



Enhanced River Academy Curriculum: Introductory Module, Part II

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OVERVIEW

Name of the Course

The River Academy: Place-based Environmental Science Program

Course Description: Using a series of place-based, water-focused modules, the River Academy aims to empower a cohort of students to become active citizens in protecting and preserving local waterways. This intensive program includes 9 modules covering cultural, historical and environmental perspectives, hands-on field ecology trainings, water quality monitoring practicum, service learning workshops and paddling lessons.

Name of the Module: Introduction to the River Academy

Module Description: This module serves as the introductory module for the entire training program, and it will provide historical perspectives on the Buffalo-Niagara region, foundational knowledge of the Niagara River watershed (including Buffalo River), and substantial understanding of community-based environmental stewardship. It will also introduce students to upcoming modules, program expectations and field protocols.

How to Use the Module: The module is structured in a way that any teacher with no formal training in Watershed Science can pick it up, review the materials and launch it in the classroom. A teacher should digest the rationale of the module by reviewing the CONSCIENTIZATION section, and proceed with the LESSON PLAN. The instructions in the LESSON PLAN are detailed enough for use by teachers unfamiliar with the subject matter, and are supported by media presentations and hands-on exercises.

CONSCIENTIZATION

Audience and Context Analysis

The Introduction to the River Academy acquaints students with water-related environmental issues in the Buffalo-Niagara region and helps them to become immersed in community-based environmentalism. The target audience is middle and high school students – ages ranging from 12 to 19 years. Participating students are expected to have a minimum of middle school level natural and social science education or equivalent, basic computer literacy and some interest in the outdoors. The introductory module may be commenced in-class, outdoors or both.¹

Next Generation Science Standards Themes

- HS – Earth Systems
- HS – Weather and Climate
- HS – Human Sustainability
- HS – Interdependent Relationships in Ecosystems

Common Core and STEM Initiatives

Participants of this module will be exposed to the contextualized Mathematics and Geological Science practices that enhance their efficiencies in STEM subjects.

Objectives for Significant Learning Experiences

After this module is over, participating students will:

1. Understand the core concept of a watershed, and remember key elements of Buffalo-Niagara region ecosystems (FOUNDATIONAL);
2. Decide to actively engage in upcoming modules (APPLICATION);

¹Recommendation for launch site(s) can be found at respective Lesson Plan.

3. Relate the health of local waterways to the existence of organisms, well-being of communities and thriving blue economy (INTEGRATION);
4. Come to see themselves as defenders of the Niagara River watershed (including Buffalo River) and protectors of local waterways for generations to come, and encourage fellow students to get involved in fresh water resource preservation efforts (HUMAN DIMENSION);
5. Value fresh water, commit to protect drinkable, fishable, swimmable waters, and energize to become active stewards in Western New York (CARING); and
6. Relentlessly engage in environmental education, identify additional learning opportunities and strive to become resourceful environmentalists (LEARNING HOW-TO-LEARN).

Topic Analysis

1. Watershed as a System – Grand Introduction
 - The Great Lakes and You
 - Who is Niagara?
 - Holistic Concept of Watershed
2. Environmental and Cultural History of Buffalo-Niagara Watershed
 - Revisiting the Watershed Concept
 - Screening of *If Our Water Could Talk*
 - Problems and Issues
3. Our Water and Our Future
 - Usurpation of the Public Trust
 - Screening of *If Our Water Could Talk*
 - Rust to Blue
4. Program Overview and Expectations

- What Can I Do?
- Overview of the Modules
- Expectations and Field Safety

Implementation Challenges

Transportation and Logistics

Length of the Module

In-Class Activities: Approximately 3 – 4 Hours

Out-of-Class Activities: Approximately 6 – 8 Hours

Program Materials and Equipment Needed

Instructor Qualifications:

- Be community-oriented and well-versed in High School level Earth Sciences;
- Be highly motivated to mentor students to become young environmental stewards; and
- Be cognizant of pedagogical methods and applications.

Materials and Equipment:

- Intro to Watershed PowerPoint slides;
- A course Blog for reflective entries;
- *If Our Water Could Talk* WNED Documentary; and
- Appendixes (A. III).

Recommended Room Setup

The room can be set up at teacher's discretion as per class size and group dynamic.

However, the classroom should have audio-visual screening capability.

LESSON PLAN

Module Name: Introduction to the River Academy

Lesson 2: Environmental and Cultural History of Buffalo-Niagara Watershed

Learning Objectives Addressed:

- Relate the health of local waterways to the existence of organisms, well-being of communities and thriving blue economy (INTEGRATION);
- Come to see themselves as defenders of the Niagara River watershed (including Buffalo River) and protectors of local waterways for generations to come, and encourage fellow students to get involved in fresh water resource preservation efforts (HUMAN DIMENSION);
- Value fresh water, commit to protect drinkable, fishable, swimmable waters, and energize to become active stewards in Western New York (CARING); and
- Relentlessly engage in environmental education, identify additional learning opportunities and strive to become resourceful environmentalists (LEARNING HOW-TO-LEARN).

IN-CLASS PLAN

TIMING	SUB-TOPIC(S)	TEACHER NOTES & CUES
10 – 15 Minutes	Revisiting the Watershed Concept	BACKGROUND <ul style="list-style-type: none">• A watershed is a system holistically composed of land and water, bounded by high elevation. Each watershed has ecosystem services that are vital to both natural and social environments. ACTIVITY <ul style="list-style-type: none">• Students-teacher open discussion<ul style="list-style-type: none">○ Students and teachers will re-visit ideas and concepts explored during the last topic, and each student will provide his/her take on the watershed as a system.<ul style="list-style-type: none">▪ HINT: Teacher should channel students to take ownership of their watershed. ASK <ul style="list-style-type: none">• Did you have a chance to visit a local waterway?

		<ul style="list-style-type: none"> ○ If so, can you please share your experience? How do you feel when you are on the water? ○ How are you connected to the waterway? ○ Did you get any cool ideas to do fun activities on the water? ● Did you see any other species on your waterway? What species share the watershed with us? ● Why is it so important to keep our watershed healthy? <ul style="list-style-type: none"> ○ What are the possible impacts on unhealthy watershed on us? <p>COMMENT</p> <ul style="list-style-type: none"> ● It is our collectively responsibility to keep our watershed healthy. We are all in this together. If we do not take care of our watershed, it will not be able to support our needs or the needs of the many other species that share its resources. <p>ASSESSMENT</p> <ul style="list-style-type: none"> ● Forward-Looking → Students and teacher will engage in the open discussion, and share meaningful ideas or thoughts. ● Feedback → Teacher will provide constructive feedbacks on each student’s idea, and motivate them to explore more about watershed ecosystem services.
12 – 15 Minutes	Screening of <i>If Our Water Could Talk</i> (First Half)	<p>BACKGROUND</p> <ul style="list-style-type: none"> ● Western New York was an economic and industrial powerhouse from the early 19th century through the mid-20th century, due to our strategic location for transportation of goods on our waterways. During that time Buffalo was a major railroad hub, the largest grain

		<p>port in the world, and a major steel producer.</p> <p>ACTIVITY</p> <ul style="list-style-type: none"> • Screening of WNET documentary <i>If Our Water Could Talk</i> (00:05:30 through 00:15:00) <ul style="list-style-type: none"> ○ Students and teacher will watch the inspirational documentary video <p>ASSESSMENT</p> <ul style="list-style-type: none"> • Forward-Looking → Students will pay close attention during the documentary screening, and engage in audio-visual learning.
<p>15 – 20 Minutes</p>	<p>Problems and Issues</p>	<p>BACKGROUND</p> <ul style="list-style-type: none"> • Past industrial prosperity has left Western New York with a legacy of neglected and polluted waterways. By the late 1960s the Buffalo River was one of the most polluted rivers in North America, and Lake Erie was also famously declared dead. That period serves as a benchmark for the severity of post-industrial pollution and the relative indifference to its consequences. <p>ACTIVITY</p> <ul style="list-style-type: none"> • Big group discussions on the historical problems and issues in our waterway <ul style="list-style-type: none"> ○ Teacher will initiate the discussions by encouraging students to reflect on the video, and to produce one thing that strikes him/her most. <ul style="list-style-type: none"> ▪ HINT: Give students a 2 – 3 minutes break before launching discussions, so that students can digest the content and context. ▪ SHOW: Picture of Buffalo during industrialization (Appendix A. III). <p>ASK</p>

- What did the Buffalo River look like before the City of Buffalo was established?
 - How did our activities change it?
 - What are the impacts of industrialization?
 - How did people’s perception of pollution change over the course of Buffalo’s history?
- Who initiated the fight to protect WNY waterways?
 - Does a voice of a single person count?
 - How strong was that “voice”?
- What did President Johnson find in the river?
 - How do you feel when you see the sludge in your river?
- How are we involved in the story of the Buffalo River’s pollution?

COMMENT

- As Buffalo became industrialized, pollution in our waterways was seen as an indicator of industrial success. Smokestacks represented the progress in economy, although such industrial activities have left us with legacy of contaminations in our rivers and streams.
- Although you and I standing in this classroom did not contribute in polluting our waterways, we are directly affected by the legacy of contamination.
- Aspects of the lifestyle that we enjoy have indirectly resulted in pollution of our waterways, often without our awareness. Every choice we make as citizens and consumers is important, as is how we think about and speak about our communities.
- Citizens’ voices and choices are extremely important in shaping the fate of our waterways, our livelihoods, our

		<p>health and the survival of other species.</p> <p>ASSESSMENT</p> <ul style="list-style-type: none"> • Forward-Looking → Each student should identify one problem or issue that concerns him/her, and participate in discussion questions prompted by teacher. Students should also come to realize the importance of the citizen actions in protecting the local waterways. • Feedback → Teacher should answer any confusion that may arise from the video, and provide constructive answers that may nurture students’ ability to see injustices.
OUT-OF-CLASS PLAN		
TIMING	SUB-TOPIC	TEACHER NOTES & CUES
22 – 25 Minutes	Story of Stuff	<p>ACTIVITY</p> <ul style="list-style-type: none"> • <i>Story of Stuff</i> documentary movie (available at http://storyofstuff.org/movies/story-of-stuff/) <ul style="list-style-type: none"> ○ Each student will invite family members, and watch the Story of Stuff documentary movie together. <p>COMMENT</p> <ul style="list-style-type: none"> • This video will help us digest what we, as citizens, could do to reduce our footprints on the world. <p>ASSESSMENT</p> <ul style="list-style-type: none"> • Forward-Looking → Students will watch the movie with family and discuss ideas and thoughts they acquired from the movie. In addition, students should share what their ideas with the class.

APPENDIX

Appendix A. III: The Industrialized Buffalo in Color

