# Place-Based Education Unit Planning Sheet

**Teacher:** Chris  
**Grade:** 7/8  
**Grading Period:** Fall 2017  
*(Red highlighted text indicates formative assessment opportunities)*

<table>
<thead>
<tr>
<th>Title and Description</th>
<th>Planning Section</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Theme/Title:</strong></td>
<td>Animal and Environment Interdependence: Ecosystem survey</td>
</tr>
<tr>
<td><strong>Overall description of project and reason for it.</strong></td>
<td>Student perform an ecosystem survey of a local wildlife refuge before a major change is implemented to the ecosystem. The reservoir in the ecosystem will change from 30 acres to 10 acres effectively becoming ⅓ the size. <a href="#">See the letter from Portland Parks and Recreation to understand more about the situation</a>. This will happen as a result of replacing a smaller culvert with a much larger one. The local Audubon society voiced concerns on the impact on waterfowl. The intention of the change is to increase biodiversity of the refuge by increasing the size of a culvert that connects this ecosystem to the larger river ecosystem it was separated from 50 years prior by a railway. This culvert is large enough for salmon to stop off for reading on their annual run, deer and larger mammals to swim through etc. This project has been 10 years in the making. The data generated by the first student group will provide a based line of where the ecosystem is at before the project. A later student group will come back and look at where the ecosystem is at after the change.</td>
</tr>
</tbody>
</table>
| **History of changes to this area:** | - Used by First Peoples the area to grow crops (very fertile)  
- Railroad installed: Cuts the ecosystem off from the large river ecosystem  
- Used as a landfill  
- Invasive species overtook the area  
- Covered over and converted to wildlife refuge: Restoration work began |
<p>| <strong>Final Product</strong> | is a presentation displaying the data and findings where the students draw hypotheses about the impacts of the change. |</p>
<table>
<thead>
<tr>
<th>Essential Questions:</th>
<th>Essential/Driving Question</th>
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<tbody>
<tr>
<td>What are the big questions that will guide learning in this project?</td>
<td><strong>Is this culvert project a good idea?</strong></td>
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</tbody>
</table>

**Guiding Questions**
- What is ecology?
- What is an ecosystem?
- How do we identify different species in an ecosystem?
- What are the needs of different species in an ecosystem?
- What are their relationships between different species in a specific ecosystem?
- What is interdependence? How are different elements of an ecosystem interdependent?
- What is biodiversity?

How do scientists construct an argument supported by empirical evidence?
- Is any change justified at Oaks Bottom?
- What is our criteria for good?
- Good for who and for how long?
- Who/What are the impacts of the culvert change?
- How can we ensure that we are causing more and better wins than losses with our plans/actions?
- How do we convince others that our idea is the best idea?

**CONTENT**
- **What is ecology?**
  - Definition of Ecology
  - Biotic and Abiotic factors
- **How do scientists ask and answer questions?**
  - Scientific inquiry:
  - Reasoned arguments
  - Hypothesis
  - Evidence generating questions
  - Questions that generate better questions
  - Evidence
  - Substantiation

**SKILLS:**
- **Observe** the world around them.
- **Draw** inferences about the reasoning behind the actions they are observing
- **Predict** possible consequences of actions

(Field work)
- **Observe** the natural world around them.
- **Ask and address** questions brought up by the observations.
- **Compare and Contrast** the locations of different living organism.
- **Draw** inferences about why things are growing where and how they are growing.
- **Predict** possible consequences of actions.
<table>
<thead>
<tr>
<th>Questions</th>
<th>Answers</th>
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</table>
| **How do we identify different species?** | - Using resources **identify** plants and animals in the ecosystem  
- **Construct** scientific drawings as accurate representations of the parts of an ecosystem  
- *(Draw)* inferences about why things are growing where and how they are growing. |
| **What is an ecosystem?** | - **Identify** the abiotic and biotic factors of the ecosystem  
- **Identify** appropriate trophic levels for different organisms within the ecosystem  
- **Construct** a web diagram explaining interactions between parts of the ecosystem  
- **Explore** different definitions, characteristics, and boundaries of what an ecosystem is. |
| **What are the relationships between different species in a specific ecosystem?** | - **Discuss** the effects of resource availability on organisms and populations of organisms in an ecosystem.  
- **Explain** different approaches to obtaining necessary resources  
- **Describe** the patterns of interactions between living organisms and their environment. *(MS-LS2-2)*  
- **Construct** an explanation that predicts interactions among organisms we are studying within this ecosystem |
| **What are the needs of different species?** | - **Explain** the interactions between biotic and abiotic factors  
- **Analyze** how different species use, cooperate, and compete for the resources available *(MS-LS2-1)* |
| Grow | Explain and predict the impact of an event on the ecosystem (phylo card extension) |
| Reproduce | Demonstrate an understanding of how one event can influence another. |
| Resources: Food, Water, Shelter | |
| Creates competition and cooperation for resources | |
| Small changes in one part of a system can have large impacts on other parts of the system | |
| Leverage point for changes | |

| What is interdependence? How are different elements of an ecosystem interdependent? | Construct an explanation that predicts impacts of changes among organisms we are studying within this ecosystem (MS-LS2-2) |
| | Diagram different organisms interaction in an ecosystem |
| | Analyze possible impacts of the loss (or change in quantity) of one species in an ecosystem (MS-LS2-5) |
| Stability and Change | Reasonably predict intended consequences and reasonably predict and prepare for unintended consequences (EFS-C31 [Cloud Institute]) |
| Small changes in one part of a system might cause large changes in another part. (MS-LS2-5) | |

| What is biodiversity? | Hypothesize the importance of biodiversity in living systems |
| | Examine impacts of different paces and types of change within an ecosystem |
| | Define biodiversity |
| | Explore the role that people are playing in affecting changes in biodiversity. |
| | Present claims and findings that constructs an argument for protecting and enhancing biodiversity (Include changes to physical or biological components of an ecosystem affect populations.) (MS-LS2-4) |
| Transfer to Human Social Diversity | Possible Transfer: importance of biodiversity to the importance of all kinds of social diversity to life, resilience and creativity |
| -Socially diverse groups (that is, those with a diversity of race, ethnicity, gender and sexual orientation) are more innovative than homogeneous groups. | |
| -Different backgrounds bring new information. | |
| -Diversity of expertise confers benefits | |
| -Sustaining diversity is important for increasing a complex system’s capacity | |

- Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems.
- The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health. (MS-LS2-5)
- Diversity makes complex life possible and assures resilience in living systems. (EFS-EU 6 [Cloud Institute])
- Difference between keystone species and others
- Life Organizes towards life

- Socially diverse groups (that is, those with a diversity of race, ethnicity, gender and sexual orientation) are more innovative than homogeneous groups.
- Different backgrounds bring new information.
- Diversity of expertise confers benefits
- Sustaining diversity is important for increasing a complex system’s capacity
to cope with change, reduces sensitivity to losses of specific elements and enhances human well-being (adapted from Norberg, Cumming, Ostrom, 2008).

<table>
<thead>
<tr>
<th><strong>Is this culvert project a good idea?</strong></th>
<th><strong>Is any change justified at Oaks Bottom? Who/What are the impacts of the culvert change?</strong></th>
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</table>
| ❑ Is any change justified at Oaks Bottom? Who/What are the impacts of the culvert change? | ❑ Examine the history of the site  
❑ Analyze impacts of previous changes  
❑ Read the proposal and possible counterarguments (if available)  
❑ Cite specific textual evidence to analyze possible impacts of the proposed change to the ecosystem |
| ❑ What is our criteria for good change? Good for who and for how long? | ❑ Develop the 1st draft of criteria for good change for people and for an ecosystem  
❑ Determine which leverage points have the greatest impact and which have the least so that they can identify where to intervene in the system(s) for the best possible impact on the system(s) consistent with the stated goal(s). |
| ❑ How can we ensure that we are causing more and better wins than losses with our plans/actions? (the best we can do) | ❑ Apply criteria for “good change” to analyze different possible changes to the ecosystem  
❑ Demonstrate that causes and effects are not always closely related in time and space in a system (there are delays in systems).  
❑ Adjust and iterate criteria as needed  
❑ Select a contribution that meets the criteria MS-LS2-5.  
❑ Design a contribution that solves more than one problem at a time and minimizes the creation of new problems. (Create value.) |
| ❑ How do we convince others that our idea is the best idea? | ❑ Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. (MS-LS2-5) |

**Learning Goals and Standards:** What skills and content will my students need in order to complete the final project?

- **Next Generation Science Standards**
  - ❑ **MS-LS2-1.** Analyze and interpret data to provide evidence for phenomena and the effects of resource availability on organisms and populations of organisms in an ecosystem.
  - ❑ **MS-LS2-2.** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
  - ❑ **MS-LS2-4.** Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
  - ❑ **MS-LS2-5.** Evaluate competing design solutions for maintaining biodiversity and ecosystem services. (restoration and conservation)

**Detailed NGSS Content:**
MS LS 2-2
<table>
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<th>Stability and Change</th>
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**LS2.A: Interdependent Relationships in Ecosystems**

- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

**LS2.C: Ecosystem Dynamics, Functioning, and Resilience**

- Biodiversity describes the variety of species found in Earth’s terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem’s biodiversity is often used as a measure of its health. (MS-LS2-5)

**LS4.D: Biodiversity and Humans**

- Changes in biodiversity can influence humans’ resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (secondary to MS-LS2-5)

**ETS1.B: Developing Possible Solutions**

- There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (secondary to MS-LS2-5)

**Writing:**

Skills: Reading, Interpreting data, Research, Reading scientific Articles, Synthesizing info,

- 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. (MS-LS2-2)

- 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. (MS-LS2-2)

- Draw evidence from literary or informational texts to support analysis, reflection, and research. (MS-LS2-2)

- Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. (MS-LS2-2)

- Trace and evaluate the argument and specific claims in a text, assessing whether the reasoning is sound and the evidence is relevant and sufficient to support the claims. (MS-LS2-5)

- Distinguish among facts, reasoned judgment based on research findings, and speculation in a text. (MS-LS2-5)

- Cite specific textual evidence to support analysis of science and technical texts. (MS-LS2-2)

**Reading:**

6-8.RH.1

- Cite specific textual evidence to support analysis of primary and secondary sources.

6-8.RH.2

- Determine the central ideas or information of a primary or secondary source; provide an accurate summary of the source distinct from prior knowledge or opinions.

**Community Partner Connections:**

- What are the opportunities to connect

  Partnership: “Who are you partnering with?:”
  - Portland Parks and Recreation is our primary Partnership
learning to place/community within or outside of the school? * (see supporting page)

Goals:
How will you meet a community need?

Assessment/Reflection:
How will you assess the extent to which you met the community needs?

What other community resources can support your project?
- Friends of Trees for Identification purposes
- Bird Identification: Susan Hawes, Audubon. Laura Guderyahn (PPR)
- Audubon Society of Portland; Support in general identification
  - Beautiful Birds Program (guest Speaker)- pnw bird identification and background info

Summative Assessment Part 1:
Project: “What project will you be doing?”
- Identifying and cataloging different plant and waterfowl species at 5 different location around Oaks bottom reservoir. (EFS-I 3 [Cloud Institute])
- Document the quality of the Soil and water using pH, Dissolved Oxygen, temperature, texture.

What will we provide to the community at large/partners?
- Animal and plant survey
  - Data about the established ecosystem before a big change to the overall size of the reservoir.

Summative Assessment part 2:
- Presentation creation providing hypotheses for the impacts of future changes on the ecosystem. (EFS-I 37 [Cloud Institute])

Final Reflection Question Part 3
- Is the culvert project a good idea? (draw evidence from research and hypothesis) (EFS-EU 7 [Cloud Institute])

Possible Fieldwork Sites/Locations
Oaks Bottom South Meadow and Reservoir

Community Experts/Possible Classroom Speakers
PPR Expert: Laura Guderyahn
Local Ecologists
Audubon Society
Park design and maintenance

Disciplines:
How will literacy be integrated into this project?

- Reading
  - Read-aloud:
    - Marin Marten by Brian Doyle

Central Text: Metro Nature University (James Davis summary of Ecological concepts) used as a reference when teaching. I have it as a printed set of materials in a binder.

- Writing
  - Expository
  - Persuasive
| Duration: How long will the project last? | 10 weeks  
- Sept through 3rd week of December  
  - Tuesday project time (1.5 hrs) spent planning for Thursday or digesting data from the previous trip.  
  - Every Thursday ½ day trip to the ecosystem to collect data and record observations about the reservoir. |
| --- | --- |
| Timeline and Benchmarks: * (see supporting page)  
What is your timeline for implementing the project? What are several benchmarks along the way? | Starts in September  
Calendar is on this accompanying document  
- General Surveys Regarding topic (ie gathering a baseline)  
- Researching native animals/plants, and present  
- Mapping and identifying the species of the quadrant  
- Developing a conclusion/presentation  
Field-Work Dates:  
Place based Unit: South Meadow Reservoir Ecological Assessment  
- 9/28 Initial Visit to South Meadow: Exploratory  
- 10/5 Mapping OB  
- 10/19 Species Identification and soil/water testing (Laura come in 16-18th morning)  
- 10/26 Species Identification and soil/water testing pt 2  
- 10/31 Species Identification and soil/water testing pt 3  
- 11/9 Species Identification and soil/water testing pt 4  
- 11/16 Species Identification and soil/water testing pt  
- 11/30 Wrap up data gathering and maps  
- 12/7 Final trip with wrap up of  
Bus Schedule  
From school to Bridge  
Leave 12:08  
From bridge to school  
Leave 216  
Reflection: Schedule ended up being best with students having only 1 hour at the park. Any more time and they didn't have enough to do.  
- This was a lot of travel time. It was important to have different observation activities for them to do during the walk or a lens through which they can experience the same thing differently  
Ten Different jobs: Leaders, Equip managers, motivators(support absences and help problem solve), Journalists, Historians, Field Sketch artists, Water quality, Soil quality, waterfowl, and vegetation specialists.  
The jobs were good. They met in different locations of blended groups at the park and then when we got back they... |
<table>
<thead>
<tr>
<th>Debriefed with their expert groups.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supports:</strong> Who might help you with this project?</td>
</tr>
<tr>
<td>- Administration:</td>
</tr>
<tr>
<td>- Co-Teachers:</td>
</tr>
<tr>
<td>✓ Families: LOTS OF PARENT SUPPORT NEEDED FOR THIS We needed at least 3 chaperones per trip. Every week for 8 weeks.</td>
</tr>
<tr>
<td>- Other:</td>
</tr>
</tbody>
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<thead>
<tr>
<th><strong>Resources:</strong> Documents, books (anchor texts, read alouds), worksheets, support text, websites, videos, models, student examples etc.</th>
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<tbody>
<tr>
<td><strong>Read-aloud:</strong></td>
</tr>
<tr>
<td>- Martin Marten by Brian Doyle</td>
</tr>
<tr>
<td>- Yes! This was great for content connections and relevance, but the book lacks plot so it was not a great accompaniment to our short story unit. We did not finish the book during the trimester.</td>
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<tr>
<th><strong>Youth Voice and Choice:</strong> How will students be a part of the process in this project? How will you prepare students to engage and contribute?</th>
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</thead>
<tbody>
<tr>
<td><strong>Choose the Topic of identification/job they will be focusing on:</strong></td>
</tr>
<tr>
<td>- Water Qual</td>
</tr>
<tr>
<td>- Soil Qual</td>
</tr>
<tr>
<td>- Water Fowl</td>
</tr>
<tr>
<td>- Vegetation etc.</td>
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<tr>
<th><strong>Diverse Perspectives:</strong> How will you include opportunities for students to share their perspectives and for students to be exposed to a variety of perspectives on this topic? (Be specific.) * (see supporting page)</th>
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<tbody>
<tr>
<td><strong>Looking at history of the area:</strong></td>
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<tr>
<td>- Native americans, first development of Portland, Changes over time.</td>
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<tr>
<td>- Who uses the area and for what?</td>
</tr>
<tr>
<td>- Who doesn't use the area… why not?</td>
</tr>
<tr>
<td>- Who maintains the area and what are their biggest struggles?</td>
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</tbody>
</table>

**History of changes to this area:** |
- Used by First Peoples the area to grow crops (very fertile) directly connected to the Willamette River Ecosystem. |
- Railroad installed: Cuts the ecosystem off from the large river ecosystem |
- Used as a landfill |
- Invasive species overtook the area |
- Covered over and converted to wildlife refuge: Restoration work began
| Group Work Supports:  
| How am I supporting groups throughout the project? What group work skills will I need to teach for this unit to be successful?  |
| Expert groups based on individual job:  
| - Group de briefs and reflections  
| - One day a week meeting to digest the information and plan for the next outing.  
| - One outing to collect data.  
| - Weekly updates on what should be done and where students should be with their data collection |

| Career/Volunteer Connection:  
| What are career connections to the project? Are there any future volunteer opportunities?  |
| Portland Parks and Rec Staff  
| Park Stewards  
| Ecologists |

| Challenges:  
| What are potential obstacles and solutions?  |
| ❏ Differentiation  
| Naturally differentiated based on jobs and skills  
| Weekly supports given based on ability and needs  
| ❏ Getting volunteers  
| ❏ Training  
| ✓ Transportation: the time and cost of transportation could be prohibitive  
| ❏ The time required to get there was challenging  
| ✓ Funding: Diack Grant ($2000 to purchase water and soil quality testing devices)  
| ❏ This was great. We should write a slightly different grant next year to get more probes AND THE SOFTWARE.  
| ✓ Planning Time  
| - Getting the correct resources and supporting student generated field study topics  
| - Working over the summer time  
| ❏ Scheduling : Staying on schedule and making sure the students are supported for each visit to the park |

| Reflection:  
| Where are opportunities for teacher and student reflection?  |
| Teacher:  
| ❏ Pre- Observation trip to the park to sit and observe the space without knowing how its species  
| ❏ During- Feedback about the process and group struggles  
| ❏ This was great, we did an awesome job of providing reflection and using the strengths of the team leaders to support struggles of expert groups.  
| ❏ Post- Written reflection, Group conversation,  
| ❏ This will happen at the end after the presentations. |

| Student Assessment:  
| * (see supporting page)  |
| 1. Expert group training test: |
| What formative and summative assessments will you use? | - Did not happen But should have.  
- Was challenging because of the timing of our fall trip and when we needed to start collecting data. |
|---|---|

3. Research Presentation
- This is going to be great and contain a lot of the standards we strove to meet.

Apply the process of critically thinking about the impacts of a change to an ecosystem to a new situation.

| Culminating Product: What is your final product? Are there any intermediate products along the way? | Product: "What is being created?"
- Research Project and presentation (classroom and contributing scientists as audience)
- Conclusions about the species in the space and why they are the way they are.
- Should humans work to bring in more species why or why not?
- Hypothesis about the impacts of the culvert project on the ecosystem

Audience: "Who is this for?"
- PPR and potentially for future park visitors. |
|---|---|

| Celebration: How will you celebrate the project with your students, families and school community? How will you communicate and share with the larger community? (press release, PSA, School Website, Neighborhood newsletter, etc) | Present at the School
- Picnic at the Refuge: Happened with the kinders. During not after.
- Hard with the rain that usually happens in December |
|---|---|

| Unit Evaluation: What were some successes of the project overall? What were some things that could be improved? | Successes: Content in class was clearly tied to the work they were doing in the field.
- I have never had ecology be more deeply understood by a group of students.
- Expert groups became experts by the end of the unit. Their level of understanding of their specific topic could be deeper. **Think about including mini lessons during the debrief time that will help them to deepen their understanding of the impacts of what they are studying on the overall ecosystem.**
- Purpose driven work. Having an outside source/problem that needed their work really helped to keep the drive going even when they are starting to lose steam.
- The read aloud (*Martin Marten*) was really closely linked to the content and the field work. It provided a lot of references and connections.

Challenges:
- Getting enough parent chaperones
- Supporting the student and chaperone relationship (giving the students control and... |
| - | responsibility but also making sure that they are held accountable to the chaperones) |
| - | Making sure the chaperones clearly know what is being asked of everyone. |
| - | Deepening the level of understanding of the data they are gathering. Through class and through small group work |
| - | Providing more time and support for analysis and drawing conclusions about the data |
| - |  |