

Lesson 1: “Whowhatwhenwherewhy?”
A Brain Drain

ENGAGE!

Overview: Several different song and/or poem samples on the subject of invasive species are studied, as the students work in small groups to compile a bank of their current knowledge of “invasives”. All group input, correct or incorrect, is then displayed in a prominent location, to be updated throughout the duration of the ensuing unit. New vocabulary is identified.

Objective: The students will assemble and view all prior knowledge on the topic of invasive species. The students will generate a list of key vocabulary and questions for further research.

Key Concepts: Invasive species and term variants i.e.; exotics, non-natives, introduced flora and fauna, etc.
Subjects: Biology, Ecology, Language Arts
Duration: 1 class period (40 minutes)
Setting: Classroom
Season: Any
Interdisciplinary Connection Frameworks:

Environmental Education @ the Cove River Site, and other coastal Connecticut settings.



*Produced by the Graduate Students in
Environmental Education EVE 546 Spring 2009*



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INTRODUCTION; In this lesson the students will read creative pieces, and discuss each topic together as a group in order to pull prior knowledge, or any misconceptions, partial truths, and even solid facts. This will then be used to enter the unit of study with the same knowledge base, and to build upon it. The instructor does no teaching during this lesson, it is strictly meant to serve as a safe place for the students to explore what they may think they already know, may have heard, viewed and surmised, or have been secretly curious about, but have not yet been able to get a satisfactory answer to.

BACKGROUND INFORMATION; None needed for this lesson

MATERIALS;

- Several copies of different songs, poems, or other creative selections about invasive species
- Lined paper or journals
- Butcher paper roll
- Heavy tape/ duct tape
- Various bold colored markers, crayons

PREPARATION;

- collect and make several copies of the different poem/song selections that deal with the subject of invasive species (see suggested list in resources),
- spread the roll of butcher paper across one wall of the classroom and tape it up at eye-level,
- distribute markers/crayons below papered wall.

PROCEDURE;

1. Divide students into small working groups and distribute the copies.
2. Allow them several minutes to read through them, silently.
3. Instruct them to discuss the selections and then together compile lists of all ideas and any previous knowledge they may have concerning “what is an invasive species?” They can also include any new questions that may arise. All of these ideas can go on the lined paper, or in journals, as preferred by the instructor.
4. Once the thought flow in each group seems to be tapering off, have one or two representatives from each group at a time, come and write their ideas on the giant

papered wall. Encourage them to fill it with their ideas regardless of whether they feel they are right or wrong, or even if someone has a fragmented thought and needs to write it. They may sign their own work as in the sample below:

"I think species is a plant or animal-Sarah P."

5. Resist the urge to correct or instruct at this point. The objective is to pull all previous knowledge and move forward from there during the ensuing study.
6. NOTE: While this is going on, the instructor or another student can be making a list of all new vocabulary. Write these new terms and phrases both on a separate piece of paper and down one margin of the butcher paper. These words will then need to be divided up among the students (doubled up if needed) and defined for homework.

CLOSURE: Lead the class in a quick review of the activity, and come to a consensus on a few solid areas or ideas where the entire class has questions ie: agree on what they need to learn, or study, in order to fully understand what is an invasive species. The instructor can use this information to tailor portions of upcoming lessons.

SUGGESTED FOLLOW-UP/HOMEWORK: Evenly split the list of terms or phrases generated during discussion and have the students define them for homework. Share the results with the whole class, during the next class session, and agree upon a standard workable definition for each.

RESOURCES and WWW LINKS:

http://www.greatlakeswiki.org/index.php/Professor_singing_the_blues_about_invasive_species

<http://windthatshakesthebarley.net/music-47.html>

<http://www.usadeepsouth.com/article1220.html>

Kudzu (poem by James Dickey)

<http://www.amyclampitt.org/poems/reedbeds.html>

"Invasive Species" song by Robert Resnik and Marty Morrissey

"The Return of the Giant Hogweed" song by the group Genesis

<http://www2.oakland.edu/english/farfield/faculty.cfm?ID=7>

<http://www.clarkcraft.net/jsclark/fiction/wisteria.html>

<http://www.highbeam.com/doc/1G1-134459087.html>

Search Tip:

Type in the string of a specific invading species' name + "song" or "poem" ie;
"purple loosestrife poem" or
"Asian shore crab song"

PROVIDED RESOURCES/ etc: see song poem sample to follow

SHORT SAMPLES:

Seductive Invader by Raymond A. Foss

She was beautiful
elegant, sly, alluring
In her rich color
long supple body
full flowering
envy of others
less able
to spread

August 17, 2005 19:27 – about Purple Loosestrife, invading all of New England's wet places

Nettles

My son aged three fell into the nettle bed.
"Bed" seemed a curious name for those green spears,
That regiment of spite behind the shed:
It was no place for rest. With sobs and tears
The boy came seeking comfort and I saw
White blisters beaded on his tender skin.
We soothed him till his pain was not so raw.
At last he offered us a watery grin,
And then I took my billhook, honed the blade
And went outside and slashed in fury with it
Till not a nettle in that fierce parade
Stood upright any more. And then I lit
A funeral pyre to burn the fallen dead,
But in two weeks the busy sun and rain
Had called up tall recruits behind the shed:
My son would often feel sharp wounds again.
Vernon Scannell

Lesson 2: Hiding in Plain Sight

What does an “invader” look like?

Overview: Students will create their own gardens using basic plant “needs” to define their perimeters during the planning. Also, a short story is begun, in which students read the tale of a new student in school and draw comparisons between his arrival and that of plants or animals to a new habitat.

Objectives: Students will make comparisons between the way a plant, animal, and human enter a new environment. Students will plan and design a garden which optimizes the growth requirements of the plants they are given.

Key Concepts: living requirements
Subjects: Biology, Ecology, Math
Duration: 1 class period (40 minutes)
Setting: Classroom
Season: Any
Interdisciplinary Connections
Frameworks:

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Introduction: Many of the decorative plants in our gardens are non-native, introduced species which, when allowed to propagate and spread unintended, have become unintentional invaders. These intentionally or accidentally introduced plants and animals often flourish outside of their native habitat due to a lack of natural predation or resource competition. No U.S. state is immune to invasives and the following lesson helps students to put a face on some of our more common introduced plants, and gets them thinking about how and why they are now here.

Background: No additional information is needed for this lesson but make sure that your students understand that all living plants/animals have specific requirements in order to thrive and grow. Plants need measured light, water and nutrient intake, space and a means of reproduction or propagation. Additionally it should be understood that sunlight amounts and patterns of exposure change with the season. For completing the plant space requirements of the planned garden, the students need a general understanding of map scale and also basic multiplication for calculating yearly plant growth. Students will also need to create and utilize a map key.

Materials:

- plant photo/info cards; approx. 20 plant cards per group of 3 (see Provided Resources),
- land plotting maps; 1 per group of three students (in Resources),
- crayons, markers, colored pencils,
- Teacher’s Invasive Plants Key (Resources),
- (OPTIONAL) journals,
- several copies of New Student story; Part I “Arrival”.

Preparation / Set Up :

- Create your own plant cards that suit your particular geographic region OR use the samples provided in the resources section.
- Cut them into individual plant samples and make enough copies for each group of 3 to have at least 20 different plant species.
- Create your own or copy the provided land plot sample (in resources), 1 per group of 3 students.
- Copy story of New Student, 1 per student.

Procedure:

1. Divide students into groups of 3 and provide each group with at least 20 plant cards and 1 land plot map.
2. Instruct the class that they have approximately 30 minutes (or 75% of total class time) to create a well-planned garden based upon the plant requirement information on each card, as well as personal aesthetics.
3. The groups must use at least 15 of the plants in their garden displays, and use the markers/crayons to plot where each plant is placed and how many of them are in each spot, based on size and map scale. They may utilize a color-coded map key to help with this task.
4. Each group must also be prepared to give justification for much of their planning, including the provided light/water/soil/space requirements.
5. At completion of planning time, display each garden plot and lead a discussion on their methods. (Again, NO instruction is given yet)
6. Finally, using the provided key, identify for the class which plants are considered native to CT (or New England), were introduced, are considered severe pests, etc. and have students remove them from their gardens.

CLOSURE: Discuss responses and/or allow several minutes to journal reactions to activity.

SUGGESTED FOLLOW-UP/HOMEWORK:

Distribute Part I of New Kid Story. After reading it they are to make a Venn diagram using the new student and invasive species and draw conclusions about them, especially the arrival (or introduction) of both.

RESOURCES and WWW LINKS (and origins clues):

<http://www.hort.uconn.edu/CIPWG/>

<http://www.invasivespeciesinfo.gov/unitedstates/ct.shtml>

<http://www.ct.gov/dep/cwp/view.asp?a=2702&q=323494>

http://nbii-nin.ciesin.columbia.edu/ipane/ctcouncil/CT_Invasive_Plant_List.htm

<http://www.ct.nrcs.usda.gov/invas-factsheets.html>

<http://invasivespecies.nbii.gov/states/connecticut.html>

<http://www.defenders.org/resources/publications/invasives/connecticut.pdf>

http://ct.gov/caes/lib/caes/Aquatics_Guide.pdf

<http://www.nature.org/wherewework/northamerica/states/connecticut/science/art24071.html>

http://www.woodstockconservation.org/Invasive_plants.htm

http://www.seagrant.uconn.edu/whatwedo/ais/lis_tour.php

PROVIDED RESOURCES:

Sample plant photo/information card

Sample land plotting map

Teacher's Invasive Plants Key (based on plant sample card above)

Story starter of New Kid in School; The Arrival

Lesson #3 and 4: They're HEERrrre!
Finding Local Aliens

EXPLORE!

Overview: A scholarly article is studied and the students will use it to begin to define and take notes on the various topics involved with invasive species. They will also spend 2 days conducting internet research and will compile a bank of credible resources for further use during the course of this unit, concentrating specifically on their own geographic region of the world. Part II of the story of the New Kid is read.

Objectives: The students will read and organize existing data, taken from the most current scientific research, surrounding the phenomena of invasive species. The students will compile notes and condense scientifically collected information from journal articles and begin to put these into their own notes. The students will search for, and research, specific invasive plants and animals that have been discovered and documented in their local area.

Key Concepts:
Subjects: Ecology, Biology
Duration: 2 class periods (80 minutes)
Setting: classroom or computer lab.
Season: Any
Interdisciplinary Connections
Frameworks:

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INTRODUCTION; Invasive species are creatures that are not native to a local area but become introduced there by human means (predominantly) and eventually cause negative environmental, economic, or human health impacts. Invasive flora and fauna can occur terrestrially or in aquatic/marine environments. They can be plants, animals, or microbes. At least half of the native species on Federal Threatened or Endangered lists are there as a direct result of invading species and it has been estimated that in the US alone, invasive species costs are at least \$100 billion yearly. (source; USDA National Agriculture Library)

BACKGROUND INFORMATION; There are hundreds of organizations, world-wide, that study and monitor invading species. Whether it is a private or government agency, this is a much-researched topic and yet we are still only knowledgeable of a fraction of what we need to know, in order to control the growing problem. While most countries do cooperate with each other, especially within the scientific community, all recognize that world ecological and economic health is at stake. Introduced species affect all continents.

MATERIALS;

- 2 or more scientific articles on invasives (see list of suggestions in Resources Section),
- computers with internet connections,
- blackboard/whiteboard/or butcher paper,
- student notebooks/journals (as preferred),
- Part II of New Kid story
- (OPTIONAL) flash drives, discs for saving research, or paper for printing and filing into a binder

PREPARATION; It might be helpful to scan through most of the suggested websites in the resource section in order to become familiar with some of the largest and most well-organized invasive species research organizations, as well as to prepare for questions and trouble-shooting suggestions.

Also in preparation,
-make copies of the journal articles for each student, each student may read a different selection if the content is similar, (NOTE: the

instructor may wish to present these articles with a few search prompts given in advance. Many methods can be used for content reading and I'd definitely encourage it if needed in order to optimize reader comprehension. You know your students the best.)

-prepare the best way for your students to save their computer research, so that it may be utilized often during the rest of this unit of study, i.e. in sheet-protectors, inside a binder.

PROCEDURE;

1. Distribute articles to each student and allow them to read through them carefully. (Suggestion, read them first for the story and a second time through with specific search prompts given by the instructor)
2. Once the class has completely read the articles, lead them in a discussion and be sure to cover the following points:
 - any new/unfamiliar and critical vocabulary related to the subject (post a visible list),
 - all new questions that the article prompts,
 - awareness of any local "exotics" or even nationwide.
3. Explain the objective of the rest of the class period, and the following, in which they are to research **local** invasive species.
4. They must find the following information on each:
 - latin name
 - common name
 - a good photo
 - where it is found native
 - where it is an invasive-and it's new range
 - describe it's habitat
 - how it spreads, migrates, etc.
 - any detrimental effects recorded
 - any other important info.
5. They may use any resources available, they must find a way to save or copy the information on each for use in the rest of the unit to come. Suggestion, in a binder so that it can be carried into the field.
6. As the students find and complete the info. file on each, they must keep a running list on the blackboard so as to eliminate duplicates. This can be done in lists under the headings; "Aquatic" and "Terrestrial", or "Plant", "Animal", "Microbe". (etc.)

CLOSURE: This is a 2 day lesson which, if it is extremely productive, may be stretched into another class period, or as homework. At the close

of these lessons, a sizeable file of local, non-native, species should be available as a tangible classroom resource; organized according to how the students think it would be easiest to reference.

SUGGESTED FOLLOW-UP/HOMEWORK:
Part II of story: "Acclimation and Other Skills" is to be distributed and read.

RESOURCES and WWW LINKS:

Use the suggested websites listed in Lesson 2 Resources section

Check www.iconn.org (a journal search site)
<http://proquest> database
<http://scholar.google.com>

Also, some other starting points for multiple articles per journal are as follows:

- >Science Scope Magazine Feb. '09, V32, #6
- >New England Wildflower Journal-
"Invaders" Issue, 1998, V2, #3
- >Invasion Ecology from Cornell Scientific Inquiry Series/NSTA Press
- >The Natural Inquirer, V8, #1, "Invasive Species Edition"

PROVIDED RESOURCES:

Local newspaper article, "Parakeets move to Milford" (CT Post)
Part II of New Kid story