**Unit Overview**

**Title of PBL Unit: Rain Gardens**

**Target Grade Level**: 3-5

**Subject**: Science/STEM

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**Problem Statement:**

1. **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?
2. **How the problem related to the workplace/students’ lives**: This problem relates to the lives of students’ future possibilities in the categories of:
   * 1. Housing and land ownership: Students will have the skill and experience to assess and build on the area around their homes to best filter the water that enters the Puget Sound.
     2. Their own future education & job market: Students will already be developing skills in environmental sustainability and can take that into university-level studies and into a career. That can range from landscaping to city planning.
     3. Maritime behaviors: Students will have a better understanding of the importance of being mindful about what gets into their water and what it affects. That should affect their behaviors while completing domestic tasks, such as washing their car, in addition to how they treat the waterways they encounter.

**Unit Overview and Table of Contents**

1. Lesson 1: Expert Vocabulary
   1. GLAD Strategy: [Cognitive Content Dictionary](https://www.teacherspayteachers.com/Product/Vocabulary-Cognitive-Content-Dictionary-CCD-2138818) ([video](https://www.youtube.com/watch?v=8wrcSBOLVLo) of how to use this strategy):
      1. [Pollutants & Contamination](https://www.kingcounty.gov/services/environment/water-and-land/stormwater/introduction/science.aspx)
      2. [Stormwater](https://www.kingcounty.gov/services/environment/water-and-land/stormwater/introduction/science.aspx)
      3. [Watershed](https://www.youtube.com/watch?v=QOrVotzBNto)
      4. Food Web
      5. [Rain Garden](https://fortress.wa.gov/ecy/publications/publications/1310027.pdf)
   2. [GLAD Strategy: Observation Charts](https://docs.google.com/presentation/d/18LMBRy1PJwLjXUB_kWClQaZRY3tABctEfUI1nfBflrM/edit#slide=id.p) ([video of how to use this strategy](https://www.youtube.com/watch?v=VliRibwOeFk))
      1. [Pollutants & Contamination](https://www.kingcounty.gov/services/environment/water-and-land/stormwater/introduction/science.aspx)
      2. [Stormwater](https://www.kingcounty.gov/services/environment/water-and-land/stormwater/introduction/science.aspx)
      3. [Watershed](https://www.youtube.com/watch?v=QOrVotzBNto)
      4. Food Web
      5. [Rain Garden](https://fortress.wa.gov/ecy/publications/publications/1310027.pdf)
2. Lesson 2: Smell Your Way Home
   1. Goal: Students will name the problem (contaminants in the water affecting marine animals)
   2. Inquiry-Based
3. Lesson 3: Exploring Contaminants
   1. Hands-on
   2. KWL contaminants chart
   3. In different clear containers of water, students will add contaminants (motor oil, fertilizer, dog poop, aspirin tablet). Then, they will make observations (notice/wonder).
   4. Match the contaminant “The Pollution You Can’t See” River Poster
   5. Brainstorm solutions for the unit’s *problem statement*. Students chart (possible answers: eco-friendly products, rain garden).
4. Lesson 4: Hands-on: Create a model of a filter (money/budget, materials (cotton balls, dirt, etc.)
   1. Choose how to lay out filter
   2. Purchase materials to build filter
   3. Build filter with two trials
5. Lesson 5: What is a [rain garden](https://fortress.wa.gov/ecy/publications/publications/1310027.pdf) (engineering, real-world practicum on school campus)
   * 1. Tour of school to identify areas for rain gardens
     2. Choose the best location and size of a rain garden (impervious vocab, area/perimeter, design ideas)
6. Lesson 6: Reflect
   1. Apply for a real [grant](http://www.12000raingardens.org/gsi-mini-grants/) for rain garden
   2. Create a brochure

**Standards**

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| **Lesson(s)** | **Next Generation Science Standards (NGSS)** |
| 1 | [**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. |
| 2, 3 | Practice 1 Asking Questions and Defining Problems (Grades 3-5):  Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships. |
| 4, 5, 6 | [**Performance Expectation 3-5-ETS1-2: Engineering Design**](https://www.nextgenscience.org/pe/3-5-ets1-2-engineering-design) **-**  Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem. |
| 6 | [**Performance Expectation 3-5-ETS1-1: Engineering Design**](https://www.nextgenscience.org/pe/3-5-ets1-1-engineering-design) **-**  Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost. |

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| **Lesson(s)** | **Soft Skill** | **Social-Emotional Standards**  **(**[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)**)** |
| 1, 4, 6 | Communication | STANDARD 5: SOCIAL MANAGEMENT  Individuals have the ability to make safe and constructive choices about personal behavior and social interactions. |
| 1, 2, 3, 6 | Collaboration | STANDARD 3: SELF-EFFICACY  Individuals have the ability to motivate themselves, persevere, and see themselves as capable. |
| 1, 4 | Critical Thinking | STANDARD 1: SELF-AWARENESS  Individuals have the ability to identify their areas for growth, and potential external resources and supports. |
| 1, 4 | 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. |
| 4 | Communication | STANDARD 2: SELF-MANAGEMENT  Individual has the ability to regulate emotions, thoughts, and behaviors. |

**Locally and/or Personally Relevant for Students**

Students will build on their understanding of their connection to and impact on the Puget Sound [water]. They will see images of where their water comes from and what might contaminate stormwater on its way to the Puget Sound. This will be connected to personal habits in the community.

**Connections to career and educational pathways**

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

* University programs for environmental sustainability, civil engineer
* Employment in city planning, landscaping, ecology, biology
* [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)