PART 3: INCOPORATING ENVIRONMENTAL JUSTICE WHEN REDUCING POLLUTION IN STORMWATER[1]

Lesson Plan 7: Introduction to Stormwater Pollution and a Green Stormwater Infrastructure (GSI)

Goal: Participants will learn about sources of stormwater pollution, how green stormwater infrastructure (GSI) can be used to protect both our waters and people, and how government agencies are working with underrepresented communities to install GSI.

Learning Objectives:

By the end of this lesson plan, participants will be able to:

- List three examples of the types of contaminants found in stormwater
- Describe how combined sewer overflows work
- Explain what green stormwater infrastructure does and give three examples
- Discuss how government agencies and underrepresented communities can work together to improve community conditions

Materials:

- LCD projector
- Computer
- Connection to the internet or download in advance
- Video: *Water Blues Green Solutions – Philadelphia segment (18 min)* (Penn State Public Media) (highest priority to watch)
    - http://waterblues.org/themes/philadelphia/philadelphia-segment (requires internet connection)
    - W*ater Blues Green Solutions* DVD which you can order at http://waterblues.org/order-dvd for $24.95
- Video: *Drained: Urban Stormwater Pollution* (9 min) by Earthfix http://vimeo.com/51603152
- Video: *Neighbors Fight Stormwater Pollution by Building Rain Gardens* (7 minutes) http://vimeo.com/28494253.

Time Required: 50-75 minutes

Background:

The next two lesson plans address stormwater pollution and actions being taken to address it. As previously discussed in the Introduction, *Beyond Waste* is Washington State's strategic plan with a 30-year vision "to eliminate most wastes and toxics and use any remaining waste as resources." One of the most important reasons for properly managing our hazardous materials and wastes is to help protect the State's waterways and Puget Sound from polluted runoff. Rainwater washes substances from both point and non-point sources into stormdrains that flow into rivers, streams, lakes and Puget

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Sound. Contamination that enters waterways can adversely affect both the environment and human health (references in the Background section below).

In this lesson plan we watch three short videos (18, 9 and 7 minutes) to introduce participants to stormwater pollution and GSI. If you are short on time, we recommend that you prioritize watching the *Water Blues Green Solutions* video. The host of the video is Majora Carter, a well known Environmental Justice activist (http://www.ted.com/talks/majora_carter_s_tale_of_urban_renewal?language=en). The video explains Philadelphia's stormwater pollution issues and how the city is tackling the problem through the use of green infrastructure. It also covers how Philadelphia is working with an underrepresented community to create green infrastructure. Important discussion points should cover how other community conditions are improved as a result of this project (e.g., food security, social cohesion, etc.).

Afterwards, we use the ORID (Objective, Reflective, Interpretative, Decisional) facilitation technique (Institute of Cultural Affairs) to discuss the videos. We often do not get to the Decisional part in our discussion in this lesson plan, but the ORI process helps participants understand what other people in the discussion group are perceiving (O), how they are reacting emotionally (R), and how they are making sense out of what they are seeing (I). The decisional (D) part of the discussion is covered in Lesson Plan 8 (Equity Impact Review)

Suggested Preparation for the Teacher/Facilitator

- Watch videos cited above
- Combined Sewer Overflow websites
  - EPA website: http://water.epa.gov/polwaste/npdes/cso/
  - King County Combined Sewer Overflow (CSO) locations http://www.kingcounty.gov/environment/wastewater/CSO/Library/map.aspx
  - Natural Drainage Solutions for Protecting Our Waters http://www.kingcounty.gov/environment/wastewater/CSO/Solutions/Green.aspx
  - Historical Solutions = Modern Problems http://www.kingcounty.gov/environment/wastewater/CSO/Solutions/Historical.aspx
  - Glossary http://www.kingcounty.gov/environment/wastewater/CSO/Library/Glossary.aspx
- Green infrastructure
  - *Tapping Green Infrastructure to Curb Sewer Overflows*. EPA. Science Matters Newsletter. http://www.epa.gov/sciencematters/april2012/overflows.htm
  - EPA. Green infrastructure website http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm

- Puget Sound
  - *Encyclopedia of Puget Sound* by the Puget Sound Institute has a wealth of information on Puget Sound. Watch out you could get lost on this website. http://www.eopugetsound.org/areas;
    http://www.eopugetsound.org/articles/pollution-control-strategies-puget-sound
- Facilitation: *A Magical Tool for Group Decisions* by Christopher Avery http://masterfacilitatorjournal.facilitatoru.com/archives/skill124.html

Word Wall:

- *Stormwater:* Runoff that is generated when precipitation from rain and snowmelt events flows over land or impervious surfaces and does not percolate into the ground. As the runoff flows over the land or impervious surfaces (paved streets, parking lots, and building rooftops), it accumulates debris, chemicals, sediment or other pollutants that could adversely affect water quality if the runoff is discharged untreated (http://water.epa.gov/polwaste/npdes/stormwater/).
- *Impervious surfaces:* Mainly artificial structures, such as pavements (roads, sidewalks, driveways and parking lots) that are covered by impenetrable materials such as asphalt, concrete, brick, stone, and rooftops. Soils compacted by urban development are also highly impervious (http://en.wikipedia.org/wiki/Impervious_surface).
- *Green infrastructure (*or *green stormwater infrastructure):* Green infrastructure uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water (http://water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm).
- *Infrastructure:* refers to the fundamental facilities and systems serving a country, city, or area, including the services and facilities necessary for its economy to function. It typically characterises technical structures such as roads, bridges, tunnels, water supply, sewers, electrical grids, telecommunications and so forth, and can be defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions(http://en.wikipedia.org/wiki/Infrastructure).
- *Combined sewer overflows (CSOs):* Overflows that occur during wet weather that consist of combined wastewater and stormwater. CSOs happen when flows in the wastewater collection system exceed the capacity of that system. The term "CSO" is also sometimes used to denote a pipe that discharges those overflows (http://water.epa.gov/polwaste/npdes/cso/).

- *Rain garden*: Rain gardens are shallow, vegetated basins that collect and absorb runoff from rooftops, sidewalks, and streets. Rain gardens mimic natural hydrology by infiltrating and evapo-transpiring runoff. Rain gardens are versatile features that can be installed in almost any unpaved space (http://water.epa.gov/infrastructure/greeninfrastructure/gi_what.cfm#raingardens)

Facilitation questions

Prompt: Today we are going to watch two (or three) short videos about stormwater pollution and about green stormwater infrastructure.

Note: The questions below are generic and can be repeated for each video clip. We recommend stopping between each video, using the questions below to discuss what participants see (O), feel (R), and interpret (I) along a conceptual ladder of thinking (ORID). You do not have to ask each question. You can use a flip chart or white board to record what participants are saying. Try to get everyone involved.

1) Objective *(Senses)*
   a) Question 1: What scenes do you remember?
   b) Question 2: Who were some of the characters in the video?
   c) Question 3: What facts or terms do you remember? (CSO, green infrastructure, rain garden, impervious, pervious, community building)

2) Reflective (Reactions)
   a) Question 1: What parts did you have a positive reaction to?
   b) Question 2: What parts did you have a negative reaction to?
   c) Question 3: Were there any parts that were confusing?

3) Interpretative (Sense-making)
   a) Question 1: What is the importance of this video?
   b) Question 2: What new vantage points do you have?
   c) Question 3: What conclusions were made?

4) Decision
   a) Question 1: What decisions were made in this video?
   b) Question 2: What actions were taken or suggested in this video?
   c) Question 3: What action might you be inspired to take based on watching this video?

5) Closing

   Prompt: In our next class, we will be working on a worksheet to help us decide where we might build GSI in Seattle using an equity lens.

Extensions that build on previous lesson plans

1) Lesson Plan 1: What makes a community healthy?
   a) Thinking about stormwater pollution and green infrastructure:
   b) What indicators would you use to identify unhealthy parts of your community?
   c) What indicators would you use to identify healthy parts community?
   d) What other benefits do rain gardens do besides reducing pollution to our waterways?

2) Lesson Plan 2: Whose Backyard? Environmental Justice – Toxic Waste Management meeting
   Do you think that there are some communities that are more likely to be exposed to stormwater pollution than others? Why or why not?
3) Lesson Plan 3: How is equity different from equality?
   If the City of Seattle and/or King County decide to start a green infrastructure program to reduce stormwater pollution, what might an equitable program look like? How would you do it? (Note: this is Lesson Plan 8).
4) Lesson Plan 4: Causes of the Causes: What are the root causes of this problem?
   a) Why is Community X having stormwater pollution problems?
   b) Why is GSI needed?
5) Lesson Plans 5 and 6: Environmental Justice Matters: Mapping ZIP codes and Mapping Cumulative Impacts)
   What kind of evidence would you collect to justify why you would start a green infrastructure program in one neighborhood versus another? Where would you go look for the data?

Extensions if participants have access to computers

1) Rain garden and cistern virtual tours
   http://www.kingcounty.gov/environment/wastewater/CSO/BeRainwise/Tour.aspx
   - South Park (ZIP code 98108)
   - Ballard (ZIP code 98107)
2) Natural Drainage Solutions for Protecting Our Waters
   http://www.kingcounty.gov/environment/wastewater/CSO/Solutions/Green.aspx
3) Rainwise Demonstration Project, South Park (8th Avenue Regulator Station)
   In the summer of 2014, JHA piloted the EJ curriculum with 16 youth. One of the action projects was to install a cistern and rain garden in South Park with the assistance of Homegrown Organics, Bellwether Design, and Urban Systems Design. The installation was funded by King County Waste Water Treatment Division.
   https://www.youtube.com/watch?v=I1P3zxEmx5M (approximately 3 minutes)