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Original Environmental Education Lessons and Curriculum

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At the Confluence of Environment and Education

Developing interdisciplinary lessons and curricula for the high school classroom

Honors Capstone Project – Winter 2020

By Waverly Shreffler

Advised by Gene Myers

Author's notes:

The following curriculum is a living document. Learning and teaching are ongoing processes with which this document is meant to change over time. This curriculum reflects my philosophies and positionality at this moment in time. I have taken liberty in source and content choice with acknowledgement that not all might be considered approvable for public-school. This curriculum represents a culmination of my learning through Huxley and the Honors Program designed with the intent of exercising creativity and resourcefulness to better myself as a future educator.

This material was designed for 9th - 10th grade learners. The lessons and gathered material reflect ideas from many disciplines and are not concretely meant to be taught from one classroom but as ideas for bringing traditional subject areas into relation. There are five diversely focused units designed to be taught in progression with a time span of three to four weeks in mind. Sample original lesson plans follow the curriculum overview.

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Curriculum Overview and Progression:

*lessons with an asterisk have been developed into original lesson plans

Unit 1: Anthropology

Unit Goals:

- Basic understanding of human migratory patterns
- Introduction to critical cartography and how maps perpetuate relations of power
- Connect energy surplus (from food) to population growth
- Human reliance on environment for survival

Teaching Methods:

- Lecture
- Readings
- Individual research project and presentation
- Documentary film

Lessons:

- Subsistence and Cultivation
 - Ethnographic study through reading, film, and individual research project
- Maps and critical cartography
 - Learn about types of maps, cartographers, and how maps tell narratives through physical map analysis, map making, and introductory use of GIS software

Resources:

- <http://s3.amazonaws.com/rdcms-aaa/files/production/public/C3-Framework-for-Social-Studies.pdf>
- <https://store.der.org/north-america-c136all.aspx>
- Decolonizing the geography classroom- A call to action for educators to reimagine pedagogy of place.pdf
- La Paperson - A ghetto land pedagogy an antidote for settler environmentalism.pdf

Films and Readings from ENVS 303:

- FILM: Our Diverse World- foragers & pastoralists
 - https://www.d.umn.edu/cla/faculty/troufs/anth1604/video/Our_Diverse_World.html#title
- 5a Patterns of Subsistence Food Foragers (<https://www.youtube.com/watch?v=KIVrrNlmJyg>)

Unit 2: Globalization

Unit Goals:

- Students find connections between globalization and: environmental degradation, wealth gap, personal environmental impact, geopolitics, loss of culture(s), human migration, and imperialism
- Critical thinking about personal global impact and positionality
- Students are able to contextualize why global change has occurred at a more rapid rate than any other time in human history
- Students can see how they fit into these greater global concepts
- Improve research and public speaking skills

Teaching Methods:

- Reading
- Journal entries
- Socratic discussion
- Group Project
- Student led “council meeting”
- Research and writing
- Individual presentation
- documentary

Lessons:

- *Arctic Geopolitics lesson
- Population Studies
 - Industrial revolution, Agriculture in America, and capitalism
 - Carbon Footprint a matter of wealth and poverty, not number of children
- Global Personal Impact Assessment
 - Set personal goal to reduce impact
 - Coinciding journal assignment, measure progress
- Globalization impact on humans and cultures
 - Continuing migration
 - Loss of cultural diversity
- “Soapbox Monologue” assignment: students choose a topic they feel passionate about from or related to Globalization Unit to research further and write a one-page monologue, song, or poem about. Students will practice public speaking by reading their original writing aloud to peers.

Resources:

CO2 calculator <https://www3.epa.gov/carbon-footprint-calculator/>

Gapminder (population study) <https://www.gapminder.org/tools/>

Anthropocene film

Readings:

- *Globalization: The Transformation of Social Worlds*. Eitzen & Zinn. 3rd edition. Wadsworth.

Unit 3: FOOD! (sustainability, culture, and social justice)

Unit Goals:

- Associate food with cultural and ecosystem health
- Critique concept of sustainability
- Broaden knowledge of global cultural perspectives
- Contemplate subjective societal impact of food deserts and farming practices
- Consider the ethics of food workers, production, transportation, and market
- Understand importance of biocultural diversity

Teaching Methods:

- Lecture
- Research paper
- Readings
- Group work
- Journal assignments

Lessons/Activities:

- Tragedy of the Commons: students write and perform a short skit or interpretive project that represents the moral of Garret Hardin's "Tragedy of the Commons"
- Potluck with cultural foods from around the world, attached research report
- Food Deserts and minorities (reading and discussion)
- Monocropping, soil health, GMO's, and workers' rights (reading and discussion)
- Biocultural case study (Assignment)

Resources:

<https://www.pbs.org/newshour/arts/the-socio-economic-significance-of-food-deserts>

<http://www.guerrillagardening.org/>

Biocultural Diversity Conservation: A Global Sourcebook by Ellen Woodley and Luisa Maffi

Unit 4: Class Reading: Braiding Sweetgrass by Robin Wall Kimmerer

Unit Goals:

- Re-learn/un-learn history of America through Indigenous perspectives
- Deconstruct narratives of ownership over land
- Promote personal relationship with "nature"
- Critically think about memory and identity
- Reflect on positive outdoor experiences
- Learn through observation and practice of natural history

- Learn through Kimmerer and other author's Indigenous Knowledge and Ways of Knowing
- Improve reading comprehension, understanding of rhetoric in texts, and creative writing
- Dispel narratives of "pristine or untouched" wilderness, native people as managers of ecosystems

Teaching Methods:

- Reading: in class, at home
- Journal writing
- Outdoor learning
- Class discussion
- Individual creative project
- Field trip (meeting with local or regional tribal elders or spending time with a school)

Lessons:

- *Memory mapping
- *Braiding Sweetgrass Discussion
- Practicing Natural History: outdoor journaling throughout this unit
- Short story or poems using scientific, learned, and lived knowledge mimicking Kimmerer

Resources:

- War Dances Sherman Alexi (collection of short stories)
- Lynch "The Highest Tide"
- Land Use, Environment, and Social Change: The Shaping of Island County, Washington by Richard White

Unit 5: Healthy Individuals, Communities, and Ecosystems

Unit Goals:

- Find correlations between individual, community, and environmental health
- Practice observation and inquiry outdoors
- Encourage individuality and creativity through multimodal projects
- Practice critical thinking through reflective journaling on podcasts, readings, and lecture
- Deconstruct narratives of wilderness as "out there", institute concept that "nature is everywhere"
- Student driven learning through "change project" and "art gala"

Teaching Methods:

- Outdoor learning
- Lecture
- Art activity
- Individual project

- Group project
- Podcast
- Readings
- Journal writing

Lessons:

- *Greenspaces lesson
- *Light pollution lesson: might connect with student-peer teaching assignment, or partner program with local middle school students STEM activities
- “Change Project”: inspired by Conservation Psych and UW Nature Health Initiative
- Art Gala: students design an inquiry inspired by this unit and create a piece of art representative of their learning (examples: photo album of “nature” “culture” fusion, interactive art piece, compilation of poems, podcast, etc)
 - Beauty culture, nature photography, and social media
 - Elite sports, societal and environmental impact
 - Recreation and accessibility
 - Ecotourism, costs and benefits

WA State Standards:

Health and Physical Education Standard 2: Students will analyze the influence of family, peers, culture, media, technology, and other factors on health behaviors.

Resources:

- Children’s Participation: the theory and practice of involving young citizens in community development and environmental care by Richard Hart
- UW nature and health research:

<https://www.washington.edu/news/2018/10/24/nature-for-health/>

<https://ehp.niehs.nih.gov/doi/10.1289/EHP1663>

- NPR podcast (our better nature)

<https://www.npr.org/2019/08/12/750538458/you-2-0-our-better-nature>

- https://www.ted.com/talks/jeremy_rifkin_the_empathic_civilization
- Mistinguette Smith – Wildness (video) <https://www.youtube.com/watch?v=p3Ao44InFIU>
- Emma Marris – nature is everywhere (ted talk)
https://www.ted.com/talks/emma_marris_nature_is_everywhere_we_just_need_to_learn_to_see_it

Additional lesson ideas:

- Natural history project based on journal observations
- Environmental Mediation Law Cases
- Writing creation stories (outdoor activity)
- Intertidal zone, resilience and writing

Post lesson reflection exercise:

- Idea for post unit or lesson journal reflection
 - Something you felt
 - Something you heard
 - Something you saw
 - something that stuck with you
 - Something you want to share
 - Something you want to know

Foundational teaching philosophies:

- Students are whole, unique, and capable people
- Diversity and individuality should be celebrated
- Learning is dynamic and perpetual
- Unlearning and (re)learning are deep learning
- Place is a teacher, and part of identity
- Growth mindset, work ethic, and self-reflection should be rewarded above grades
- Nature is everywhere (separate othering ideas about 'wilderness,' 'environment,' 'nature')
- Acknowledge positionality
- Include opportunity for emotional, spiritual, and physical learning/being
- Transformative learning comes from critical thinking

Curriculum Sources:

Washington State Learning Standards:

<https://www.k12.wa.us/student-success/learning-standards-instructional-materials>

Washington State Environment and Sustainability Standards:

<https://www.k12.wa.us/sites/default/files/public/environmentsustainability/pubdocs/esestandards.pdf>

Common Core Standards:

http://www.corestandards.org/wp-content/uploads/ELA_Standards1.pdf

From Unit 2 - Globalization:

Teaching Geopolitics through Arctic Diplomacy Lesson Plan

Subject: Arctic Council, Arctic Nations, geopolitics, borders, environment, and military

Duration: two weeks

Location: in class and at home

Materials: access to computers, paper and pencils for group work

Group size: class size broken into 6 Arctic Council Working Groups

Overview & Purpose: through in-class lecture, discussion, writing assignments and at home research and preparation, students will engage in discourse surrounding the Arctic as a place of international interest and focus. The culmination of this study will be an in-class meeting mimicking an Arctic Council meeting where students will represent different nations/states through Workings groups and their interests. By representing members of the Arctic Council students will learn skills in communication and mediation, expand their knowledge of other countries' international interests and positions, and deepen their understanding of the Arctic as climatic region and human delineated region.

Lesson Goals:

The intent of this lesson is to:

- Promote critical thinking about the complexity of international relations
- Complexify Arctic Interests through differing international perspectives
- Encourage students to build their communication skills through this process
- Encourage students to make connections between disciplines of study
- Learn about the Arctic as an ecosystem, analyze the Arctic as a symbol for climate change

Learning Goals:

Students will be able to:

- Identify the top Arctic interests of each Country
- Identify values of the Arctic as a region
- Understand the basic effects of human caused climate change and recognize the implications of the Arctic as a susceptible region
- Recognize relationships of power based on political and economic motives
- Understand the workings of an Arctic Council meeting
- Conduct themselves respectfully and help to facilitate class mock meetings
- Improve interpersonal skills through group collaboration

EDUCATION STANDARDS:

<https://www.k12.wa.us/sites/default/files/public/socialstudies/outlines/unitoutlinesninthtenthgrade.pdf>

9th and 10th grade Standards

Civics:

1.2.3 Evaluates the impact of various forms of government on people in the past or present.

1.3.1 Analyzes the relationships and tensions between national interests and international issues in the world in the past or present.

Social Studies Skills:

5.3.1 Evaluates one's own viewpoint and the viewpoints of others in the context of a discussion

EALR: 3. GEOGRAPHY The student uses a spatial perspective to make reasoned decisions by applying the concepts of location, region, and movement and demonstrating knowledge of how geographic features and human cultures impact environments.

3.3 Understands the geographic context of global issues.

Geography:

3.2.2 Understands and analyzes examples of ethnocentrism.

3.2.1 Analyzes and evaluates human interaction with the environment across the world in the past or present.

TEACHING METHODS:

- In-class lecture
- Access to computers (in and out of class)
- Small group work
- At home research
- At home reading
- Prompted in-class writing
- At home writing and project work
- In-class discussion
- Preparatory, evaluation, and reflection assignments

BACKGROUND INFO:

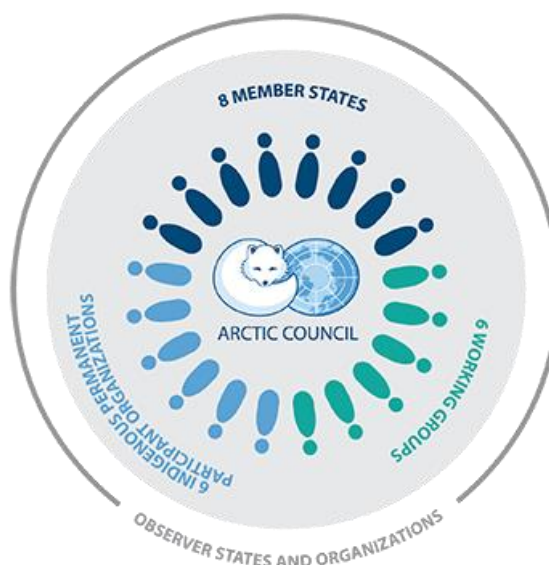
Information from Arctic Council Website: <https://arctic-council.org/index.php/en/about-us>

What is the Arctic Council?

The Arctic Council is the leading intergovernmental forum promoting cooperation, coordination and interaction among the Arctic States, Arctic indigenous communities and other Arctic inhabitants on common Arctic issues, in particular on issues of sustainable development and environmental protection in the Arctic.

Member States:

- Canada
- Denmark
- Finland
- Iceland
- Norway
- Russia
- Sweden
- United States

**Permanent Participants:**

- Aleut International Association (AIA)
- Arctic Athabaskan Council (AAC)
- Gwich'in Council International (GCI)
- Inuit Circumpolar Council (ICC)
- Russian Association of Indigenous Peoples of the North (RAIPON)
- Saami Council (SC)

Out of a total of 4 million inhabitants of the Arctic, approximately 500,000 belong to indigenous peoples (12.5%). Indigenous peoples' organizations have been granted Permanent Participants status in the Arctic Council. The Permanent Participants have full consultation rights in connection with the Council's negotiations and decisions. The Permanent Participants represent a unique feature of the Arctic Council, and they make valuable contributions to its activities in all areas.

What does the Council do?

The work of the Council is primarily carried out in six Working Groups.

- The [Arctic Contaminants Action Program \(ACAP\)](#) acts as a strengthening and supporting mechanism to encourage national actions to reduce emissions and other releases of pollutants. [ACAP website](#)
- The [Arctic Monitoring and Assessment Programme \(AMAP\)](#) monitors the Arctic environment, ecosystems and human populations, and provides scientific advice to support governments as they tackle pollution and adverse effects of climate change. [AMAP website](#)
- The [Conservation of Arctic Flora and Fauna Working Group \(CAFF\)](#) addresses the conservation of Arctic biodiversity, working to ensure the sustainability of the Arctic's living resources. [CAFF website](#)
- The [Emergency Prevention, Preparedness and Response Working Group \(EPPR\)](#) works to protect the Arctic environment from the threat or impact of an accidental release of pollutants or radionuclides. [EPPR website](#)

- The [Protection of the Arctic Marine Environment \(PAME\) Working Group](#) is the focal point of the Arctic Council's activities related to the protection and sustainable use of the Arctic marine environment.
[PAME website](#)
- The [Sustainable Development Working Group \(SDWG\)](#) works to advance sustainable development in the Arctic and to improve the conditions of Arctic communities as a whole.
[SDWG website](#)

How does it work?

Arctic Council assessments and recommendations are the result of analysis and efforts undertaken by the Working Groups. Decisions of the Arctic Council are taken by consensus among the eight Arctic Council States, with full consultation and involvement of the Permanent Participants.

The Chairmanship of the Arctic Council rotates every two years among the Arctic States. The first country to chair the Arctic Council was Canada (1996-1998), followed by the United States, Finland, Iceland, Russia, Norway, the Kingdom of Denmark, and Sweden. The second cycle of Chairmanships began in 2013. On 11 May 2017, the second United States Chairmanship concluded, and the [second Chairmanship of Finland \(2017-2019\)](#) began. The next country to assume the Chairmanship will be Iceland (2019-2021).

What doesn't it do?

The Arctic Council is a forum; it has no programming budget. All projects or initiatives are sponsored by one or more Arctic States. Some projects also receive support from other entities.

The Arctic Council does not and cannot implement or enforce its guidelines, assessments or recommendations. That responsibility belongs to each individual Arctic State.

The Arctic Council's mandate, as articulated in the Ottawa Declaration, explicitly excludes military security.

CONTENT:

Possible Readings:

1. **Media and the Politics of Arctic Climate Change: When the Ice Breaks** (Book) - emphasis on section "Arctic region-building" pg 14, and chapter 4 (pg 70-84)
2. **Arctic Governance** Challenges and Opportunities (Council for Foreign Relations article)
<https://www.cfr.org/report/arctic-governance>
3. **A thawing Arctic is heating up a new Cold War** (National Geographic article)

Websites to assist student research:

1. <https://arctic-council.org/index.php/en/> (and many links from this page – working groups, info on member states and permanent residents linked from here)
2. <https://nca2018.globalchange.gov/>
3. https://www.ecfr.eu/article/commentary_strategy_on_ice_has_russia_already_won_the_scramble_for_the_arct

ASSESSMENT:

See end of lesson for drafts

- Daily Journal/Notes check
- Participation in discussions/meetings
- Group Assessment
- Self-Assessment
- Reflection Paper or Project

LESSON SCHEDULE:

Mon	Tue	Wed	Thu	Fri	Weekend
Class: lecture on background of Arctic Council, overview of next 2-week schedule, questions Home: read background info on Arctic Council and number 2 on reading list	Class: writing prompt Short discussion on reading Home: read/outline arctic parties' interests, come to class prepared with top 3 Working group choices	Class: Split into groups based on common interests, review group assignment Home: Research your working group	Class: Class drafts Council Meeting Agenda based on interests of Working groups, end – group meeting time Home: reading/notes on reading 3, read about past arctic council meetings, top 3 agenda topics to vote on tomorrow	Class: Group meeting time, Finalize Council Meeting Agenda topics Home: research and pre-meeting worksheet	Home: prep for Council meeting, pre meeting worksheet
Class: Short Group Prep time, Review Council Meeting procedure, Start Meeting Due – pre meeting worksheet Home: write notes on class	Class: Council Meeting cont. Home: write notes on class today, how will your group conclude the meeting? Are your needs/interests begin met?	Class: wrap-up Council Meeting Home: answer wrap-up questions and assess group and self	Class: discuss how the meeting went. Were parties satisfied with result? Were all voices heard? Home: Due Council Meeting wrap-up,	Class: review of paper/project assignment, prep time Home: Due Monday: Reflection Paper or Project	Home: Due Monday: Reflection Paper or Project

today, improvements to be made tomorrow			group assessment, self- assessment		
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Draft In-class Discussion Questions (Tue week 1):

- What are the positives and negatives of having an intergovernmental body that has no direct power within each country?
- Why might interests in the Arctic differ for each country/stakeholder?
- How do delineated political borders alter how the Arctic as an environmentally significant region is governed?
- How might political borders effect species?
- Who created these borders and why?
- What role do native groups play in the Arctic Council?
- Do you think Indigenous people are being represented fairly?
- Do you think ethnocentrism might be a problem during international collaborative work?

Draft Pre-Council Meeting Worksheet

What countries and people groups are involved in your working group?

Describe some of the past and present projects of your working group.

What are your interests as a working group?

What is your goal for this meeting?

What are your concerns for this meeting?

Are there any other working groups or countries who do not support your work?

Draft post Council meeting group-assessment:

Rate yourself/your group on a scale of 1-5 (1 poor, 3 met standards, 5 excellent)

- Did you conduct yourself with maturity and respect during the meeting? 1 2 3 4 5
- Did you prepare thoroughly? 1 2 3 4 5
- Did group members contribute equally to the group preparation? 1 2 3 4 5
- Did the result of the meeting satisfy your party's interests? 1 2 3 4 5

Draft Reflection Paper/Project Assignment:

In a two-page paper or a creative project of your choice, answer/incorporate the following questions:

What challenges and opportunities are created by international collaboration like Arctic Council working groups? Are the people who live in the Arctic represented fairly? How is the Arctic as a region representative of or related to larger global impacts of climate change, politics, economic relations, social implications?

From Unit 4 - Braiding Sweetgrass:

Braiding Sweetgrass by Robin Wall Kimmerer example lesson

Time: about a month

Location: in classroom and at home

Materials: Journal, Braiding Sweetgrass hardcover book (unless e-book or audio necessary for learning accommodation)

Learning Goals:

- Define reciprocity with evidence from reading
- Relate personal experience to learning from the reading and discussion
- Recognize food as central to culture
- Identify symbolism within the reading
- Identify personal and cultural beliefs of the narrator
- Practice note-taking and critical thinking
- Encourage learning of classmates through student led discussion

Common Core ELA Standards:

Key Ideas and Details: 1. Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.

Craft and Structure: 6. Determine an author's point of view or purpose in a text and analyze how an author uses rhetoric to advance that point of view or purpose.

Example discussion period:

Assigned Reading: **The Gift of Strawberries (Ch. 3)**

Homework for the night previous:

"Please read ch. 3 The Gift of Strawberries taking notes in your journal as you go or reflecting after reading the chapter. Here are a few questions to guide your thinking, please journal about at least one:

- Write about a time when you felt humbled by a meal.
- Write about a time you were given a meaningful gift. What is the meaning of a gift to you?
- Write about a joyful experience you recall spending outdoors near your home? What was the setting? What living things were involved?
- Recall an experience you have had gathering a wild food. How did it taste? How did it feel to eat something you had not grown or bought?
- Recall Kimmerer's excitement at watching as strawberries ripened with the season. Why do you think she explained how the strawberry is called the "heart berry" in Potawatomi? Why are the seasons important to Kimmerer?

In class Socratic discussion:

Students should be familiar with the setting of discussion days. When they arrive, they help put desks in a circle to allow for face-to-face conversation. Everyone, including the teacher, should take a seat and get out materials (Braiding Sweetgrass book, journal, extra pens or paper, etc). The teacher will begin a Socratic discussion by asking an open-ended question. The teacher should have a list of questions to assist students if they get stuck on a topic, too far off track, or need a new talking point, otherwise the teacher should remain from inserting themselves in the dialogue. The teacher might want write down names of students in the formation of the desks and draw lines tracking who is speaking and any notes. If there are students struggling to join the discussion, encourage them when there are natural breaks.

Example guiding questions/topics:

- What does reciprocity mean?
- Share a story from your journal aloud, allow others to do the same
- How does a gift economy differ from a monetary economy?
- What is the significance of seasons in this story?
- How do you think Kimmerer wants you to feel while reading descriptive imagery?
- What is the significance of the strawberry to the Potawatomi who call the berry the “heart berry”? What other foods do you associate as symbolic?
- How does Kimmerer go about harvesting the strawberries? What does this show about her beliefs toward the land?
- How is wild food connected to culture?
- What makes a food wild?

Citations:

On the Socratic method of teaching:

Hopkins, Kathleen R. (2010). The Power of Oral Language. In *Teaching How to Learn in a What-to-Learn Culture* (1st Edition, pp. 81–94). San Francisco : Jossey-Bass. Retrieved from <https://onlinelibrary-wiley-com.ezproxy.library.wvu.edu/doi/pdf/10.1002/9781118269435.ch6>

Other possible teaching points from Braiding Sweet Grass book:

- Invasive species vs. “naturalized” species (association with colonialism)
- Cultural impact on identity. Experience of biculturalism for Americans today.
- Power of gratitude and reciprocity
- Writing analysis and practice: Kimmerer’s use of symbolism
- Restoration: ecological and societal

From Unit 4 – Braiding Sweetgrass:

Memory Mapping Lesson Plan

Concept inspired by Nature Essay assignment in Literature of Nature and Place course taught by Nini Hayes

*Note: this lesson is intended to go with the class reading of Braiding Sweetgrass, it would fit best in the unit if it occurred after the first few chapters as students become accustomed to Kimmerer's writing and have been introduced to multiple sections where Kimmerer writes on the importance of place and memory of place. It should fall after Braiding Sweetgrass discussion on The Gift of Strawberries (ch. 3).

Learning Goals:

- Define why certain memorable places are significant to them today
- Identify their own privilege and positionality in context of relationship to place
- Better understand the perspectives Kimmerer shares in Braiding Sweetgrass through reflection upon their own relationship to place
- Associate the importance of place to different cultures
- Gain awareness about ownership of land and how that effects relationship to place

Materials: Braiding Sweetgrass book, Journals, access to: computers, watercolor, pencil, markers, magazines, scissors, glue, tape, colored poster paper

Time Required: 2-3 class periods, plus homework

Lesson Progression:

Homework for Day 1:

At the end of class explain that we will be continuing to contemplate relationship to place through journal writing and a project during the coming week. Based on recent reading from Braiding Sweetgrass students should be familiar with the concept that place is significant to who we are as individuals and what we value as cultures.

Journal entry homework:

Write a list of a few outdoor places that are memorable or significant to you in some way (leave some space between them so you can fill in description later). Take time to make this list. Think upon places that you remember fondly. They can be close or far from home.

After you have finished making a list, write some description under each item. Jot down who you were with, how many times you have been there, how you got there, if it was difficult to get there, what was the surrounding landscape like, were there animals there, did you experience something emotionally significant that is memorable, etc.

Once you have added some description to each of your places contemplate how they impacted and continue to impact you. Jot down your thoughts below your list or on a new page. Did you find any similarities or differences between the places you recalled? How do you think significant places differ among different cultures and demographics? How might your experiences differ if you lived somewhere else?

Be prepared to share some of your places and findings with the class if you are comfortable doing so.

Class plan Day 2:

Begin class by having students pair-share some of their significant places (since these places and memories may be highly personal and/or triggering for some, allow students to choose partners they are comfortable with, or give them an alternative prompt if they do not want to share)

Describe the Memory Mapping assignment:

Create a map of your significant place(s) with a one-page reflection that goes with it. Your map can be created using any media you like (ArcGIS, watercolor, collage, poster board with photos, etc). Think of the map as an artistic and scientific documentation of your significant place(s). The one-page reflection should include the following:

- Description of which media you chose and why
- Description of the place(s) (what does it look like in real life), how and why you portrayed them on the map how you did
- Why the place(s) on your map are significant to you, what kind of feelings do this place or places evoke in you?
- Do you feel a sense of ownership of this place?
- Do you know the history behind this place? Who originally lived there, who owns it now? If you don't, do a little digging!
- Describe what the accessibility of each place was. Was it hard to get to or hard to find? Did you have to pay to get there? If you did have to pay, contemplate who you were paying and what you are paying for?
- How have these places or place helped make you who you are today?
- What did you enjoy or not enjoy about mapping these places that are significant to you?
- How did this assignment remind you of the stories in Braiding Sweetgrass? Be specific.

After describing the assignment and answering questions, allow students to begin drafting or planning their project for the remainder of class. To make sure they are on the right track, check each student's plan as their ticket out the door.

Homework: do some research on the places you have chosen to use for your project. What is the human history of these places? What animals and plants may have lived there before it became a... park, field, trail, landscaped subdivision, etc.?

Day 3-5

Allow class time for continued work on the project. Continue assigned readings from Braiding Sweetgrass.

From Unit 5 – Human and Environmental Health:

Greenspaces Lesson Plan

Adapted from <http://teachers.egfi-k12.org/map-the-green-space/>

Learning Goals:

- evaluate positive and negative interactions between humans and greenspaces
- identify different types of green spaces in their community
- Explain the benefit of green spaces to humans and non-humans
- Differentiate the value of different environments
- Complicate their own interactions with living and built environments
- Communicate their learning about greenspaces through their poster or portfolio

Materials:

- Camera or phone
- Notebook
- Printed map
- Pens, pencils, paint (optional)
- Yarn
- Clipboards (optional)

Time Required: 3-4 class periods

WA State Standards:

ESE Standard 2: The Natural and Built Environment. Students engage in inquiry and systems thinking and use information gained through learning experiences in, about, and for the environment to understand the structure, components, and processes of natural and human-built environments.

Overview: Students learn about urban planning and living and built environments by assessing the value of greenspaces and the environmental health of their school and city. By walking around the school and surrounding area (city parks or field trip optional) students use a green space characteristics inventory, which should help them become more aware of “greenspaces” and how humans impact them and are impacted by them.

Activity 1: Defining “Environment”

Time: one class period

Location: classroom, or outdoor space weather permitting (note materials needed for lesson to work outdoors)

Materials: whiteboard or large paper pad (if outdoors), printed worksheet material, colored pencils or markers

Progression:

1. Write “environment” on the board allowing students to raise their hands giving their definition or words they associate with environment. Create a web connecting their definitions.
2. Introduce the idea of living and built environments, if they have come up with both circle each using different colors asking for additions as you go. Introduce the word “greenspace” and talk about how it might fit into the web on the board.
3. Explain that the following activity is meant to help students think about how we and other species interact with these different spaces. Why we value them, what we use them for, what we call them, etc. Tomorrow we will be exploring some of the greenspaces near campus to continue our inquiry.
4. Pass out worksheets and have students form small groups (3-5), students will each fill out a worksheet but are paired in groups for discussion and sharing opportunity
5. Each worksheet should have a photocopied satellite image map of the school and some surrounding area. Ask students to complete their own worksheet individually but work with their group to share ideas and discuss findings.

The following pages ask prompting questions such as:

- i. First, mark at least 5 areas that could be considered greenspaces using one color. Next mark 5 areas that are built environments using another color. Identify with a key or label which color represents which environment. If there are other living environments that you would not consider greenspaces mark them in a different color.
 - ii. Write a short paragraph describing how you interact with each of these spaces. Which ones are your favorite, if you could plan your own city which spaces would you add more of?
 - iii. Using numbers or arrows write some known or hypothesized human uses for each space
 - iv. Next do the same for how animals use these spaces
 - v. Brainstorm some ideas on how the greenspaces within this map benefit your community. Are there any ways in which the greenspaces have an adverse effect on your community?
6. Prep students for what to expect of the following days activities (ie. What to bring to be prepared for weather, bring or plan to borrow a camera/phone)
 7. As homework have students write down in their journals what sorts of greenspaces they noticed on their way home. However small or big is fine! Just jot down some of the different living and built environments near your home. Continue to think about which you value most and why and how that might differ to another person or animal.

Activity 2: Walking Tour of local Greenspaces

Time: 1-2 class periods

Location: school campus and within short walking distance of school campus (Think through any necessary accommodation of this lesson for students of all ability)

Materials: clipboards or notebooks for writing on, journal, worksheets from Activity 1, colored pencils, camera (either personal or checked out from school)

Progression:

1. Break into small groups and distribute needed materials so that each group has: at least 1 clipboard, journal, worksheets from the previous day, pencils or markers, and at least one camera
2. Explain the purpose of the following activity and subsequent reflective assignment (Description of the reflective assignment found under Activity 3). The purpose of the walking tour is to collect information and observations of the living and built environments around the school campus. By walking these landscapes and documenting findings using multiple methods, students should continue to think critically about how humans and other species are in relation to these environments.
3. Advise students to stay within eyeshot and earshot, to stay on campus, and go over any other safety ground rules.
4. Lead the groups around the perimeter of the school campus at a slow pace so that groups can stop at various places and still be within safe distance.

Sample worksheet found at end of lesson plan

Activity 3: Reflection/Report Assignment

Time: 1-2 class periods

Location: classroom

Materials: poster material, blank paper (white and colored), colored pencils and markers, scissors, tape, glue, yarn, tacks

Assignment:

Groups should take the class period (or two) to compile and compare their findings from Activities 1 and 2 by creating a poster, portfolio, or other visually representative project. Each project should include description of at least 4 locations (with pictures if you'd like). The project should address how students perceptions of greenspaces changed or remained the same from their anticipations in Activity 1 and observation in Activity 2. Each student should include a segment describing how they relate to greenspaces. The group should collaborate to answer the questions: Why are greenspaces important to your community? Why are they important in the context of climate change? How could they be improved to be more inclusive and accessible?

Sample worksheet for Activity 1

(reformat before printing so that the satellite image is centered with at least an inch margin on all sides to allow for writing. Add space between questions so there is room to write after each one)



- i. First, outline at least 5 areas that could be considered greenspaces using one color. Next outline 5 areas that are built environments using another color. Identify with a key or label which color represents which environment. If there are other living environments that you would not consider greenspaces mark them in a different color.
- ii. Write a short paragraph describing how you interact with each of these spaces. Which ones are your favorite, if you could plan your own city which spaces would you add more of?
- iii. Using numbers or arrows write some known or hypothesized human uses for each space
- iv. Next do the same for how animals use these spaces
- v. Brainstorm some ideas on how the greenspaces within this map benefit your community. Are there any ways in which the greenspaces have an adverse effect on your community?

Sample worksheet for Activity 2

(reformat before printing to allow space for writing)

Location description	Living or built environment	People interaction/use	Animal interaction/use	Notable features in the area

From Unit 5 – Human and Environmental Health:

Light Pollution Lesson

Time: One class period

Location: classroom with tables if possible, desks might be tricky

Materials: student journals, watercolor paper, water-color paints, salt, ½ and 1/8 teaspoon measuring, computer/slide projector for pictures, whiteboard

Learning Goals:

- Learn about light pollution
- Be able to describe the effects of excess light on humans and animals
- Brainstorm solutions for reducing light impact
- Contextualize human relationships to stars/night sky across time

Learning Standards:

NGSS Standard: MS-ESS3-3 Earth and Human Activity: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Sources:

<https://kids.nationalgeographic.com/explore/space/light-pollution/>

(<https://www.vox.com/2016/6/10/11905390/light-pollution-night-sky>)

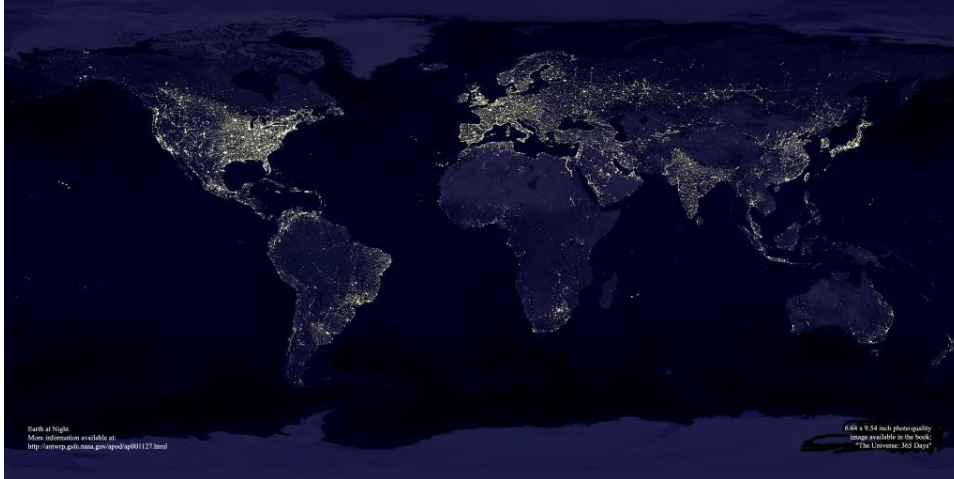
Instruction Sequence:

Short presentation on light pollution:

Include:

- Excess light from screens effect on sleep (disrupts circadian rhythm and melatonin production)
- Give examples of ecosystem impacts
 - Sea turtle nesting, hatchlings go toward city lights rather than water
 - Migratory birds confused by bright tall buildings
 - Bugs and birds never rest
 - Fireflies can't find a mate
- Energy loss caused by lighting (streetlights that shine all directions rather than down, cities up to 40% electric bill on lighting)
- How has light in cities causing inability to view stars changed human and animal ability to have a sense of place?
- Imagine a world without electricity and lightbulbs

Show images such as these as visuals



https://apod.nasa.gov/apod/image/0011/earthlights_dmsp_big.jpg



Guide students through a watercolor activity showing the change in star visibility over the past 100 years. Explain that in the early 1900s cities began using electric lighting which was the start of light pollution.

Watercolor activity:

- Pass out paper and watercolors to each student/group/table
- Prompt students to draw or fold a line down the middle of their paper, the left side will represent 1900/~100 years ago, while the right side will represent current day explain: "Normally, about 2,500 individual stars are visible to the human eye without using any special equipment. But because of light pollution, you actually see just 200 to 300 from today's suburbs, and fewer than a dozen from a typical city." (National Geographic)
- Give them time to watercolor their night sky, suggest that students watercolor the whole page using dark colors so the salt will show up and there will be no blank spaces

- Once they have finished their watercoloring ask each student to measure ½ tsp of salt and sprinkle it on the left side representing the year 1900, then 1/8 tsp for the right side (current day)
- The salt will dissolve and look like stars

Following clean-up have students write for 5-10 minutes in their journals

Short journal write: Take about 5 minutes to write about the night sky. Prompt ideas: Use descriptive language to tell a story or poem. Or write some questions you've always wondered about stars or space. Think back to some of the readings we have done – how might have some of these people used stars to guide them? Do you think star visibility will get better or worse during your lifetime? Can you think of some solutions to light pollution? Who needs light at night? Who doesn't that might be using more than they need?

Students might consider using this lesson as a template for their assignment to create a lesson for their peers or to teach as a part of a partner science program with school district 6th graders.

Ongoing Journal Description:

Time: ongoing

Materials: unlined journal minimum 200 pages and 6x8in size

Location: for use in and out of class

Learning Goals:

- Improve skills in different forms of writing
- Learn new modes of recording their thinking through use of different medias
- Gain confidence in articulating their voice through their work
- Think creativity in non-stressful environments
- Challenge their own thinking and past assumptions
- Practice time management and self-accountability
- Practice natural history observation

Description:

Throughout this class you will keep a journal averaging two entries per week. This journal should be unlined and have a sturdy cover as we will use journals outside. Entries should take a minimum of 15 minutes and can include reflective writing, poetry, storytelling, drawing, painting, collage, or other media formats as long as it shows critical thinking, creativity, and intention. Periodic journal prompts will be given based on current course content. We will use journals in class often so please bring it to class every day.