

TITLE: *Turning Tides: Giving Riparian Invasive Species in Lake Champlain a Raincheck*

DESCRIPTION: This program includes a case study of terrestrial invasive species, classroom discussions, an outdoor harvesting activity and a final environmental conservation based art project. Several videos have been developed to aid in teaching introductory principles, and these can be accessed via a playlist at [YouTube.com/_____](https://www.youtube.com/playlist?list=PL1111111111111111). It is estimated that you will need a total of ___ hours to complete all the activities.

GOAL: By the end of this program, students should be able to successfully;

- Identify what an invasive species is
- Identify and understand the dangers of introducing invasive species into a new habitat
- Demonstrate an awareness of Abenaki (Native American) tribal communities and their traditional usages for the goldenrod plant, as well as their concerns over the introduction to the phragmite plant
- Practice disseminating seeds by hand to propagate

GUIDING QUESTIONS:

- What are invasive species?
- What are some of the traditional Abenaki uses for the riparian zone?
- How do terrestrial invasive species affect the riparian zones of Lake Champlain and indigenous artists?

MATERIALS (provided):

- Videos
 - What are invasive species?
 - Why are invasive species a concern?:
 - Utilizing invasive species: an indigenous perspective
 - Sustainable harvest practices
 - Seed paper activity demo
- Factsheets
 - Phragmite Fact Sheet¹ see footnote below for digital availability
 - Canada Goldenrod Fact Sheet² see footnote below for digital availability
 - Broad-Leaved Cattail Fact Sheet³ see footnote below for digital availability

¹ U.S. Fish and Wildlife Service, . "Phragmites: Questions and Answers." U.S. Fish and Wildlife Service. Accessed July 20, 2018. https://www.fws.gov/GOMCP/pdfs/phragmitesQA_factsheet.pdf.

² Natural Resource Conservation Service, . "Plant Fact Sheet." United States Department of Agriculture. Accessed July 20, 2018. https://plants.usda.gov/factsheet/pdf/fs_soca6.pdf.

³ Natural Resource Conservation Service. "Plant Guide." United States Department of Agriculture. Accessed July 20, 2018. https://plants.usda.gov/factsheet/pdf/fs_soca6.pdf.

- Hybrid Cattails Fact Sheet⁴ see footnote below for digital availability
- *Optional*: How to ID poison sumac handout
- *Optional*: If you touch poison sumac handout
- Powerpoint Presentation
- Printable instructions for the seed paper DIY project

MATERIALS (necessary to gather):

- A stack of newspapers, to be cut into strips
- Several pairs of scissors
- A large container or bowl for mixing
- Two *non-plastic* containers, for harvesting flowers and seeds
- *Optional*: A pair of gloves, preferably gardening gloves for each harvester
- A blender
- Seeds of your favorite riparian plants (available from harvesting through your area, for purchase through amazon.com or by asking your neighbors!)
- A space to lay out your seed paper to dry
- A source of water
- For dying (be prepared for these materials to get messy)
 - A blender
 - Goldenrod flowers / staghorn sumac flowers
 - Markers for decorating your paper

FIELD SAFETY TIPS:

- Instructors, if necessary, should reach out to parents of minors before the harvesting day to double check that the participants are not allergic to any of the species that will be handled (Ask: where to put this, where to mention the species that will be handled)
- Sharp tools should be kept pointed downward or in a container
- Phones should be kept in pockets or backpacks at all times
- Keep the group together while traveling to the collection site of your choice.

INSTRUCTIONS:

INTRODUCTION

1. Greet the students and welcome them to this stewardship program. We have provided a script for your convenience that you may read aloud or summarize. Feel free to use the accompanying PowerPoint presentation.

The program that you will be doing today was created as a collaboration between the UVM Extension Watershed Alliance and the Vermont Abenaki Artists

⁴ New York Sea Grant, . "Hybrid Cattails (Typha x glauca)." SUNY College of Oswego. Accessed July 20, 2018. <http://www.seagrant.sunysb.edu/lodune/pdfs/Cattails.pdf>.

*Association. By participating, you will begin to familiarize yourself with **Wicked Problems**; complex issues that have no clear ‘good’ answer, where it is difficult to predict the consequences of any action (or inaction) taken to solve those problems, and new problems may splinter off of the original Wicked Problem⁵. The issue we will be focusing on today will be terrestrial invasive species, their effect on riparian zones and how solutions can be reached while considering the significance of an indigenous perspective from the local Abenaki (Native American) tribes.*

***The Abenaki** have lived in the Lake Champlain region for over 12,000 years⁶. However, their territory extended as far as what is today known as eastern New York, northern Massachusetts, southwestern Maine, Vermont, New Hampshire and north toward Quebec, Canada.”⁷ As of 2011 and 2012, four Abenaki tribes have achieved State Recognition in Vermont -- a complicated, evidence-based legal process undertaken to validate their Native American heritage for governmental purposes. By becoming Recognized, Native American tribes gain the ability to market their art as ‘Native American made’ or ‘Indian made’ (something that raises the value of the product) and further legalizes aspects of their spirituality and religion. The four Abenaki tribes that are Recognized today are: the **Elnu** Abenaki Tribe, the **Nulhegan** Abenaki Tribe, the **Koasek** Traditional Band of the Koas Abenaki Nation, and the Abenaki Nation at **Missisquoi**.*

*Today, the Abenaki live lives very similar to yours. They live in houses and apartments, drive cars, go to school, and use grocery stores. Like many other Americans, Abenakis care about the world around us. In a resource guide developed by the Vermont Abenaki Artists Association, they note that, “Our natural resources are to be cherished and protected, as no generation has more of a right to enjoy those resources than any other. We are taught to think of ourselves as stewards of the environment, safeguarding it for the future, and we are each responsible for teaching the next generation to do the same.”⁸ This concept is referred to as **the Next Seven Generations**, or simply, the Seven Generations.*

2. Warm up the students by holding a brief discussion.

⁵ Cooper, Katherine. ““Wicked” Problems: What Are They, And Why Are They Of Interest To NNSI Researchers?.” Northwestern University School of Communication. Accessed July 12, 2018. <https://nnsi.northwestern.edu/social-impact/nnsi-blogs/wicked-problems-what-are-they-and-why-are-they-of-interest-to-nnsi-researchers/>.

⁶“State Recognized Tribes | Vermont Commission on Native American Affairs.” 1999. *Vermont.Gov*. December 31. <http://vcnaa.vermont.gov/recognition/recognized-tribes>.

⁷ Sheehan, Vera D., Melody Walker Brook, Lina L. Schulmeisters, Francine Poitras Jones, and Liz Charlebois. Vermont Abenaki Artists Association. Accessed July 19, 2018. <http://abenakiart.org/>.

⁸ Sheehan, Vera D., Melody Walker Brook, Lina L. Schulmeisters, Francine Poitras Jones, and Liz Charlebois. Vermont Abenaki Artists Association. Accessed July 19, 2018. <http://abenakiart.org/>.

- a. Ask them to raise their hands if they are familiar with the concepts of invasive species.
 - b. *If hands are raised*, prompt them further and ask if they wish to share their own definition of the term or give an example of an invasive species they are aware of.
 - c. *If no hands are raised*, suggest that they may be familiar with invasive species but may not be aware of it. Zebra mussels and water chestnuts are aquatic invasive species; the emerald ash borer beetle and earthworms are terrestrial pest invasive species; giant hogweed and false indigo are terrestrial plant invasive species. Are your students familiar with any of those species.
3. Use the classroom discussion to segway into introducing the first video, *What Are Invasive Species?* (Would be create to come up with an analogy here)
 4. Play the second video, *Why are invasive species a concern?*
 - a. **TIPS:** To help things move smoothly, we recommend having the videos already loaded in two different internet tabs or windows *before* beginning class. If you pause them each at the start of the video, it will give each video time to buffer so that the footage does not appear to stop and start over and over again while it plays.
 5. After viewing the video, pose the follow question to your students: *Is it possible for an invasive species to provide any benefits to any ecosystem or communities surrounding an ecosystem?* Students can respond by nodding or shaking their head, raising their hands if they believe it's possible, or verbalizing "yes" / "no". Use this to take a temperature gauge of the room.
 6. **Ask:** *What about earthworms?* to your students, and collect some responses if there are any.
 7. **Discuss** the following:

At the end of the last ice age the land that is now Vermont, known as N'dakinna or 'the dawnland' by the local Native American tribes⁹, lost its native earthworm population to cold temperatures and glacial ice¹⁰. However, earthworms were first "inadvertently" reintroduced to the area as a byproduct of colonization when organic materials such as dirt or plants, containing earthworms was brought over from Europe and Asia.

⁹ Sheehan, Vera D., Melody Walker Brook, Lina L. Schulmeisters, Francine Poitras Jones, and Liz Charlebois. Vermont Abenaki Artists Association. Accessed July 19, 2018. <http://abenakiart.org/>.

¹⁰ Knowles, Meghan, Donald Ross, Josef Gorres, Sandy Wilmot, and Cecilia Danks. "Earthworms in Forests." Vermont Forests, Parks and Recreation. Accessed July 20, 2018. http://fpr.vermont.gov/sites/fpr/files/Forest_and_Forestry/Forest_Health/Library/EarthwormsInForests_final.pdf.

Technically, these worms and all earthworms that exist within Vermont today are invasive species¹¹. In spite of this, earthworms still provide many benefits to us including:

- i. Increase soil aeration and water infiltration by burrowing into the soil¹²*
- ii. Make soil more porous, reducing soil compaction*
- iii. Neutralize soil pH through digestion*
- iv. Provide nutrient input for soil through their excrement¹³*

FIELD HARVEST PROJECT

- 8.** This component can be done on the same day or broken up and done on another day, whichever is most convenient for you. Introduce the concept of the field harvest and conservation work to the classroom. Feel free to adapt the following script depending on the skillset of your students.

Depending on the season, you will either be harvesting **goldenrod or staghorn sumac** flowers (pictured below). Goldenrod blooms during the summer, into early fall. Staghorn sumac begins to flower in as early as May and may be present as late as September.



Staghorn sumac¹⁴ (left) and Canada goldenrod¹⁵ (right).

¹¹ The University of Vermont Extension. "Earthworms." The University of Vermont Extension. Accessed July 19, 2018. <https://www.vtinvasives.org/invasive/earthworms>.

¹² Duiker, Sjoerd W., and Richard Stehouwer. "Earthworms." Penn State Extension. Accessed July 19, 2018. <https://extension.psu.edu/earthworms>.

¹³ Ramsay, Jennifer A., and Stuart Hill. "Earth Worms the Agriculturalist's Friends." McGill University. Accessed July 19, 2018. <https://eap.mcgill.ca/publications/eap6.htm>.

¹⁴ Forest Service Alaska Region, USDA, *Western Canada goldenrod*. May 4, 2015. Source: 2015, Digital Image. Available from: Flickr, https://www.flickr.com/photos/alaska_region/17346529006 (accessed July 18th, 2018).

Conservation is a vital component of environmental science and coexisting with the natural resources that we rely on every day. As we continue to expand our cities, roads, and as global population continues to grow, it is inevitable to consume resources to provide the clean water, plentiful food, and to build shelters that we need to survive. It should seem natural that we should want to protect and conserve the environment, as well as the natural resources it contains, so that future generations are able to rely on the same resources. But by in large, concepts of preserving habitat, protecting endangered species and restoring damaged ecosystems are relatively new. Nevertheless, it is important that everyone play their part in building a more sustainable future whether you are a student or professional, young or old, so that we do not create further issues of scarcity.

*In today's activity, we will take what we've learned from Abenaki tribal citizens about sustainable harvesting use it to create an art project that will be used to help restore the riparian zones of the Lake Champlain watershed back to their original state. To do this, we will be looking for **goldenrod / staghorn sumac**, harvest some of the flowers to process for dyes, and create our own seed paper out of recycled newspaper.*

9. Before you enter any field, make it clear to participants that they should be stepping mindfully through the area. The goal of this project is to *aid in conservation efforts* of the riparian zone, therefore as good stewards of the environment, we do not want to haphazardly damage the ecosystems we enter.
10. Before leaving your classroom or teaching site, go over any relevant safety protocol your institution has. Feel free to use some of our recommended safety tips.
11. Travel to your chosen field collection site. Once you arrive, you may use your discretion to decide whether to keep the participants together in one large group or to split them up into two smaller groups. If there are two separate groups, you may need to double your collection supplies.
12. Use the photographs on the previous page to aid you in your search for the appropriate seasonal plant. As you are searching, consider building on the knowledge recently gained from stream monitoring to assess the surrounding area. You might pose the following questions:

¹⁵ Mayer, Joshua, *Staghorn Sumac fruit (Rhus typhina)*. July 25, 2009. Source: 2009, Digital Image. Available from: Flickr, <https://www.flickr.com/photos/wackybadger/5919509221> (accessed July 18th, 2018).

Does the ground appear stable or eroded? Does the appear to have low plant biodiversity, with only a few of the same plants repeating in the area? Or does it have a high biodiversity, with many kinds of different plants spread across the area? How close are you from the road -- is it possible that road salts or other contaminants could enter the field as runoff after a storm? How might each of these factors affect the health of the ecosystem?

13. Once you have located the appropriate plant, circle around it as best as you can, paying mind not to accidentally trample over it. The goal of harvesting is to remove some of the flowers, without damaging the rest of the plant. This will enable the plant to continue growing, focusing its energy on the flowers that are left behind. You want to remove the flowers as cleanly as possible, so it is best to use a sharp pair of scissors or gardening shears to cut just below the flower bud.
14. Ensure that you are not taking the majority of the available resource pool. Leave at least half of the flowers on each plant and do not take more than a visual 10% of the available plants. While following this guideline, you can leave once your container is full.
15. **Optional:** While travelling to or from the site, feel free to discuss changes or disruptions going on in your neighborhoods or in the area participants grew up in. Perhaps there has been recent construction, or the expansion of residential areas, or an increased presence of tourism or recreational usage of waterways. Maybe someone's neighborhood is still in recovery from a large weather event like Hurricane Irene, where large amounts of sediment and stormwater accumulated so quickly that they damaged surrounding land or property.

Invasive species are dependent on an external force relocating them into a new area. Do any of the neighborhood changes run the risk of transporting invasive species into your area?

16. Return to your classroom.

SEED PAPER PROJECT

*This portion of the instructions have been adapted from NASA's Climate Kids' Seed Paper Project.

17. Either at the start of this section or during, play the matching *Turning Tides: Seed Paper Project* themed video to watch a demonstration of the activity take place. You will also

get to hear from two Abenaki artists regarding how important they feel conservation is, as well as make their own recommendations about which seeds they would suggest using as a part of the project.

- a. **TIP:** Teachers, you may wish to preview this video to help decide which kind of seeds you will be using in the seed paper.

18. Shred or cut your stack of newspapers into long strips.

19. Soak the paper pieces in the bowl of water overnight.

20. Put the soaked paper into the blender, then fill the blender halfway with fresh water. Blend until the mixture is soupy.

21. Using the knowledge provided to us by the Vermont Abenaki Artists Association, add the flowers from either the goldenrods or staghorn sumac that you collected. If neither are available at the time of year that you are performing this activity, feel free to try using blueberries, strawberries or cherries -- depending on what is seasonally available.

- a. If you are using berries instead of the preferred plants, you will have to freeze for at least a night prior to use to ensure that the seeds within the berries are no longer viable. In the case of cherries, the seeds are large enough that they can simply be removed by hand.

22. Strain the excess water from the blender.

23. Take a portion of the pulp, no larger than a handful, and begin to press the additional water out of the pulp by hand.

24. After doing this, you may begin to shape the pulp into any shape that you may wish for decorating.

25. Once the pulp has been shaped into paper, lay it out onto a flat surface to dry, ontop of a towel, cooking tray, or directly onto the tabletop if you don't mind risking a mess.

26. Gently press some of your chosen seeds onto the top of the paper shapes, ensuring that they are embedded into the paper and not just laying loosely on top of it.

27. Let the paper dry for at least twenty-four hours.

- a. If the paper does not lie flat, place a heavy object (like a book) on it for a few hours to flatten it.

28. Decorate it with markers on the un-seeded side.

IMPLEMENTING CONSERVATION

29. Once the seed paper has dried, decide whether you wish to do with the seed paper. The paper can be taken home by the students and be used to repair a local area near their homes, or the class can come together to choose a location where to leave all of the seed paper. The choice is yours.
30. Review and complete the Watershed Alliance's data sheet for *Turning Tides*. Don't forget to keep us informed about what you're doing!

Citations

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