2015-2016 BEMP Stormwater Science Education Overview

The main objective of the Stormwater Science outreach education program is to teach students that the health of the Rio Grande is directly related to the health of the surrounding watershed. The Stormwater Science program includes a one and one-half hour classroom activity, a four to five hour study trip to the Rio Grande and. During the 2015-2016 school year 1804 students participated in Stormwater Science activities in their classrooms, in the field or both. The one and one-half hour classroom program was delivered to 955 students in 34 classrooms at 18 different schools in Bernalillo, Rio Rancho, Albuquerque, Los Lunas and Socorro.

The classroom portion of the program demonstrates that runoff carries contamination to the Rio Grande. Students in 4th grade and higher construct a model of the Rio Grande Watershed (image 1). The watershed has 5 different communities along the river; a cattle ranch, up-and-downstream eco-friendly towns, an urban city, and agricultural fields. Students add different ‘runoff cards’ to the river downstream of the community where they came from. Some of the runoff is naturally occurring (turbidity), and others are human caused (pesticides, oil, etc.). The program runs through two different scenarios, a before-the-storm and after-the-storm river. They demonstrate the harmful effects storm water contamination can have on aquatic organisms and downstream communities. Students in grades one through three build a simplified version of the watershed model and discuss how runoff impacts habitat health. They also work with a 3D water model (image 2); students can place food coloring representing pollution in the city and watch it run into the river when they sprinkle water to represent rain.

The program encourages students to change their daily behavior in ways that can help to keep their watershed clean. Educators help to provide solutions as well as having students come up with ideas on their own. The handout to accompany this activity is available to students in both English and Spanish, the middle school level handout is included below.

188 students also took part in study trips. This field portion of the program is a four to five hour trip to the Rio Grande during which students investigate how stormwater moves through the city and collect and interpret water quality data. The program starts with a trail/arroyo survey which examines and categorizes the amount of visible pollutants (plastics, paper, dog poop, animal scat, etc…) in the San Antonio arroyo in Albuquerque or the Arroyo de la Baranca in Rio Rancho, both of which empty into the Rio Grande. In the arroyo students calculate how fast erosion occurs and test water quality. When the students arrive at the bank of the Rio Grande they examine the water using a LaMotte water quality monitoring kit and search for macro-invertebrates. Students share their results, compare them to results gathered by students in the past and to the data they gathered in the arroyo, and discuss what they could mean in terms of river health.
Hundreds of students also took part in *Stormwater Science* related field activities at BEMP’s events or during BEMP’s monthly data collection. These field activities included a discussion on urban runoff and a hands-on water quality investigation, either through chemical tests or macro-invertebrate identification. Students are then asked to come up with ways they could prevent pollution from reaching the river. Events included BEMP Student Congresses, (where BEMP students to share their research and experiences in the Bosque) and Bosque School’s Otter Day, (an event for first graders, hosted by high school students to teach about endangered animals in New Mexico).

Image 1.
Students at Martin Luther King Jr. Elementary brainstorm ideas for ways to prevent runoff from reaching the Rio Grande after building a watershed model in their classroom.
Lower elementary students can place food coloring on this model before using a sponge to create a rainstorm. Water washes the contamination through the city and into the river.

Students from Madison Middle School perform water quality tests on the banks of the Rio Grande to compare to the tests they ran on water they found in the arroyo.
Stormwater Science

What 2 sources can New Mexicans get their drinking water from?
1. ____________________
2. ____________________

Where does water go after we use it?

A watershed: an area of land where all of the water that falls on it, or that is under it, drains to the lowest point.

A stream or arroyo that brings water to the main channel of the river
Nonpoint source pollution: types of nutrients found in fertilizers that can lead to excess algae growth
E. coli: a single location where pollution is being leaked into the environment
Pathogenic pollution: a type of bacteria found in warm blooded animal's intestines that can make people sick
Nitrates and phosphates: tiny 'water bugs' whose species are an indication of water quality
Tributary: any type of pollution that comes from many different sources
Macro-invertibrates: a measure of water clarity, based on the amount of suspended solids

Cattle Ranch
Upstream eco-friendly town
Farm Fields
City
Downstream eco-friendly town

How do the living things in the river ecosystem react to the stormwater?

List some types of runoff that come from natural areas:

List some types of runoff that come from your community:

How can YOU help to keep our watershed clean?
1.
2.
3.
4.
5.
6.
7.
8.
Field Journal for outdoor study trips

BEMPin’ it Up!

Stormwater Science Field Journal

Date: ____________________
Name: ____________________

1.) List two things that you can do to help keep our watershed clean. (Ex: picking up trash)

Litter Survey

The San Antonio Arroyo collects water from all over the west side of Albuquerque. Anything that ends up in these arroyos could travel to the river.

<table>
<thead>
<tr>
<th>Type of Pollutant</th>
<th>In the arroyo</th>
<th>In the bosque</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Paper trash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Plastic trash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Glass or aluminum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Other trash</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Dog poop</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Coyote scat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Other types of scat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Evidence of erosion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9 Cigarette butts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Chemicals</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

What is the main type of pollutant you found today? ________________

How many of these items could have been recycled? ________________

Water Chemistry

<table>
<thead>
<tr>
<th>Arroyo or Ditch</th>
<th>Which is better</th>
<th>River</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>65 35 0°F</td>
<td>65 35 0°F</td>
</tr>
<tr>
<td>Turbidity</td>
<td>0 0-40 4000 4000</td>
<td>0 0-40 4000 4000</td>
</tr>
<tr>
<td>Nitrate</td>
<td>14 5 10 ppm 10 ppm</td>
<td>14 5 10 ppm 10 ppm</td>
</tr>
<tr>
<td>Phosphate</td>
<td>0 4 8 ppm 8 ppm</td>
<td>0 4 8 ppm 8 ppm</td>
</tr>
<tr>
<td>pH</td>
<td>4.5 6 7.9 9</td>
<td>4.5 6 7.9 9</td>
</tr>
<tr>
<td>Feal Calibrom</td>
<td>present/ not</td>
<td>present/ not</td>
</tr>
<tr>
<td>Dissolved O2</td>
<td>0.4 5 ppm 5 ppm</td>
<td>0.4 5 ppm 5 ppm</td>
</tr>
</tbody>
</table>

What grade would you assign to this section of the river? ________________

Scoop the Poop

Save the Soil Sheet

Phosphates: 5 ppm (Good) 10 ppm (Fair) 15 ppm (Poor) 20 ppm (Poor) 30 ppm (Poor)
Nitrate: 0.5 ppm (Good) 1 ppm (Fair) 1.5 ppm (Poor) 2 ppm (Poor) 3 ppm (Poor)
Turbidity: 0.5 ppm (Good) 1 ppm (Fair) 1.5 ppm (Poor) 2 ppm (Poor) 3 ppm (Poor)
Dissolved Oxygen: 7.5 ppm (Good) 5 ppm (Fair) 2.5 ppm (Poor) 1 ppm (Poor) 0 ppm (Poor)

What grade would you assign to this section of the river? ________________
Weather Report

1. Time: ___________ am/pm
2. Cloud Cover ______________%
3. Humidity ______________%
4. Temperature: ___________
5. Wind Speed _____________ km/h

Journal Space

How long will it take? Answers:
1-H, 2-F, 3-G, 4-E, 5-C, 6-B, 7-A, 8-D

How long will it TAKE?

Every piece of trash has a face... where, and from WHO did it come from? It takes just a moment for an item to be carelessly discarded or blown by wind into a river, but it can take many, many years for it to completely decompose. Test your knowledge about decomposition times below by drawing a line from the item to its decomposition time.

A. 1 million years
B. 600 years
C. 450 years
D. 80-200 years
E. 50 years
F. 1-5 years
G. 8 months
H. 2-5 weeks