APPENDIX D-1

LESSON PLAN FORM

Intern: \_\_\_Jocelyn Miller\_\_\_\_\_\_\_\_ Date: \_\_\_10/31/14\_\_\_\_\_ Group Size: \_\_24\_\_\_\_

Estimated time for Lesson: \_\_\_55 min\_\_\_\_ Mentor teacher approval: \_\_\_\_\_\_\_\_\_\_\_\_

Content Area: \_\_\_\_\_7th Life Science\_\_\_\_\_\_\_

Topic: \_\_Ecological Succession Lab\_\_\_\_\_\_\_\_

**L.A. Content Standard & Benchmark:**

[CCSS.ELA-LITERACY.RST.6-8.3](http://www.corestandards.org/ELA-Literacy/RST/6-8/3/)
Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

[CCSS.ELA-LITERACY.RST.6-8.7](http://www.corestandards.org/ELA-Literacy/RST/6-8/7/)
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

[CCSS.ELA-LITERACY.RST.6-8.8](http://www.corestandards.org/ELA-Literacy/RST/6-8/8/)
Distinguish among facts, reasoned judgment based on research findings, and speculation in a text.

[CCSS.ELA-LITERACY.RST.6-8.9](http://www.corestandards.org/ELA-Literacy/RST/6-8/9/)
Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic.

1. Generate testable questions about objects, organisms, and events that can be answered through scientific investigation (SI-M-A1)

12. Use data and information gathered to develop an explanation of experimental results (SI-M-A4)

13. Identify patterns in data to explain natural events (SI-M-A4)

14. Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5)

15. Identify and explain the limitations of models used to represent the natural world (SIM-A5)

32. Describe changes that can occur in various ecosystems and relate the changes to the ability of an organism to survive (LS-M-D2)

* Explain the processes of primary and secondary succession
* Demonstrate the impact of human activity and natural events on the stability of the environment

**Objective(s):**

* Students will create a model of the processes of primary and secondary succession based on their experience in the lab exercise
* Students will predict which stage of succession takes the most time
* Students will use their data to create an example of succession taking place
* Students will be able to provide examples of primary and secondary succession taking place within the past 10 years
* Students will be able to identify gaps in their models
* Students will relate the events of secondary succession to the stability of ecosystems

**Methods of Assessing Learning:**

* Students will complete a chart to record their path through the phases of succession
* Students will answer questions about the activity
* Students will draw a diagram or write a paragraph explaining the stages of primary and secondary succession
* Students will complete a short current events homework assignment

**Background Information** 🡨 History of Ecology integration

Frederic Clements authored the first popular ecology textbook in 1905. Later, he published his “climax theory” of vegetation succession (1916) which now forms the basis for modern theories of ecological succession. He observed that vegetation cover is not permanent, rather it changes over time. Vegetation develops in a sequence of stages, culminating in a final “climax” state that is best suited for that environment. The progression through the stages can be seen as either building up to that ideal state or deviations from the ideal state due to unfavorable conditions.

**Materials:**

Station Label sheets (1 of each, 24 total)

Wooden blocks or paper cubes, labeled (1 for each station, 24 total)

Succession Activity Worksheet (1 per student)

Lab notebooks (1 per student, if available)

**Management Considerations:**

This lab is designed to have every student up and moving around the room for up to 30 minutes. If the classroom is too small for everyone to be up at once, the activity may take place outdoors to avoid overcrowding and injuries.

**Accommodations for different ability levels and learning styles:**

Homework assignment can be adjusted for different grade levels or turned into a group project.

**Justification:**

* This lab works well with my research as it can be an indoor or an outdoor lab, depending on which one I need at the time.
* This lab also ties together our section on ecosystems and gives the students the opportunity to move through an accelerated version of succession as a member of an imaginary ecosystem.

**Procedures/Activities:**

**Engage**

1. Outdoor location: As students come in, have them retrieve their lab notebooks and copy the title and date for today’s lab. Tell the students that we will be doing an outdoor activity today
2. Pass out Succession Activity Worksheets, but do not tape them into notebooks until end of lab
3. Remind the students that on (Monday) we started learning about ecological succession. Give them a brief (< 5 min) history of how the theory of succession was formed (See Background Information)
4. Read the instructions with the students; assure them that the activity will make more sense once they get started
5. Lead the class outside and allow them to choose a starting station. Remind them to record the station name and make their predictions
6. Allow the students to begin once everyone has found a station and completed their prediction
7. Indoor location: Same, except give students a minute to familiarize themselves with the layout of the stations. Teacher may want to provide a map (on the board) identifying the locations of each station to minimize the number of students running into each other or wasting time looking for their next station
8. Do not arrange stations in any order!

**Explore**

1. Students conduct the lab on their own
2. Remain visible and available to help students locate the next station, but do not answer questions about the activity

**Explain**

1. When every student has completed the chart by rolling 36 times, bring everyone back inside to complete their questions
2. Give the students no more than 5 minutes to answer the questions individually
3. Students should complete their models on a separate sheet of paper; can be homework if not finished in class
4. If time allows, tell students to get with a partner and compare their results. Did you create similar models? Why or why not? Did you visit the same stations or get stuck at the same spot? Have the students create a new model that incorporates their partner’s results, and then compare that model with another pair’s model.
5. In a future class, groups can report their complete models on the board (or draw using the MobiView tablet). The entire class can then combine the 5-6 models to create an all-encompassing process of succession.

**Elaborate**

1. Read the directions for the homework assignment with the class
2. Explain that the events they experienced in the activity represent real ecosystem disturbances and that we have experienced several of these in the past 15 years. They should find an article about one of these succession events occurring, and write a one paragraph summary of the article, relating it to the activity.

**Evaluate**

1. Activity Worksheets can be graded as homework or as part of lab notebook grade
2. Current event homework can be graded for accuracy or completion – as long as the student relates their article to their lab

APPENDIX D-2

Lesson Plan Format

\_\_\_\_\_\_\_Jocelyn Miller­­­ \_\_\_\_\_\_\_\_\_ \_\_\_\_10/31/14\_\_\_\_\_ \_\_\_\_7\_\_\_\_\_

Student Teacher Date Grade Level

\_\_\_24\_\_\_\_ \_\_\_\_\_\_\_\_55 min\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Group Size Estimated Time for Lesson Mentor Teacher’s Signature

Lesson Title: \_\_\_\_\_Ecological Succession Lab\_\_\_\_\_\_\_

**GLE’s/Benchmarks:**

1. Generate testable questions about objects, organisms, and events that can be answered through scientific investigation (SI-M-A1)

12. Use data and information gathered to develop an explanation of experimental results (SI-M-A4)

13. Identify patterns in data to explain natural events (SI-M-A4)

14. Develop models to illustrate or explain conclusions reached through investigation (SI-M-A5)

15. Identify and explain the limitations of models used to represent the natural world (SIM-A5)

32. Describe changes that can occur in various ecosystems and relate the changes to the ability of an organism to survive (LS-M-D2)

* Explain the processes of primary and secondary succession
* Demonstrate the impact of human activity and natural events on the stability of the environment

**Objectives: (TLW:)**

* Students will create a model of the processes of primary and secondary succession based on their experience in the lab exercise
* Students will predict which stage of succession takes the most time
* Students will use their data to create an example of succession taking place
* Students will be able to provide examples of primary and secondary succession taking place within the past 10 years
* Students will be able to identify gaps in their models
* Students will relate the events of secondary succession to the stability of ecosystems

**Background Information**

Frederic Clements authored the first popular ecology textbook in 1905. Later, he published his “climax theory” of vegetation succession (1916) which now forms the basis for modern theories of ecological succession. He observed that vegetation cover is not permanent, rather it changes over time. Vegetation develops in a sequence of stages, culminating in a final “climax” state that is best suited for that environment. The progression through the stages can be seen as either building up to that ideal state or deviations from the ideal state due to unfavorable conditions.

**Teacher Materials/Resources:**

Station Label sheets (1 of each, 24 total)

Wooden blocks or paper cubes, labeled (1 for each station, 24 total)

Succession Activity Worksheet (1 per student)

**Student Materials/Resources:**

Lab notebooks (if available)

**Lesson Procedure and Activities:**

1. **Introduction:**
	1. Outdoor location: As students come in, have them retrieve their lab notebooks and copy the title and date for today’s lab. Tell the students that we will be doing an outdoor activity today
	2. Pass out Succession Activity Worksheets, but do not tape them into notebooks until end of lab
	3. Read the instructions with the students; assure them that the activity will make more sense once they get started
	4. Lead the class outside and allow them to choose a starting station. Remind them to record the station name and make their predictions
	5. Allow the students to begin once everyone has found a station and completed their prediction
	6. Indoor location: Same, except give students a minute to familiarize themselves with the layout of the stations. Teacher may want to provide a map (on the board) identifying the locations of each station to minimize the number of students running into each other or wasting time looking for their next station
	7. Do not arrange stations in any order!
2. **Activities:**

**Explore**

* 1. Students conduct the lab on their own
	2. Remain visible and available to help students locate the next station, but do not answer questions about the activity

**Explain**

* 1. When every student has completed the chart by rolling 36 times, bring everyone back inside to complete their questions
	2. Give the students no more than 5 minutes to answer the questions individually
	3. Students should complete their models on a separate sheet of paper; can be homework if not finished in class
	4. If time allows, tell students to get with a partner and compare their results. Did you create similar models? Why or why not? Did you visit the same stations or get stuck at the same spot? Have the students create a new model that incorporates their partner’s results, and then compare that model with another pair’s model.
	5. In a future class, groups can report their complete models on the board (or draw using the MobiView tablet). The entire class can then combine the 5-6 models to create an all-encompassing process of succession.
1. **Closure:**

**Elaborate**

* 1. Read the directions for the homework assignment with the class
	2. Explain that the events they experienced in the activity represent real ecosystem disturbances and that we have experienced several of these in the past 15 years. They should find an article about one of these succession events occurring, and write a one paragraph summary of the article, relating it to the activity.

**Accommodations/Modifications:**

Homework assignment can be adjusted for different grade levels or turned into a group project.

This lab is designed to have every student up and moving around the room for up to 30 minutes. If the classroom is too small for everyone to be up at once, the activity may take place outdoors to avoid overcrowding and injuries.

**Assessment/Evaluation:**

1. Activity Worksheets can be graded as homework or as part of lab notebook grade
2. Current event homework can be graded for accuracy or completion – as long as the student relates their article to their lab

Volcano

Erupts

Lava

Cools

New Rock

Forms

Lichens &

Moss Arrive

New Soil

Forms

Grasses

Arrive

Plants

Decay

Soil becomes

Fertile

Small Shrubs

& Trees Arrive

Wildfire

Flood

Animals

Arrive

Bare Soil

Exposed

Bare Rock

Exposed

Agriculture

Ecosystem

Stabilizes

Hurricane

Climax

Community

Logging

Grasses &

Herbaceous Plants

Fast-growing Evergreen Trees Arrive

Shade-tolerant

Trees Arrive

Lichens Start

to Decay

A Glacier

Melts

|  |  |  |
| --- | --- | --- |
| **Name of Station** | **# of Sides** | **Go to:** |
| 1. Volcano Erupts
 | 2 | Volcano Erupts (stay) |
| 4 | Lava Cools |
| 1. Lava Cools
 | 1 | Volcano Erupts |
| 1 | Lava Cools (stay) |
| 4 | New Rock Forms |
| 1. New Rock Forms
 | 1 | Volcano Erupts |
| 1 | New Rock Forms (stay) |
| 4 | Lichens & Moss Arrive |
| 1. Lichens & Moss Arrive
 | 1 | Volcano Erupts |
| 2 | Lichens & Moss Arrive (stay) |
| 1 | New Soil Forms |
| 2 | Lichens Start to Decay |
| 1. New Soil Forms
 | 1 | Volcano Erupts |
| 2 | New Soil Forms (stay) |
| 3 | Grasses Arrive |
| 1. Grasses Arrive
 | 2 | Grasses Arrive (stay) |
| 4 | Plants Decay |
| 1. Plants Decay
 | 2 | Plants Decay (stay) |
| 4 | Soil becomes Fertile |
| 1. Soil becomes Fertile
 | 2 | Soil becomes Fertile (stay) |
| 4 | Small Shrubs & Tree Arrive |
| 1. Small Shrubs & Trees Arrive
 | 1 | Wildfire |
| 1 | Flood |
| 2 | Animals Arrive |
| 2 | Fast-Growing Evergreen Trees Arrive |
| 1. Wildfire
 | 2 | Wildfire (stay) |
| 4 | Bare Soil Exposed |
| 1. Flood
 | 1 | Flood (stay) |
| 2 | Bare Rock Exposed |
| 3 | Bare Soil Exposed |
| 1. Animals Arrive
 | 1 | Animals Arrive (stay) |
| 1 | Wildfire |
| 1 | Flood |
| 1 | Agriculture |
| 2 | Ecosystem Stabilizes |
| 1. Bare Soil Exposed
 | 1 | Bare Soil Exposed (stay) |
| 1 | Flood |
| 2 | Grasses Arrive |
| 2 | Small Shrubs & Trees Arrive |
| 1. Bare Rock Exposed
 | 2 | Bare Rock Exposed (stay) |
| 4 | Lichens & Moss Arrive |
| 1. Agriculture
 | 1 | Grasses & Herbaceous Plants |
| 2 | Agriculture (stay) |
| 2 | Bare Soil Exposed |
| 1 | Hurricane |
| 1. Ecosystem Stabilizes
 | 3 | Climax Community |
| 2 | Logging |
| 1 | Agriculture |
| 1. Hurricane
 | 3 | Bare Soil Exposed |
| 2 | Flood |
| 1 | Hurricane (stay) |
| 1. Climax Community
 | 1 | Climax Community (stay) |
| 1 | Wildfire |
| 1 | Flood |
| 1 | Hurricane |
| 1 | Logging |
| 1 | Agriculture |
| 1. Logging
 | 2 | Bare Soil Exposed |
| 3 | Grasses & Herbaceous Plants |
| 1 | Small Shrubs & Trees Arrive |
| 1. Grasses & Herbaceous Plants
 | 2 | Small Shrubs & Trees Arrive |
| 2 | Fast-growing Evergreen Trees Arrive |
| 2 | Wildfire |
| 1. Fast-growing Evergreen Trees Arrive
 | 1 | Fast-growing Evergreen Trees (stay) |
| 1 | Wildfire |
| 1 | Logging |
| 3 | Shade-tolerant Trees Arrive |
| 1. Shade-tolerant Trees Arrive
 | 3 | Animals Arrive |
| 2 | Shade-tolerant Trees Arrive (stay) |
| 1 | Logging |
| 1. Lichens Start to Decay
 | 2 | Lichens Decay (stay) |
| 1 | Volcano Erupts |
| 3 | New Soil Forms |
| 1. A Glacier Melts
 | 2 | Glacier Melting (stay) |
| 4 | Bare Rock Exposed |

**Directions:** The purpose of this activity is to show you some of the changes that occur in an ecosystem. Pick one of the 24 stations to start at, and record the station name next to the Start position in your data table. Before you begin, answer the **Thinking Ahead** question and make your prediction. When the teacher gives you the signal to start, roll the provided wooden block and go to the station that it lands on. If you roll the same station, stay put and continue rolling until it allows you to move on to the next station. If multiple people are sent to the same station, you must wait for the student in front of you to finish rolling. You will roll 36 times, filling in your data table with the names of every station that you visit. When you have collected all of your data, please step away to give your peers room to complete the activity.

**Thinking Ahead and Making a Prediction.** Do you think that the process of ecological succession is linear or cyclic? (Circle one) Which stage of succession do you predict will take the longest: primary succession, disturbance, or secondary succession? Why? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Data.** Record each station that you visit during your journey through the processes of succession.

|  |  |
| --- | --- |
| **Roll #** | **Station Name** |
| Start |  |
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |
| 5 |  |
| 6 |  |
| 7 |  |
| 8 |  |
| 9 |  |
| 10 |  |
| 11 |  |
| 12 |  |
| 13 |  |
| 14 |  |
| 15 |  |
| 16 |  |
| 17 |  |
| 18 |  |
| 19 |  |
| 20 |  |
| 21 |  |
| 22 |  |
| 23 |  |
| 24 |  |
| 25 |  |
| 26 |  |
| 27 |  |
| 28 |  |
| 29 |  |
| 30 |  |
| 31 |  |
| 32 |  |
| 33 |  |
| 34 |  |
| 35 |  |
| 36 |  |

**Continue on next page.**

**Data Analysis.** Tally how many times you ended up at each station.

|  |  |
| --- | --- |
| **Station Name** | **Number of Times Visited** |
| Volcano Erupts |  |
| Hurricane |  |
| Logging |  |
| Lichens & Moss Arrive |  |
| Bare Soil Exposed |  |
| Grasses Arrive |  |
| Shade-tolerant Trees Arrive |  |
| Soil becomes Fertile |  |
| Small Shrubs & Trees Arrive |  |
| Wildfire |  |
| Ecosystem Stabilizes |  |
| Animals Arrive |  |
| **Station Name** | **Number of Times Visited** |
| Bare Rock Exposed |  |
| New Soil Forms |  |
| Agriculture |  |
| Flood |  |
| Lava Cools |  |
| Climax Community |  |
| New Rock Forms |  |
| Grasses & Herbaceous Plants |  |
| Fast-growing Evergreen Trees |  |
| Plants Decay |  |
| Lichens Start to Decay |  |
| A Glacier Melts |  |

**Thinking about your data.**

1. Summarize your journey through the stations, noting where you spent the most time and where you did not go.
2. Was the prediction you made at the start of the activity correct?
3. What is the scientific term for organisms such as lichens and moss that are the first species to colonize new land?
4. Which type of ecological succession is represented by your data, primary or secondary? Based on your data, is ecological succession linear or cyclic?
5. Using your data, create a graphic organizer that models the process of ecological succession that you followed. You may use the back of this sheet or your own paper. Complete your graphic organizer for homework if you do not finish in class.

**Research assignment. 10 points**

Find a news article published after you were born that describes an event that could have led to ecological succession. **Hint**: Ecological succession usually takes place after a major disturbance, such as hurricanes, floods, earthquakes, and fires. Write or type a one-paragraph summary of the article, describing what happened and how it relates to this activity. Print and staple your article to the front of your summary.

**Due in class on Tuesday, Nov. 4**

**Research assignment. 10 points**

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