**Lesson 1: Expert Vocabulary**

**Problem statement:** How can we reduce the amount of pollutants distributed by stormwater in our community from entering our region’s waterways so that marine animals are not contaminated?

This lesson will provide students the vocabulary needed for students to discuss and proceed through the unit.

**Learning objectives:** Students will define the following vocabulary and give examples within the context of the unit: pollutants, contamination, stormwater, watershed, food web, and rain garden.

Discussion questions for a possible connection to underrepresented minorities:

* Where do we see more hard land surfaces like blacktop and pavement, urban or rural areas? Why?
* What resources might be available to make rain gardens in rural, suburban, or urban areas?
* Which communities are affected most by pollutants that contaminate marine animals? How?

**Lesson standards (**Source: [Next Generation Science Standards](https://www.nextgenscience.org/search-standards)**)**

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| **Standard** | **How the Standard Will Be Assessed** |
| [**Performance Expectation 3-LS4-3 Biological Evolution: Unity and Diversity**](https://www.nextgenscience.org/pe/3-ls4-3-biological-evolution-unity-and-diversity) **-**  Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. | Cognitive Content Dictionaries (CCDs) after the 3rd part of the lesson |

**Soft skills: (**[Source: Social Emotional Learning Standards, Benchmarks, and Indicators](https://www.k12.wa.us/sites/default/files/public/studentsupport/sel/pubdocs/Appendix%20D%20Standards%2C%20Benchmarks%20Indicators.pdf)**)**

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| **Soft Skill** | **Standard** |
| Communication | STANDARD 5: SOCIAL MANAGEMENT – Individuals have the ability to make safe and constructive choices about personal behavior and social interactions. |
| Collaboration | STANDARD 3: SELF-EFFICACY – Individuals have the ability to motivate themselves, persevere, and see themselves as capable. |
| Critical Thinking | STANDARD 1: SELF-AWARENESS – Individuals have the ability to identify their areas for growth, and potential external resources and supports. |
| Creativity | STANDARD 6: SOCIAL ENGAGEMENT – Individuals have the ability to consider others and show a desire to contribute to the well-being of the school and community. |

**Locally and/or personally relevant for students:**

Students will build on their understanding of their connection to and impact on the Puget Sound [water] and the marine animals that inhabit it. They will see images of where their water comes from (watersheds) and what might interfere along the way (pollutants), which will be connected to personal habits in the community.

For example, students may already be familiar with shrimping, fishing, crabbing, and clam-digging in local waters. They may have been entertained by the fish that are thrown at Pike Place Market. Seeing whales might be part of their family vacations to the San Juan Islands or to a family member’s house on Whidbey Island. Students may also be familiar with the causes and sources of local pollutants. Sources may include their parents’ places of employment. Causes may be the manner in which they themselves are disposing of certain materials at home.

**Connections to career and educational pathways:**

When students are discussing their Observations Charts, the teacher could ask questions like:

* What kind of job would someone have if they work at a *watershed*?
* What kind of job would someone have if they figure out how a *Food Web* works?
* What kind of job would someone have if they study and solve problems related to *pollutants* for their job?
* What kind of job would someone have if they create *rain gardens* for their job?
* What kind of job would someone have if they collect and test *stormwater*?
* What do you think their job is called?
* What kinds of things/learning would they have to learn in order to do their job?

Students will also learn about various professionals that work on stormwater solutions:

* [Snohomish Conservation District’s Urban Stormwater Program](https://snohomishcd.org/sound-homes) (ecologists)
* [12,000 Rain Gardens in Puget Sound](https://www.12000raingardens.org/) (ecologists, group: Working Women in Sustainability, Washington State University)

**Materials:**

* [GLAD Observation](https://ntcprojectglad.com/) [Chart printables](https://docs.google.com/presentation/d/1TaKBGQWBTZ9A0Do-qXpGzq5a5IRNKxU_8l8Cj18shCY/edit?usp=sharing)
* [GLAD](https://ntcprojectglad.com/)’s [Cognitive Content Dictionary template](https://www.teacherspayteachers.com/Product/Vocabulary-Cognitive-Content-Dictionary-CCD-2138818)
* writing paper
* writing utensils

**Lesson preparation:**

* Print 1 color set of GLAD Strategy: [Observation Chart images](https://docs.google.com/presentation/d/1TaKBGQWBTZ9A0Do-qXpGzq5a5IRNKxU_8l8Cj18shCY/edit?usp=sharing)
* Print enough GLAD Strategy: [Cognitive Content Dictionary (CCD)](https://www.teacherspayteachers.com/Product/Vocabulary-Cognitive-Content-Dictionary-CCD-2138818) templates for each student to have one.
* Pre-Teaching: Students should already know how to make observations of details and read pictures.
* Teacher Knowledge: Teacher should already know how to use the two GLAD strategies
  + [Video: How to use the GLAD Strategy: Observation Charts](https://youtu.be/VliRibwOeFk)
  + [Video: How to use the GLAD Strategy: CCD](https://www.youtube.com/watch?v=fsNO5boSzIM)

**Total Time required:** Approximately 1 ½ hours (90 minutes)

It’s ok to do each activity on different days, but they must be done in this order:

1. Part 1: [Cognitive Content Dictionary (CCD)](https://www.teacherspayteachers.com/Product/Vocabulary-Cognitive-Content-Dictionary-CCD-2138818)**:** 20 minutes
2. Part 2: [Observation Chart images](https://docs.google.com/presentation/d/1TaKBGQWBTZ9A0Do-qXpGzq5a5IRNKxU_8l8Cj18shCY/edit?usp=sharing)**:** 35-50 minutes minutes (7-10 minute rotations for each group to make observations for each 1 of the 5 sets until they have observed all 5 sets of images)
3. Part 3: Assessment: 30 minutes

**Grouping of students for instruction:**

1. **CCD**: Students will each have their own CCD template. As the teacher asks for predictions, students will talk with a partner to develop their prediction.
2. **Observation Chart (OC)**: Students will be separated into 5 groups (1 group for each Observation Chart image set).

**What is the instruction? Consider the PBL Procedure that is being addressed here:** Students will explore a problem in this lesson in order to develop background knowledge and build understanding about why certain actions in the environment are problems.

**Understanding the Problem**

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| **Part 1: Cognitive Content Dictionary (CCD)** | |
| **Teacher** | **Student** |
| CCD: Start by distributing a blank CCD chart to each student and display one on the board or projector (somewhere that all students can see it).  Tell students the first *expert vocabulary* word (Pollutants) while you model writing it in the first empty box in the first column that is displayed to the students. | Students will write the word in the first empty box of the first column on the CCD chart.   |  | | --- | | The Expert Vocabulary Words/Terms  Pollutants, Stormwater, Watershed, Food Web, Rain Garden | |
| CCD: Ask students:   * Who has heard of this word before? * What part of speech is it? | Students write the first word in the first empty box in the first column. They can also annotate to note the part of speech next to the word. |
| CCD: Ask students to predict what the word means. Give them a moment to think. Then, have them turn and talk with a partner. | Students think of predictions for the meaning of the word, then turn and talk with a partner to share and/or modify ideas. |
| CCD: Model writing your prediction on the displayed CCD in the top empty box in the second column. Your prediction should not necessarily be correct. Tell students that you are writing what you believe *right now*, but that you don’t yet know if your prediction is correct, and *that’s ok*. | Students will write their predictions on their CCD charts in the same spot. They can either write what was modeled by the teacher, the prediction that they shared with their partner, their partner’s prediction, or a combination of all of the above. |
| CCD: Repeat the steps above with the rest of the expert vocabulary words. You will only fill in these two columns right now. The rest of the CCD will be filled in as the unit continues. | Students repeat this until the first two columns are filled in with all of the new words. |
| CCD: Finish by collecting the CCDs from each student and putting it away for now. | CCD: Students should turn in their CCD charts to the teacher for safekeeping until it’s time to use them again for adding new information gained throughout the unit’s lessons. |
| **Part 2: Observation Chart (OC)** | |
| **Teacher** | **Student** |
| OC: Distribute the Observation Chart posters of the 5 Expert Vocabulary words/terms to each table group. Each group table should have 3 posters with the same vocab word on it. Each table group is a station.  *If teaching students how to make observations for the first time, model this by taking notes about the 3 images independently and then as a comparison to each other.*  After about 7-10 minutes, have students go to a new station and repeat the observations for the new vocab word at the new station.  To make connections to careers and educational pathways, the teacher can ask the following questions as they walk around visiting the various stations:   * What kind of job would someone have if they work at a *watershed*? * What kind of job would someone have if they figure out how a *Food Web* works? * What kind of job would someone have if they study and solve problems related to *pollutants* for their job? * What kind of job would someone have if they create *rain gardens* for their job? * What kind of job would someone have if they collect and test *stormwater*? * What do you think their job is called? * What kinds of things/learning would they have to learn in order to do their job? | OC: Students will discuss what they observe about each poster and compare the three posters. They will then write their observations and wonders on a single group paper to be discussed later.  After about 7-10 minutes, students will go to a new station of images and repeat the observations for the new vocab word at the new station on a new piece of paper. |
| OC: Repeat the above steps until students have visited all 5 stations. | Students will repeat these steps until they have visited all 5 stations. |
| OC: *Optional: Tell students to take a gallery walk.* | *Optional: Students take a gallery walk where they review the observations that other groups wrote. They may add or change observations on their own papers if they saw something that they liked and with which they agreed.* |
| OC: Collect all papers at the end to be reflected upon on a future date. | Turn in papers. |
| **Part 3: Assessment** | |
| **Teacher** | **Student** |
| Assessment: Return to students their CCDs. | Students will use their new knowledge from making observations to fill in the rest of the chart. They may also use dictionaries or the internet to complete the CCDs. |
| Assessment: Collect all papers at the end to be used as reference materials when needed throughout the unit. Compare the predicted definition that was done in part 1 to the final definition that was done in part 3. | Students should keep their CCDs in their personal notebooks, folders, or class organization system.  Self-reflection: Compare the predicted definition that was done in part 1 to the final definition that was done in part 3. Discuss or write about the differences and what was learned. |

**Accommodations:**

* **English Language Learners**: [*GLAD (Guided Language Acquisition Design)*](https://ntcprojectglad.com/) *strategies are intentionally designed to support students who are English Language Learners*.
  + Observations of images can be illustrated with no/few words.
  + Students may work in partners and have one person write while the other helps with what will be written.
  + Notes of 4 words or fewer can be used (vs. whole sentences).
* **Special Education**:
  + Observation Charts can be illustrated with no/few words.
  + Students may work in partners and have one person write while the other helps with what will be written.
  + Notes of 4 words or fewer can be used (vs. whole sentences).
  + Teacher’s modeling of CCD can be photocopied and turned into a CLOZE reading paragraph.
  + Teacher’s modeling of CCD can be photocopied and cut into parts. Students can paste the correct responses into each box as they are named by the teacher or a partner.
* **Highly Capable**:
  + Illustrations can be turned into diagrams with detailed labels.
  + Questions or hypotheses could be developed from the observations.
  + Students can compare across the OC terms (instead of just the images within one term).

**Extensions:**

* Field Trip: [Cedar River Watershed](https://www.seattle.gov/utilities/environment-and-conservation/our-watersheds/cedar-river-watershed/school-programs) (North Bend, WA)
* 29-minute film: [Lost and (Puget) Sound: How We Followed The Rain And Found Our Voice](http://www.seattlechannel.org/misc-video?videoid=x24436) (streaming online)
* Art Project/Field Trip: [Stencil a Storm Drain](http://seattle.gov/utilities/environment-and-conservation/our-watersheds/protect-our-waters/volunteer/stencil-a-storm-drain) (Puget Sound area)
* Community Project: [Carkeek Park Salmon Stewards](https://www.facebook.com/CarkeekParkSalmonStewards/) (Seattle, WA)

**Assessment:**

* Soft Skills: Classroom discussion and participation within groups
* NGSS Standards: Observation Chart notes and Cognitive Content Dictionary (CCD) responses

**References/Resources:**

* Instructional Plan Created during the 2019-2020 school year by Verónica West, Jenn McNease, Erin Wells, and Tim Rhoades of the Northshore School District in Washington State as part of their work with the Washington Alliance for Better Schools (WABS) ACCESS STEM program.
* Instructional Plan Consultants (not responsible for the content of this instructional plan):
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