, and identify possible pathways it might take in the waste stream.

Lesson 2 Summary Description:

This second of three lessons builds on lesson one in the series. In this lesson, students select a particular component (*or components*) of their litter collection - or litter they want to learn more about (*e.g. fishing line or single-use plastic shopping bags*). Then, with the help of their teacher, students create a narrative storyline from the perspective of the littered object, taking the position of the litter in order to explicate various events and possibilities in the path of the littered object, from point of manufacture to point of improper discard, to eventual degradation, landfill containment, or reprocessing.



Background Information for Teachers:

Writer's Workshop

1 **Ecosystems** (*Kahn Academy*)

2 **Litter** (*Wikipedia*): definitions, characteristics, prevalence in the environment, sources, effects on the biosphere

3 **Litter** (*Keep America Beautiful.org*)

This lesson series is underpinned in general by ESS 3. This overarching standard is expressed differently in different grades. The two most directly applicable phrasings of this standard are housed in Kindergarten and in 5th grade. However, the concepts embedded in these two standards are also articulated in other grades and other Performance Expecations, generally in ESS 3-1 through ESS 3-4.

K-ESS3-1 – Students who demonstrate understanding can use a model to represent the relationship between the needs of different plants and animals (*including humans*) and the places they live.

DCI: ESS3.A – Human impacts on Earth Systems: Living things need water, air, and resources from the land, and they live in places that have the things they need. Humans use natural resources for everything they do.

Crosscutting Concept – Systems in the natural and designed world have parts that work together.

Science and Engineering Practices – Using a model to represent relationships in the natural world.

Observable features of the student performance by the end of the series:

Students can use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. Specifically, this lesson series supports the following:

3.a.ii. (*Connections*): Students can use a model to describe that plants and animals, the places in which they live, and the resources found in those places are each part of a system, and that these parts of systems work together and allow living things to meet their needs.

4.a.i. (*Reasoning and Synthesis*): Students use reasoning to connect the evidence and evaluation to the claim. In their arguments, students describe a chain of reasoning that includes the concept that increases in the size of the human population or in the per-capita consumption of a given population cause increases in the consumption of natural resources.

5-ESS3-1 – Students who demonstrate understanding can obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. (*NOTE: This lesson centers on identifying and collecting data that could be used as evidence*).

DCI: ESS3.C – Human impacts on Earth Systems: Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

Crosscutting Concept – A system can be described in terms of its components and their interactions.

Science and Engineering Practices – Obtaining, evaluating, and communicating information in 3–5 builds on K–2 experiences and progresses to evaluating the merit and accuracy of ideas and methods.

Observable features of the student performance by the end of the series:

Students Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment. Specifically, this lesson series supports the following:

2.a.ii. (Evaluating Information): Students provide and describe evidence about how individual communities can use scientific ideas and a scientific understanding of interactions between components of environmental systems to protect a natural resource and the environment in which the resource is found.



OBJECTIVES

- 1** Recognize where litter comes from (what it is made of) and what happens when properly and improperly disposed of.
- 2** Demonstrate an understanding of the “cradle-to-grave” pathway of litter through the medium of story or narrative.
- 3** Connect the problem of litter to the consumption of single-use or disposable items.

MATERIALS



A collection of litter (from Lesson 1 in the series)

TEACHING PLAN

The suggestions provided in the boxes below follow the 5E lesson format.

2.a.ii. (*Evaluating Information*): Students provide and describe evidence about how individual communities can use scientific ideas and a scientific understanding of interactions between components of environmental systems to protect a natural resource and the environment in which the resource is found.

ENGAGE

Teacher begins by posing open-ended questions for students to discuss:

- a. *What do you think happens to litter if no one picks it up?*
- b. *What do you think happens to litter if it's picked up and put in a trash can or recycling bin?*
- c. *How do you think litter might affect living things?*
- d. *What could we do to reduce litter?*

Teacher then helps students create a number of possible responses to those two questions that capture their thinking about trash and litter.

EXPLORE

Teacher introduces the lesson's major task: create a group Imagination Story from the perspective of a piece of litter, in which the piece of litter is the main protagonist, that describes the path of a piece of litter from cradle to grave (*i.e. from manufacture to decomposition*). The story should contain or address a number of specific areas, listed below.

An Imagination Story is a story collectively written by the whole class, with the teacher acting as mediator and guide who draws out comments and ideas from the students and then, with input from the students, synthesizes them into a coherent story. This process begins with the class selecting a particular piece of litter to write about. When the litter protagonist has been chosen, the teacher elicits a collection of student responses to the following prompts:

A

What is the piece of litter's backstory? (*i.e. Why was this thing that became litter made in the first place?*)

B

What caused the person to discard it improperly?

C

What might have happened to it if the students hadn't picked it up off the ground?

D

What might happen to it if the students dispose of it properly?

E

What could have prevented the litter in the first place?

Starting with responses to these prompts, and with input from the students, the teacher shapes their responses into a narrative.

(Tip: To help ensure a range of voices are included, collect lots of input and write several sentences for each prompt.)

For example, an Imagination Story, based on comments from students and integrated and synthesized by the teacher might go something like this:

Prompt (a): My name is Reed and I begin my life as a little plastic straw. Someone made me so that I could help them get all the apple juice out of the very bottom of a cardboard juice box. They covered me with a plastic wrapper so I wouldn't get dirty. They taped me to the box of juice so I wouldn't get lost. I was happy being a straw on the box because I really like apple juice, and I like to help people.

Prompt (b): One day, it was hot and I was in a lunch box. When it was lunchtime, a kid picked up the juice box and peeled me off the side. Then they took off my little plastic wrapper and stabbed me into the top of the box, through a tiny little hole. The apple juice tasted great, and I helped that kid get every last drop of juice out of the box. But after the juice was all gone, I didn't have anything else to do. I felt worthless. Right after I helped the kid get the juice out of the box, the bell rang and the kid got in a rush to go line up. He must not have noticed when I fell out of the box and onto the ground. Maybe he was in too big of a hurry to notice that there was a trash can nearby.

Prompt (c): I lay there on the ground by the swing set for a long time, even overnight. Maybe I was there a week or a month, or a year. I was worried that I might be there forever. I started to get old and cracked. I wondered if I would just crumble and blow away. Or maybe a bird would find me and use me to make a nest! Or maybe I would get eaten by a turtle or a raccoon and make them sick. I didn't know what might happen. But whatever happened, I thought it wouldn't be good.

Prompt (d): Then one day, I saw 24 kids all lined up, and they started walking across the playground. They kept shouting MOOP! MOOP! I didn't know what

they were doing. I didn't know what MOOP was. They got closer and closer. All of a sudden, one kid pointed right at me and yelled MOOP! I was MOOP! Matter Out Of Place! So one kid reached down and picked me up! It was the same kid who dropped me! Then I got put in a plastic bag with a lot of other litter, like paper and some candy wrappers. Then the kids took me into the classroom and talked all about how I got left behind on the playground that day. After that, they decided to put me in a recycling bin. I made lots of new friends there. I found out from my new friends that I was going to get recycled, which means I will go back to a factory and get made into something else, maybe even a brand new juice box straw!

Prompt (e): I thought recycling sounded good. But then I thought maybe the same thing would happen again and again. Would I be on a juice box and then get thrown away again? What I really wanted was to get made into something that wouldn't get thrown away at all. I decided I wanted to be made into a pair of glasses instead, or maybe a notebook cover because that way I would get used over and over again.

EXPLAIN

As the teacher engages students in creating the class Imagination Story, students watch short videos that address various aspects of each of the prompts. *(TBD: a collection of suitable online resources already in existence, such as [this](#), and [this](#), which are offered here merely as examples).*

Target explanations *(in the context of the Imagination Story produced in the Explore phase):*

- a. Students express plausible ideas for each of the parameters in the list.
- b. Students recognize that creating litter can be avoided by discarding unwanted items in appropriate ways.
- c. Students recognize that the best solution to the problem of litter is often not using single-use or disposable items in the first place.

EVALUATE

(including student self-assessment opportunities)

The evaluation of mastery of objectives takes place in the context of discussions during collaborative writing as well as illustration of the Imagination Story *(see Elaborate, below).*

EXTEND / ELABORATE

Elaborate

1 Teacher arranges the class story into a series of captioned panels with space for student illustrations. Students then illustrate each of the panels to produce illustrated versions of the story.

Elaborate

2 Students present their illustrated story books to other classes or to their school big buddies (*Often, younger elementary students are paired with “big buddies” from older grades to support cross-grade projects and interactions*).

DIFFERENTIATION PLANS

In this space, include notes about how you will differentiate your instruction to meet the needs of any individual students in your class who may need particular adaptations or accommodations

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Cognitive:

Linguistic:

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Affective:

Other:

LESSON 3

Time to Take Action

(A Lesson Series about Litter)
Grade Band: Elementary school (K-5)



photo by Evan Halleck

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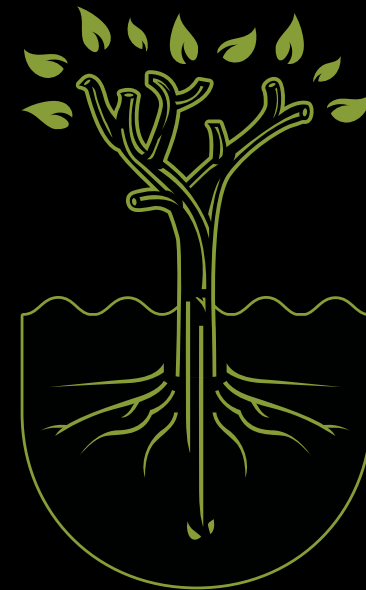
In Lesson 1, students learn what litter is and why it is problematic. In addition, students engage in place-based learning by conducting a FOD Walkdown or MOOP Walk to find and remove litter from a selected area. In Lesson 2, students explore what happens to litter, where it goes, and the impacts it has on different ecosystems. In Lesson 3, students identify a local litter problem and take action to help solve it.

Lesson 3 Enduring Understanding(s):

This lesson supports student exploration of the essential question: “What can individuals do to combat the problems associated with litter?” Based on information they collected in lesson 1 and the facts about litter and its impacts they learned about in lesson 2, students plan and carry out an action project aimed at reducing litter at their school site.

Lesson 3 Summary Description:

This third in the series of three lessons engages students in experiential place-based learning. Using their knowledge of litter and the information they collected about its prevalence at their schools, students identify a specific litter problem. Students then plan and execute an action project aimed at helping others reduce litter.



Background Information for Teachers:

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2 **Litter** (*Wikipedia*): definitions, characteristics, prevalence in the environment, sources, effects on the biosphere

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Crosscutting Concept – Systems in the natural and designed world have parts that work together.

Science and Engineering Practices – Using a model to represent relationships in the natural world.

Observable features of the student performance by the end of the series: Students can use a model to represent the relationship between the needs of different plants and animals (*including humans*) and the places they live.

Specifically, this lesson series supports the following:

3.a.ii. (*Connections*): Students can use a model to describe that plants and animals, the places in which they live, and the resources found in those places are each part of a system, and that these parts of systems work together and allow living things to meet their needs.

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2.a.ii. (*Evaluating Information*): Students provide and describe evidence about how individual communities can use scientific ideas and a scientific understanding of interactions between components of environmental systems to protect a natural resource and the environment in which the resource is found.

OBJECTIVES

Leverage knowledge about the problems of litter to contribute to a solution.

MATERIALS

Materials TBD by the action project the students identify (*see below*)

TEACHING PLAN

The suggestions provided in the boxes below follow the 5E lesson format.

ENGAGE

Teacher begins by asking students to review what they have learned from lessons 1 and 2. The teacher then mediates a discussion about some of the core ideas of the lesson series: litter is trash that's been improperly disposed of, litter can damage living things, most litter starts off as single use items.

After the review, the teacher introduces the lesson's major task: to use what they have learned about the problem of litter to help others address litter problems at school through an action project. Open-ended questions that anchor this introduction include:

- a. *What do you think are the biggest litter problems we face here at school?*
- b. *How does our litter map support your idea(s)?*
- c. *What do you wish other people knew about the problem of litter?*
- d. *What do you wish other people would do to prevent litter?*

EXPLORE

The teacher structures the explore phase using the following four steps:

Step 1: Identify Problem and/or Need

In step 1, the teacher helps students identify a problem or need they want to address. The driving question directing this part of the exploration includes:

- a. *Based on what we learned on the FOD walkdown/MOOP walk, what do you think are the biggest litter problems we face here at school?*

Step 2: Identify a message that addresses the identified problem

In step 2, students work to articulate a message – or several messages – they want to communicate to others. The driving questions directing this part of the exploration include:

- a. *What do you wish other people knew about litter?*
- b. *What do you wish other people would do to prevent litter?*

Step 3: Brainstorm ways to communicate the message(s)

In step 3, the teacher helps students brainstorm ways to convey their thoughts to others. Possibilities might include making a large banner about litter on butcher paper to hang in the lunchroom or school entrance, making a series of signs to post in places where they found litter, decorating the school trash cans with informational posterboards, and the like. The driving question directing this part of the exploration is: What should our banners, posters, signs, etc., look like to lead other people to action?

Step 4: Implement their action project

In step 4, the teacher helps students implement their project. Driving questions directing this part of the exploration include:

- a. *What seems to be working well? How do we know?*
- b. *What seems to need improving? How do we know?*
- c. *What ideas do we have for improvement?*

EXPLAIN

The teacher helps mediate discussion toward target explanations implied by each of the four steps. Because of the stepwise nature, the teacher should not proceed from one step to the next until students have internalized the reasoning behind each of the steps. Specifically:

Step 1

Students make connections between their previous learning and local litter problems.

Step 2

Students make connections between the problem they identify and the message they want to communicate.

Step 3

Students develop viable plans of action appropriate in scope and scale.

Step 4

Students execute their action projects and consider the resulting impact.

EVALUATE

(including student self-assessment opportunities)

Evaluation centers on the NGSS Engineering Design Process: problem identification and characterization followed by solution development, implementation, and improvement.

EXTEND / ELABORATE



Students expand their action projects to other locations at school.

DIFFERENTIATION PLANS

In this space, include notes about how you will differentiate your instruction to meet the needs of any individual students in your class who may need particular adaptations or accommodations

[note: the categories below are offered merely as planning guides; it is acknowledged that the categories are neither complete nor discreet].

Cognitive:

Linguistic:

Behavioral:

Affective:

Other: