

CAO AND BSA STORMWATER SUMMER EDUCATION NURTURE Summer Camp at Pratt Willert Community Center and Leadership Academy at JFK Community Center

JULY 2017







This report was prepared for the CAO and BSA for the Stormwater Summer Education sessions for the summer of 2017. Six full day sessions were conducted, teaching children the importance of stormwater management and all of the included components As part of the Willert Park Green Infrastructure Project, the Buffalo Sewer Authority wished to provide a greater community outreach program, designed for neighborhood youth in particular, with the intent of engaging and educating the neighborhood about the project happening along William Street and at both the Pratt Willert Community Center and the JFK Community Center.

Teaming up with Community Action Organization of Erie County, Inc (CAO) allowed a unique opportunity to connect with neighborhood youth from Kindergarten to Grade 8.

The following is a curriculum that was developed by Joy Kuebler Landscape Architect, PC in coordination with the Buffalo Sewer Authority and CAO leadership. This document has been created to capture the content and lesson format used for each session in an easy to follow guide for future community and youth based stormwater education needs.

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SESSION 1: WATER

Water Worx and the Big Picture We are surrounded by water - why should we care about that?

Day 1: Water Worx and the Big Picture

We are surrounded by water - why should we care about that?

Introduction:

Who are why and why are we here?

Start with a conversation about Rain:

"How many of you remember the last time it rained? Do you remember if it was a little rain, or a lot of rain? Now think back to the spring and when it rained a lot!"

Next, we'll talk about our location and surrounding waterways:

Use the map of the area (provided in Appendix A) showing the Lakes and the River and ask the students:

"Do you know the name of the lakes and the river? Have you heard of Niagara Falls? Have you ever been to see any of these?

Other water facts and observations:

How many of you turned on the sink to brush your teeth this morning? How many of you had a drink of water? Water is a pretty important part of our lives, right? In fact our bodies are 98% water, so we need it to live! So where does our water come from?

On the day we presented, we were in the middle of a very large storm. This gave us a great opportunity for the kids to observe the storm up close and allowed for some site specific questions:

"Let's look at the parking lot. What do we notice about the water on the pavement?"

"Now let's look at the park lawn. Do we see any difference from the pavement? What is the water doing and where do you think it is going?"



Where does the water in the road go?

 Return to the map to talk about how our water in Buffalo comes from Lake Erie.

- Discuss briefly how the water is collected, goes to pumping facility, gets cleaned, put in the pipe underground and travels to their homes, schools, community center, etc.
- Also discuss what happens when you flush the toilet: Water leaves the house in a pipe, goes to a treatment building, gets cleaned and then returned to lake.
- So where does the water in the road go??

Discuss the pipe in the road: The pipe from the toilet leaves your house and connects to the pipes under the road. The water from the toilet is joined with the water from the street and travels along the pipes to the treatment building.

But wait a minute...is that OK? That is an important question! Let's talk about WATER!

Today we are going to think BIG about water:

Over the next 5 sessions, we'll talk about the details.

Conversation about the Water Cycle:

Have you ever heard of something called the "Water Cycle" in school? While water cannot be created or destroyed we can certainly lack <u>clean water</u>. Over time our communities have grown, and so how the water cycle works now is very different than it did 100 years ago. Let's explore with our "water in a suitcase"!

Stormwater Suitcase Experiment: Running the Experiment for Grades 6-8:

- Borrow Stormwater Suitcase from Erie County
- Be sure to have a wide selection of pollutants: Soil erosion, pesticides, herbicides, oil and gas, trash and litter (should be included); Add 'leaf and organic litter' with <u>dried parsley flakes</u> if not included in kit.
- Ask for Volunteers to help set up the model. You'll need:
 - Architects to help place the buildings (2-3 kids)
 - Engineers to help place the bridges (1-2 kids)
 - Foresters to help place the trees (1 kid)
- Discuss the role of each of those professions briefly
- Next, ask the group about the kind of pollution they see and know about in their environment



- Have students spray a light rain, and discuss impacts of the light rain on the pollutants
- Then have volunteers spray more to create a heavy storm discussing the more significant outcomes
- Address the difference between run off that <u>directly</u> impacts waterways, and the impacts of combining the water in the sanitary and the stormwater sewer pipes which leads to a combined overflow that affects our waterways

TIPS & TRICKS:

Water Cycle Song Can be used if time permits, particularly with younger students. Be sure to have a speaker that will allow everyone to hear. Search for "Water Cycle Song" on YouTube and choose your favorite version!



- Ask students to name pollutants and have a discussion on each, asking them to help with the next step of the experiment
- Each volunteer should shake the pollutant from the kit on to the model in various places
- Be sure to talk through how pesticides and herbicides as used to support things like food crops, but also how their run off impacts us
- Once the model is adequately polluted, ask for volunteers to be the rain storm and hand out water bottles



See following page for tips on running this experiment with younger age groups!

Conversation about the Waterways Near us:

Based on our experiment, what do you think about the waterways near us? Show the map again and point out how the water is always shown as blue. Discuss the actual colors of Lake Erie, Niagara River, Lake Ontario, etc. Do you think they are clean or dirty?

How do we try to make them cleaner?

Brainstorm big ideas to make them cleaner, listing ideas on large flip chart paper as they are discussed. Introduce Green Infrastructure as a concept and note its alignment with the ideas they produced in their brainstorming.

Conversation about Green Infrastructure

Topics to discuss during this time include:

- The role of green infrastructure to catch the run off before it reaches the street
- The role of green infrastructure to take water rolling down the street and put it in the garden before it gets to the drain
- How we connect the garden and the street
- Introduce the specific green infrastructure projects going on around them [Willert Park Neighborhood, JFK and Pratt Willert Community Center projects]

Running Experiment for Grades 3-6:

- Can be run similar to first group, but may need less volunteers to keep group focused and on track
- Simplify all discussions to match the grade level

Simplify Experiment for Grades K-2:

- Set up the stormwater model yourself, but ask students what jobs create buildings and roads as you place items. Ask about trees and introduce landscape architecture
- Ask questions about pollutants. As kids name pollutants have them come up and shake onto model, one at a time - or you can opt for no volunteers, depending on your circumstances
- Reduce the number of volunteers for the rain as needed to maintain focus
- Discussion with this group will be very broad ideas:
 - Litter and pollution all around us
 - When it rains, that pollution goes to the lake unless we do something else
 - Rain gardens can catch the pollution before it gets to the lake

TIPS & TRICKS:

Be sure to have place to clean the model thoroughly between sessions. It is large and gets very messy!



WATER

Green Infrastructure Experiment:

"Let's do another experiment to see how green infrastructure works!"

Running the Experiment for Grades 6-8

- You'll need:
 - Pitcher with water
 - 2 easy to read measuring cups
 - Aluminum pan with concrete paver (be sure the paver is NOT POROUS in any way. This keeps the experiment simpler)
 - Aluminum pan with a sponge, elevated in some way so that the sponge will be out of the water resting on the bottom of the pan.
- Discuss the properties of the paver (hard, smooth, not porous) and how this represents the pavement in our communities





- Discuss the properties of sponge (bumpy, light weight, can hold water) and how this represents Green Infrastructure and Rain Gardens in our communities
- Ask for a hypothesis: "What do you think will happen to the water when poured over the paver and poured over the sponge?"
- Ask a volunteer to measure one cup of water into each measuring cup
- Pour one cup of water over the paver and one cup of water over the sponge into the aluminum pans
- Volunteers will then pour water from the paver pan back into measuring cup, announcing amount out loud to the group; repeat for sponge pan
 - Discuss: Does the outcome align with our hypotheses?

Conversation about the Pavement Around Us:

Now that we've done our experiment in a small amount, let's think about the pavement surrounding us. Can you visualize how much water a storm might produce? How will the Willert Park Green Infrastructure Project act the same as the sponge? How will this project help the Big Picture for our Lakes and River?

Wrap Up Discussion:

- 1. Ask for minimum of three things they learned today
- 2. Ask: Was today fun?
- 3. The next time we meet we're going to be talking about soil! It's not just *dirt* soil is much cooler! And we'll do some experiments with soil to see how water acts with it
- 4. After that we'll be talking about plants and their importance
- 5. Before we are done for the summer, you'll know how to take care of your garden and maybe even have an idea of what you want to be when you grow up!

Materials Needed For Water Day:

- Stormwater Suitcase kit and any additional "pollution" materials
- Two aluminum pans 13" by 9"
- 2 multi-cup Measuring cups glass or plastic, be sure they are easy to read
- 1 concrete paver (NON-POROUS)
- 1 rinsed and dried sponge per class session
- Support block for sponge in pan (should also be non-porous so that it does not interfere with the experiment
- Large flip chart paper
- Crayons & markers
- Clean up sink, paper towels, sponges, etc (for stormwater suitcase will need to be cleaned in between each session)

TIPS & TRICKS:

Sponges should be <u>rinsed and dried</u> before experiment. Just drying is not enough, you must rinse chemicals from the sponges first. Ideal to have a dry sponge for each group for maximum visual impact and continuity between experiments.













SESSION 2: SOILS Water Worx Through Soils ...but it's not by making mud!

Day 2: Water Worx Through Soils

...but it's not by making mud!

Introduction:

Ask for a minimum of three things they learned from the previous session; coach if needed:

- What is important about water?
- Where does our drinking water come from?
- When the rain picks up the pollution from the roadway, what is it called?
- Prompt with more questions from the 'Water' session as needed

Start with a conversation about Soil:

Today we are going to talk about soil and about the earth. Remember that we call it SOIL, but what don't we call it? DIRT!! Why? Because dirt is usually something not very nice or healthy for us, but SOIL... soil is pretty darn cool!

Activity:

- Ask the following questions:
 - 1. "What do we know about Soil?"
 - Use flip chart paper to record responses
 - Typical responses will include:
 - Food grows in it
 - Trees grow in it
 - Older kids will most likely know about the different rock types: Igneous, Metamorphic, Sedimentary
 - 2. "How long does it take the planet to make 1 inch of soil?"
 - Take a range of guesses
 - Answer: it takes 500 years to make 1 inch of soil!
- Obtain a 5 gallon bucket of each material and introduce the different 'ingredients' that make up soil: Sand, Gravel, Clay, and Compost that will be explored

Conversation about "soil recipes": Soil on the planet is made up of various amounts of these items and as landscape architects we can DESIGN the mix we want for our soils to do specific jobs! Think of them almost as the ingredients for a recipe. The landscape architect will create a recipe for the contractor to follow so that the rain garden works the way we want it to. Each of these 'ingredients' are found in nature and they each do a specific job to help filter and clean the run-off pollution we saw and talked about yesterday.



SOILS

Exploring Soil Samples:

- Break kids up into groups, 4-5 kids per group
- Prepare samples in paper cups, one cup of each per group
- Give each group hand-lenses to observe the samples up close as well



2. Gravel Sample

- Where does pea-stone come from?
- Discuss dolomitic limestone in our area. Did you know that the rock is so hard they often have to use dynamite to blast it out of the ground?
- · Let's look at it with a hand lens
 - What do we see?
 - How does it feel?
 - Do we think plants would grow well in this?
- 3. Clay Sample
 - Where does clay come from?
 - For older kids, you can discuss the pre-historic
 - tropical lake that was located where we are today and how the lake bottom gives us our clay soils
 - Younger kids will recognize clay from art class at school.
 - Let's look at it with a hand lens
 - What do we see?
 - How does it feel? How does it smell?
 - Do we think plants would grow well in this?
- 4. Leaf-Compost Sample (pre-shredded preferable, with leaves visible)
 - Where does compost come from?
 - Return to the conversation about the Earth taking 500 years to make 1 inch of soil and reference how compost is created.
 - Let's look at it with a hand lens
 - What do we see?
 - How does it feel? How does it smell?
 - Do we think plants would grow well in this?

TIPS & TRICKS: Have kids count off to determine

groups. They will resist going into groups or will be unable group themselves into the right sizes. This will save you a lot of time!

- 1. Sand Sample
 - Where does sand come from?
 - Discuss erosion. Wind and water wears away at rocks on the planet and erode other things in our environment that contribute to run-off and pollution
 - Look at the sand sample with a hand lens
 - What do we see?
 - How does it feel?
 - Where do we find sand most often?
 - Do we often see a lot of plants growing in sand?



Water Experiments:

Running Experiments for Grades 3-8

- You'll Need:
 - 4 strainers to act as sieves
 - Measuring cups
 - 1/2 of water per each material (you'll need (2) 1/2 cup pours for the clay)
 - 8 volunteers (4 to hold sieves, 4 to pour water)
- Fill sieve with each of the 4 materials to the top of the sieve
- Ask for hypotheses for each material. "Do you think the water will move fast or slow through this sample?"
- Have student volunteer pour 1/2 cup of water *SLOWLY* through the materials, one at a time
- Discuss hypotheses and results
- 1. Clay Sample:
 - Pour first ½ cup through sieve to get material moist
 - With moistened material, gradually work wet clay into a bowl shape in the sieve (older kids can do this themselves; younger kids will want to, but can get out of focus quickly)
 - Re-ask hypotheses question
 - Re-pour second ½ cup of water, discuss observations
 - Can plant survive in this soil alone?
 - Can there be too much water for plants to live?

• Plants NEED some amount of clay to be able to transfer nutrients to their roots

- 2. Sand Sample:
 - Pour the water through *slowly*
 - Discuss the observations and hypotheses.
 - Can plant survive in this soil alone?
 - Discuss the role of the sand as the "Filtering" part of our rain garden mix
- 3. Gravel Sample:
 - Pour the water through *slowly*
 - Discuss the observations and hypotheses.
 - Can plants survive in this soil alone?
 - Discuss the role of gravel: this is the component that keeps water moving in rain garden soil
 - We put this at the bottom usually to help to keep water moving
- 4. Compost Sample:
 - Pour the water through *slowly*
 - Discuss the observations and hypotheses
 - Can a plant survive in this soil alone?



TIPS & TRICKS: For Grades K-2 it is best

to run this experiment for them from start to finish. Their enthusiasm to pour water may cause them to lose focus quickly and lose track of the lesson.

Water Worx through Soils: 15

Let's Make Our Own Rain Garden Soil!

Ask: Can we create a soil recipe to do something specific?

Yes! By mixing specific soils and plants, we can make a Rain Garden! Remember what happened during the sponge experiment? (Give kids a chance to respond, prompt them if necessary: what happened to the water when poured over the concrete paver? How about over the sponge?)

By mixing soils in a certain recipe, we can create the sponge part of the rain garden!!

Rain Garden Soil Experiment:

Running Experiments for Grades 3-8

- You'll Need:
 - Soil sample 'ingredients'
 - Plastic scoops
 - Large plastic/tupperware containers or aluminum pans to mix 'ingredients'
 - Wooden paint stir sticks for mixing
- Break kids up into groups, 4-5 kids per group
- Ask: What do we want rain garden soil to do?
- Hypothesize about what may make a good rain garden soil recipe:
 - Remember how the water moved through each soil type
 - How much of each ingredient do we need?
 - Let's get mixing!
 - Have each group scoop different amounts of each soil type into the large plastic containers
 - Mix well!
 - Test the recipe
 - Using the strainers as sieves again, scoop your rain garden soil into the sieve
 - Pour water slowly through the soil
 - Discuss Observations
 - Did your soil work like you thought it would?
 - How do you think you could you improve it?



For Grades K-2: Allow them to create/ scoop/mix their own ingredients but monitor closely so that they stay focused on the task at hand. When it is time to pour the water, again it may be best for an adult to do this step so that the kids can pay attention to what is happening and answer questions.

TIPS & TRICKS:

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Wrap Up Discussion:

- 1. Ask for a minimum of three things they learned about water yesterday
- 2. Ask for a minimum of three things they learned about today
- 3. Ask: Was today fun?
- 4. Next time we meet we're going to be talking about PLANTS! Plants are important for our rain gardens **AND** for our communities; we'll be talking about a few of the reasons why

Materials Needed for Soils Day:

- Flip board paper and markers
- Soil samples
 - Sand
 - Clay
 - Compost
 - Gravel
- Plastic or paper cups
- Hand lens
- 4 strainers
- 4 large plastic containers
- Plastic shovels or large scoopers
- Wooden paint stir sticks for mixing
- Latex gloves (some kids may want them for soil exploring/mixing)



TIPS & TRICKS:

While gardening gloves will work for those kids that prefer to keep their hands clean (and they can be re-used again on planting day as well as weeding day), latex gloves are preferred for soil day. They will keep their hands clean while still being able to feel the different textures of soil; Because it washes off, we do encourage the kids try to work WITHOUT gloves so they can really feel the different textures





SESSION 3: PLANTS

Water Worx Through Plants

Let's Root for Roots!

Day 3: Water Worx Through Plants

Let's Root for Roots!

Introduction:

Do you remember what we talked about last time? Ask for a minimum of 3 things they learned from the previous session; coach if needed:

- Who can tell us something about water?
- What about soils?
- How long does it take the Earth to make 1" of soil?
- What is important about rain garden soil?

Start with a conversation about Plants:

Today we are going to talk about Plants! Because we can't have a garden without any plants, right?! But not just any plants - we need to be smart about the plants we have in our rain gardens!

Activity:

- Ask the following questions, using a flip chart to document student responses:
 - Do we think there are more people, or more plants on the planet?
 - Why are plants important? (Be sure each group is discovering/ identifying at least the following):
 - Air we breathe through photosynthesis!
 - Plants are Food
 - We build houses and all sorts of things from wood
 - Paper
 - Cooling/shading
 - Helpful for birds and insects and mammals (we call this supporting habitats)
 - Absorbing a lot of water!
 - 3. Why do we need to be smart about the plants we choose for our rain gardens? (Be sure each group is discovering/identifying at least the following):
 - Hint: what did we learn about the last two days?
 - Rain gardens get a LOT of water and the plants have to be able to survive
 - The rain garden soil will have a lot of sand, so we have to make sure they can grow in the sandy soil
 - Plants can be all different sizes and some might be too big, and others too little



Plant and Garden Activities:

Role Play Game (For Grades K-2):

- Ask kids to come to center of the room and take a seat
- To start the game, ask what they know about seeds
- "Pretend you're a seed"
 - Ask the kids to curl up in a ball, representing the small seed
- Narrate the Spring Rains
 - Pretend to sprinkle water on them
- "Start to sprout"
 - · Have kids wiggle their legs and arms



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- Narrate the early summer sunshine
 - "The sun is shining can you feel it's warmth?"

Mention that the air is getting chilly and have kids

Slowly shrink back down to a kneeling, then laying

Narrate that winter is arriving and snow falls on them
Pretend that snow is falling to the ground and

wrap their arms around themselves

"Wither and gently fall to the ground"

down position

covering them

- "Start growing"
 - Have kids start to kneel and then slowly move to a standing position
- Narrate that wind is blowing
 - Have them wave back and forth in the wind
- Narrate summer rain
- Pretend to sprinkle rain again and have them wiggle in place
- Narrate warm summer sun
 - "Can you feel the warm sun on your face?"
- "Bloom for Summer"
 - Have them use their hands to frame their faces as the "pretty flowers" open up
- Narrate late summer
 - They are as tall as they will grow, have the kids reach to the sky as high as they can





- But the plant's roots are still strong
 - Have them curl up and snore like they are sleeping
- Narrate that early spring is arriving
- We start to "Wake Up"
 - Ask the kids to stand up and jump!
- "You did it! You've gone through the whole growing season!"



Paper Plate Plant Sorting Game (For Grades 3 and Up)

- Create collages on paper plates to represent types of plants to consider for a rain garden.
 Be sure to create enough for both groups to have a wide selection to choose from.
 Recommended to create 3 of each for each group:
 - Spring white flowers
 - Spring red/pink flowers
 - Spring yellow flowers
 - Spring purple flowers
 - Summer white flowers
 - Summer red/pink flowers
 - Summer yellow flowers
 - Summer purple flowers
 - Tall green plants
 - Wide green plants
 - Fall color plants
 - Plants to attract birds and butterflies
 - Plants to support animal habitat
- Separate students into 2 groups



• Spread the paper plates plants across long tables, and have the students each pick three plants for their rain garden; Encourage the students to work together to decide the overall garden design



- Each student will report which plants they selected and place them on the floor, making one large garden
- Based on their selections, have a conversation about value of diversity in rain gardens, and describe what kind of garden they created i.e.: A rain garden with mostly spring flowers, some green plants in the summer, with lots of plants for birds and insects
- Photograph the group next to their garden



Real Plants Activity Part 1 (For All Grades)

- Have a table of example plants to show the students a variety of leaves, blossoms and structures
- Use two plants to show variety of scent and textures
 - Bring a pot of Russian Sage around to each student, ask if the plant smells "Sweet or Spicy"?
 - Then bring a pot of Hyssop around to each student and ask if it smells "Sweet or Spicy"?
 - The kids will notice a large difference between the two





Let's Root for the Roots! Activity (For All Grades)

We've talked a lot about variety of plants, but next we should talk about what is going on below the ground...the roots!



- On a flip chart, have a simple tree drawn with a horizontal line on the middle of the page to represent the ground
- Ask a student volunteer to come up and draw the way they think tree roots grow
- Next, draw the way roots actually grow to show the difference, if any
- Discuss how large a tree is, and how they need roots that go very wide, so they can support the tree
- Ask the following question, using a flip chart to document responses:
 - 1. Who can tell me something they know about plant roots? Be sure each group is discovering/identifying at least the following:
 - Roots are how the plant absorbs water and nutrients
 - Roots keep the plant in the ground, especially during heavy rain and wind
 - Tree roots can absorb a LOT of water because their roots are so wide

Conversation about Pollution and Runoff:

We talked about polluted runoff water the other day. And we talked about how our rain gardens collect the polluted water on purpose. Ask the following questions:

- 1. Will the plants in our rain gardens die if the water is polluted?
 - Have a discussion on how important it is to select plants that will survive the pollution
- 2. Will the plants in our rain garden now be polluted since they are absorbing the polluted water?
 - Have a discussion on how the plant converts the pollution inside its stems and gives us oxygen through photosynthesis

Conversation about Roots:

Using laminated diagram of plants and roots (image provided in Appendix B), have a discussion on the wide variety of how plants look on the surface and how their roots look. Discuss how much water comes into a rain garden and discuss the benefits of deep roots over shallow roots. Plants can reach deep for water, have more roots to absorb more water, and can stay in place during a big storm.

Real Plants Activity Part 2 (For All Grades)

Now let's look at some roots!

- You'll Need:
 - One (1) potted perennial plant for each class session
 - Garbage can or large container
- Over a container to capture the soil, pull the soil away from the roots to show the students how they look in real life
- Ask what they notice about the roots?
 - Are they long or short?
 - Are they thin or wide?
 - Are there a lot or only a few?
 - Etc.

TIPS & TRICKS:

We suggest using Monarda "Bee Balm" as it also has a unique scent, is a vigorous rooter and can easily planted bare root after the demonstration!



Wrap Up Discussion:

- 1. Ask for a minimum of three things they learned about water and about soil
- 2. Ask for a minimum of three things they learned about today
- 3. Ask: Was today fun?
- 4. Briefly recap the two previous sessions and ask what they know about water and about soil
- 5. Next time we will be looking at how landscape architects draw a garden plan and how it gets built, and we will have a planting day!

Materials Needed for Plants Day:

- One "Spicy Smelling" and one "Sweet Smelling" plant for observation (can use the same two plants for all sessions)
- One plant for <u>each</u> session that will be used to demonstrate root systems
- · Garbage can or large container (for displaced soil)
- Laminated plant root diagrams
- Paper-plate "plants" for game

TIPS & TRICKS:

We used Hyssop and Russian Sage for the sweet vs. spicy smelling plants which should be readily available at any nursery or garden center. For this activity, it is important that the scents of the two plants are distinct so that the students can easily tell the difference.











PLANTS

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SESSION 4: PLANTING A GARDEN

Water Worx by Planting a Garden ...a RAIN Garden! Let's Get Planting!

Day 4: Water Worx by Planting a Garden

...a RAIN Garden! Let's Get Planting!

Introduction:

Ask for a minimum of three things they learned from the previous sessions: water, soil, and plants; coach if needed:

- What is important about the plants we choose for our rain gardens?
- What are the jobs of the roots?
- How can we add variety to our gardens? (scent, texture, size, flower color, etc.)
- Prompt with more questions from the 'Plants' session as needed

Conversation about our Unique Day:

Today we get to PLANT but in a unique way! Since the rain garden area is presently under construction we won't be able to use real plants like we had planned. But it is still important for you to understand how a garden is constructed, so we have a very unique day planned!

Conversation about the Planting Plan:

- Let's look at the planting plan (show the kids the drawing from the full set of engineering drawings, provided in Appendix C). The landscape architecture drawings for the engineering set typically show the plants and the size of the garden they will go into. For your project we created 10 drawings, but the engineers had to create more than 100 drawings to have enough information on how to build the entire project!
- On this plan sheet we show where the plants go, and their names! (Point out the plant list and mention how the plants have something called a Botanical Name) A long long time ago, a very smart person decided we should name all the plants in the world the same name, even though we all spoke different languages. That language used to name plants is called Latin, and we refer to them by what is known as a Botanical Name. Has anyone heard of the plant Bellis perennis? Probably not... but that is the name for a Daisy! And if you are in India, China, Africa or here in Buffalo, everyone who wants to talk about a Daisy, knows they are talking about the same plant Bellis perennis.
- In order to easily see how our garden will be organized, we color coded the plan (shown below). Here we have a plant tag for a grouping of plants; on the top is the two letter code for the name of the plant, which we saw on the big list a second ago. The bottom is the number of plants for that grouping. How many plants does this tag show we should have? Ask several kids to respond to various tags on the plan. (Colored plans for both community centers provided in Appendix D.)



Measuring & Planting Activity Part 1 (For Grades K-3) The plan also shows us how big the garden is. Let's do some measuring so we can get an idea of how big our garden is.

- Before measuring anything, have students guess how big the room is
- Take up to three guesses
- Ask one volunteer to hold the tape measure in place at edge of wall and ask a second volunteer to walk with you as you pull the tape measure out
- Have that second volunteer announce the measurement at the other side of the room
- Next measure the distance between the kids outstretched arms, the length of their foot, and the length of their pointer finger
- Have a discussion comparing scale:
 - Compared to your finger is a popsicle stick big or small?
 - Compared to your arms, is a popsicle stick big or small?

Measuring & Planting Activity Part 2 (For Grades K-3)

Let's go outside and play Musical Garden!

- You'll need:
 - 'Plant templates' sized 12", 24", and 36" diameters, 3 each (we used foam poster boards)
 - Lots of volunteers!
- Tell the students that according to our planting plan, we have plants that will be 12" diameter, 24" diameter and 36" diameter
- Gardens can be arranged so that big plants are next to little plants
- Let's play "musical garden" and get some planting done!
- Have the students each hold one of the templates and move around in the garden area until you say "STOP"
- When the kids stop, take photos of their arrangement. This is "Garden 1"
- ir arrangement. This is Yell 'STOP' and
- Repeat two more times for a total of three gardens

TIPS & TRICKS:

Play music while the kids are moving around if possible via cell phone or portable radio. Yell 'STOP' and stop the music, just like with musical chairs.







Measuring & Planting Activity (For Grades 4-8)

- You'll Need:
 - Circle templates (sized to match planting plan)
 - Spray chalk or spray paint
 - Gloves
 - Face Masks (if using spray paint)
 - Measuring tapes (at least 2)
 - Color coded planting plan
- Ask for a volunteer to use the plan drawing to orient the garden and get the initial location for the measuring
- Ask for one volunteer to hold the measuring tape, and one to walk with you and announce when the length has been determined to match the plan
- Have 2 more volunteers assist with finding the width
- *This modified planting day will use circle templates and spray paint:* Pass out gloves and face masks for kids that want them; students can remove shoes, ensuring

TIPS & TRICKS:

Have kids count off to determine groups. They will resist going into groups or will be unable group themselves into the right sizes. This will save you a lot of time!

- they stay paint free, if desired as well
- Break the students into the same number of groups as colors on the coded plan (for example, if you have 6 colors on the plan, break into 6 groups)

etc.)

time

- Group 1 will look at the plan, determine which size template to use for the first color, and how to arrange them
- Take turns using the paint to outline the template (one

student can also be holding the template down while the outline is being painted)

- Lift the template and move to it's next plant location
- Once all outlines for that color have been painted, have each student write their initials in the center of the circle they painted (there will be enough circles for each student to do more than one)
- Continue with group 2 for color 2, and so on until complete
- Be sure to take a group photo with their garden



TIPS & TRICKS:

• Be sure you have enough helpers for

this activity, particularly for grades

4-6. There should be one supervisor/

"garden", so it may be difficult to have

more than one group painting at a

• While the groups are waiting, the

group supervisor/counselor can

measuring tape to confirm their

have the students guess the lengths

of various objects and then use the

guess (finger, arm span, their height,

a distance from point 'A' to point 'B',

counselor for each group, separate

from the teaching team)

• Space will be limited within the

Wrap Up Discussion:

- 1. Ask for a minimum of three things they learned from the previous sessions
- 2. Ask for a minimum of three things they learned today
- 3. Ask: What was your favorite part about today?
- 4. The next time we meet we'll be talking about how to take care of our garden
- 5. Then before you know it, we'll be here for Career Fair day!

TIPS & TRICKS:

Both gardens we 'planted' on this

day were painted on to areas

we knew would be temporary:

On a small grassy area at JFK

Community Center and in a corner

of parking lot where the final rain

garden is to be constructed at

Pratt Willert Community Center,

so we knew permanent spray

paint was not going to be an issue.

If this is not an option for you,

consider spray chalk or a more

temporary option.

Materials Needed:

- Printed planting plan laminated with colors, easy to read
- Printed planting plan from drawing set so they can see the difference
- Kid size gardening gloves for grades K-4
- Adult size gardening gloves for grades 4-8
- Spray paint to match the color coded sheet, so it is easy to read in the field (for 3 sessions, we went through ~20 cans of spray paint, 3 per each of the 7 colors used)
- OR Spray chalk (may need to ordered online plan appropriately)
- Foam-core templates for the various sizes of plants. Minimum 2 of each size
- Painters masks, goggles
- Tape Measure

Planting Day Option:

As we mentioned, this was a unique day. The original plan was to plant the rain gardens that were designed for the Willert Park Green Infrastructure Project. However, the construction schedule was a bit behind (which is not uncommon), forcing us to come up with a backup plan. If you are able to have a real planting day all measuring activities and discussions about the planting plans

Materials Needed:

- Printed planting plan laminated with colors, easy to read
- Printed planting plan from drawing set so they can see the difference
- Kids gardening gloves
- Kids gardening tools
- Adult gardening tools
- Tape measure
- Plant stakes & markers to name plants
- Kids kneeling pads
- Garbage bags
- Hose for watering after planting

created would remain the same! The difference of course will be the opportunity for the students to work with real plants and learn how to get them planted in the ground. Most rain garden plants will be small enough for all students to be able to handle and a good portion may even be able to be planted with a hand trowel (especially in rain garden soil). While it will be important for the students to get hands on experience here, it will also be important to have a good number of supervisors/counselors on hand in addition to the teaching team to ensure that the plants are not too severely damaged in any way and that the students are caring for them properly.























GARDEN

Water Worx by Planting: 35


SESSION 5: MAINTENANCE

Water Worx by Caring for our Gardens

What is a weed and why do we care?

Day 5: Water Worx by Caring for our Gardens

What is a weed and why do we care?

Introduction:

Ask for a minimum of three things they learned from the previous sessions: water, soil, plants, planting; coach if needed:

TIPS & TRICKS:

Repetition and reinforcement are key. Keep asking the students what they have learned to help them retain the information!

- How do we know how big to make the garden?
- What language was given to plant names?
- What information is given to us on a planting plan?
- Prompt with more questions from the "Planting Day" session as needed

Conversation about Weeds:

Ask the students the following questions, using flip chart paper to record responses:

- 1. What is a weed?
- 2. Do you think a weed is still a plant?
- 3. Does it still use its roots to soak up the polluted water?
- 4. Does it still perform photosynthesis and provide us oxygen?
- 5. So do you think weeds are bad?

A weed is simply a plant that is somewhere we do not want it to be!

- If a tree is growing in our rose garden, could we consider it a weed? It could be!
- If a rose is growing in the middle of a forest, is it a weed? It could be!
- Weeds are also a bully in the plant world; remember when we looked at the sheet with the plant roots? Those roots were deep! They are strong! Weed roots are the same and will push out other plants that we do want to have in our garden if we aren't careful

Drawing Our Rain Garden Activity (For Grades K-3)

- You'll Need:
 - White Board and markers (for teaching team)
 - 11 x 17 sheets of paper for students
 - Pencils with erasers
 - Crayons/colored pencils
- This will be a Cross-section/process drawing, so the kids will draw and erase for various actions
- Give each student a sheet of paper, a pencil, and an assortment of crayons
- Use a white board to have the students copy what you are drawing
- Start with a line in the middle of the page, all the way across
 - Explain this is the grass on the ground before we build our garden
- Draw a second line about 3" lower on the page
- Draw a third line 1" lower than that





Drawing Our Rain Garden Activity (Continued)

- Have the students erase part of the top line, in the middle
 - Explain that this represents the bulldozer excavating the ground for our garden
- Have them re-draw a line to create a bowl from the top line
 - This is where plants will be drawn
- Have the students color the top line green on either side of the bowl



CARE

- Have them color small purple circles between lines 2 and 3 to be the gravel layer of their rain garden
- Then have them use brown to color the rain garden soil mix between their bowl line and line 2
 - Be sure to talk about what they learned in the soil class
- Then have them draw and color the plants in their rain garden
 - Be sure to have them draw in the roots as well
 - Have them discuss the role of plant roots
- Next it will rain!
- Have the students color blue rain drops all over the sky, falling on their garden
 - Be sure to talk about run-off and pollution
- After the rain storm comes the weeds!
- Have the kids draw big brown weeds in their gardens and be sure to draw the roots too
 - Many kids will not want to ruin their gardens with the weeds, but remind them they are telling a story with their picture and it is important for the weeds to arrive
- To remove the weeds, have the kids use black crayon to "X" out the weeds
- The kids can then embellish their gardens with any other things they'd like to add such as people, rainbows, butterflies, signs, etc.





Eye Spy Game

Running the Game for Grades K-3:

- Print out 5"x7" pictures of common weeds, or weeds noted in the Rain Check "Rain Garden Maintenance" guidebook
- Prior to class, collect examples of each of the weeds you have pictures for
 - Be sure your samples have some roots to observe as well
- Have the students use the pictures to match to the actual sample

Running the Game for Grades 4-8:

- Print out 5"x7" pictures of common weeds, or weeds noted in the Rain Check "Rain Garden Maintenance" guidebook
- Take a short walk to identify plants we consider weeds and match them to the pictures.
- Ask: "How do we manage the weeds in our gardens?"
 - Dig them out properly
 - Have the students use a variety of trowels and shovels to try and get as much of the root out as possible
- Have the students place what they've dug on the nearby sidewalk so the group can examine and discuss similarities and differences in the roots
- Ask the following questions:
 - 1. Was it hard or easy to dig out the weed?
 - 2. Based on the picture of the plant roots do we think we dug all the weed out?
 - 3. What about herbicides? (Chemicals that kill plants)
 - They would remove the weeds quickly, but how do they impact our goal of cleaning pollution?



Conversation about the Rain Garden Maintenance Guidebook

This guidebook is a way to teach our community all about how to take care of our healthy plants in the rain garden. Some of the important steps to keeping our rain garden plants healthy include:

- Sweep sediment
- Clean up trash
- Weeding
- Trimming and pruning as plants grow
- Cleaning up after winter
- Remember to water if there's been a drought!
- Keeping our rain gardens beautiful and functional ensures that water will always WORK here!

Wrap Up Discussion:

- 1. Ask for a minimum of three things they learned about water, soil, plants, and planting
- 2. Ask for a minimum of three things they learned today
- 3. Ask: What was your favorite part about today?
- 4. The next time we meet it will be Career Fair day, and you'll be learning about all the different careers we've talked about this week and what they do!

Materials Needed:

- 2 copies of Rain Garden Maintenance Guidebook, laminated
- Laminated plant root sheet (Used for Plant Day)
- Shovels
- Trowels
- 5" x 7" photos, printed, of common weeds (from Rain Garden Maintenance Guidebook)
- 1 bucket for collecting weeds
- Garbage bags
- Gardening gloves (saved and reused from planting day)

TIPS & TRICKS:

If you have a garden space that needs to be weeded - use this for the demonstration! If not, most lawn areas should have enough examples of weeds for the students to pull; but remember, the students are not likely to be an effective weeding crew as they are just learning today!







SESSION 6: CAREER FAIR

Water Worx Career Fair YOU can do important work when Water Worx!

Day 6: Water Worx Career Fair YOU can do important work when Water Worx!

Introduction:

For the benefit of the guests, have the students relate what they have learned from the previous 5 sessions. Prompt if needed:

- Day 1 Water and the Big Picture
- Day 2 Soils (not dirt!)
- Day 3 Plants (and roots!)
- Day 4 Planting/Painting Day
- Day 5 Caring for our Garden

Conversation about Careers:

For the past 5 sessions we have talked about science, math, biology, design, creativity and solving problems. Today we are going to talk about how you could do all those things when you grow up and how you could consider one of these jobs as a career for yourself.

Guest Speakers (For Grades 4-8)

- Invite guests from various professions related to the lessons taught this week to talk about their variety of careers:
 - Landscape Architects
 - Engineers
 - Soil experts
 - Construction
 - Nurseryman and Plant trade
 - Others to consider if desired:
 - Water Scientists
 - Computer Scientists
 - Surveying and Mapping
 - Geologists
 - Meteorologists





- Ask guests to bring various props to help illustrate their work:
 - drawings
 - renderings
 - trace paper
 - colored pencils
 - scales
 - templates
 - hard hats
 - books
 - professional journals
 - etc.
- As the moderator, please introduce speakers and ask each one to tell the students a little bit about themselves
- Set up stations for the kids to use the various items and to ask questions of the guests

Guest Speakers (Continued)

- As moderator, you can consider the following questions to get things started and to supplement between the audience questions:
 - When did you first know you had interest in your chosen field?
 - How did you decide to study your field?
 - Where did you go to school and how long did it take you?
 - · Can you give us an example of your work day?
 - Tell us something from your career that you're proud of
 - · Tell us something from your career that you never expected









Careers Lesson (For Grades K-3)

- Prepare a simple power point with 2-3 slides for each of the careers noted above. Be sure slides have easy to see pictures: (See Powerpoint provided in Appendix E)
 - Landscape Architect
 - Engineer
 - Construction worker
 - Horticulturist
- For each career, introduce some of the props and have the kids pass them around



Imagining Our Future Activity (For Grades K-3)

- Using a template, ask the kids to draw themselves in one of the careers
- Ask them why they selected the career they did







Wrap Up Discussion:

- 1. Ask for a minimum of three things they learned this week
- 2. What was your favorite part of the week?
- 3. What was the most fun?
- 4. What did you find challenging?
- 5. Are you ready to help our waterways?!

Materials Needed:

- Guest Volunteers from various career fields
- Powerpoint for Grades K-3
- Coloring templates





CAREERS













CAREERS





COMMUNITY FAIRE

Water Worx Community Faire An opportunity to share what we've learned!

Water Worx Community Faire An opportunity to share what we've learned!

Introduction:

The Community Faire was an opportunity for the kids to present and share with family and friends what they learned from Water WORX! The event was held at JFK Community Center, with students from Pratt Willert walking over at the end of the day to participate.

Student Led Community Faire:

The students created interactive display booths for each topic, using posters to convey what they had learned, and then led younger kids, friends and family through the same experiments they had learned from in the six sessions:

- Big Picture
- Soils
- Plants
- Planting a Rain Garden
- Maintenance
- Careers

Through the creation of the poster materials and the re-creation of the experiments the students demonstrated the extent of their stormwater knowledge and had great fun!



Optional Community Faire ideas:

For the students to have an even wider reach in sharing what they have learned, a more dynamic Community Faire could be envisioned:

- In addition to the student booths consider inviting community organizations with a similar environmental focus:
 - Raincheck
 - Riverkeeper/ Waterkeeper
 - PUSH Green
 - PUSH Blue
 - Groundwork Buffalo
 - Wellness institute
 - Net Positive Foundation
 - Coalition for Positively Charged People
 - Recycling organizations
 - Pesticides and herbicide reduction organizations
- Advertise to a broader group in the neighborhood
- Round out the event with music, light refreshments and door prizes for an active and engaging event

Materials Needed:

- · Posters for distribution advertising the event
- Tables and chairs for booths
- Materials from previous sessions
 - Stormwater Suitcase (borrowed from Erie County)
 - Materials for water session experiments
 - Soil session materials and samples
 - Plant session materials and samples
- Student created posters, one for each session topic





APPENDICES

APPENDIX A





APPENDIX B







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APPENDIX D









Landscape Architect



- Landscape architecture is a profession that combines plants, arts, architecture, industrial design, study of soils, the shape of our land, ecology and habitats as well as People! Landscape architects can design parks and playgrounds, college campuses and even big office parks. We can design private gardens, as well as baseball fields, and even places like Disney World.
- Landscape architects are people who work with both building architects and civil engineers! We work with both Nature and with People.

APPENDIX E

Landscape Architect



• For the past few weeks we have been talking about stormwater run-off, and landscape architects design rain gardens like the ones we have been talking about!

Landscape Architect



• Landscape Architects spend their time drawing using computer programs, going to project meetings and talking with communities about their neighborhoods.



- Engineering has been an aspect of life since the beginnings of human existence
- Engineers use math and science to solve problems,

APPENDIX E



- like building roads and bridges like you see here. They can also design power plants so we have electricity, but also design sewers and pipes to keep our water clean to drink and to make sure the water goes down the toilet.
- Engineers can also design the green infrastructure we have been talking about for several weeks!



- But ALSO
- A civil engineer created the slippery part of the water slide
- A civil engineer designed a pumping system to circulate just the right amount of water to the flume. Without the right flow of water, there is no ride. Additionally, civil engineers have designed the slide to withstand the weight of people, the water, and even the force of the wind blowing on it



APPENDIX E

• Construction workers are the people who actually BUILD all sorts of things around us! Houses, and museums, and roads and bridges. They read the plans that the engineers and architects give them and they know how to make it into a real thing!

APPENDIX E

Construction Worker



• Some construction workers build only with metal, and some only with wood. Some know how to pour concrete, others know how to connect lots of pipes.




• Some work on the ground, and some work very high in the air!

Horticulturist/ Plant Professional



- A nursery is a place where plants are grown! And people who grow plants there are called Horticulturist or Plant Professionals
- They are responsible for growing with plants from seeds, and caring for them so that they get big enough for people to buy them

Horticulturist/ Plant Professiona



• They make sure they are free from insects, and protected from bad weather so they grow big and strong. When a construction worker gets the plans from the landscape architect, they call the Nursery to order the plants they need for the project





• Horticulturists can also create new variety of plants and trees. 300 years ago, there were only pink tulips, and now we can plant a whole rainbow of tulips because horticulturist used science to figure out how to create lots and lots of colors.

APPENDIX E

Think of all the possibilities for what you can be! You can be anything you want!

