Invasive Species Impact Study

CHICAGO RIVER FIELDTRIP ACTIVITY

Summary

Students compare the diversity of plants in an area invaded by non-native invasive species and an area relatively free of invasive species.

This is an especially good lesson to include when students will be involved in restoration efforts at river edge sites.

Grade Level: 6th – 12th

Duration: 10 – 20 min

Objectives:

1. Students will develop observation skills.
2. Students will be able to articulate one of the impacts of non-native invasive species on local ecosystems.

Materials:

- Measuring tape
- Flags
- Pen and paper
- Copies of student data sheet, one per group OR
- Copies of student calculation sheet, if doing extension

Standards:

11.A.3b, 11.A.3c, 11.A.4c, 12.B.5a,

Background

Biodiversity

Biodiversity is defined as the variety of all life. It includes all the genes, species and habitats in a given area. Across the world, and right here in the Chicago River watershed, we are loosing biodiversity. Biodiversity is important for a wide variety of reasons. People depend on natural products such as honey, timber and fish. People also tap the genetic diversity of the world in search of new drugs to cure and treat diseases and for genes to hybridize with our crops to increase their productivity. Biodiversity also supports the life systems of the earth, filtering water and cleaning air. People enjoy watching, photographing and exploring the rich species and habitat diversity of the world. Nature offers us a wealth of inspiration and opportunities for relaxation. It also inspires our creativity and challenges our minds as we try to understand the way the world works. Biodiversity can also be seen as valuable just because it is there. We do not necessarily have to use it or experience it for it to have some value to us. In addition, biodiversity can be seen as valuable and something needing protection because it is believed to have the intrinsic right to exist.

Invasive Species

Invasive species are species not native to a country or region that are so successful in the new environment that they replace native species and threaten local biodiversity and function. Not all non-native species are invasive. Invasive species are those that are able to reproduce quickly and outcompete native species.

Restoration
In ecological restoration people initiate, accelerate and/or guide the recovery of an ecosystem. Frequently, the ecosystem that requires restoration has been degraded by human activities. Restoration attempts to return an ecosystem to its historic trajectory. Often it will be impossible, and perhaps not even desirable, to return an ecosystem to its historic state, but the restoration process should pilot the ecosystem towards improved health and integrity. Restoration can involve returning native species to an area, stabalizing soil and reducing erosion, returning more natural flow regimes, and much much more.

Procedure
For information on planning and organizing a field trip and for safety tips, visit our web site at www.chicagoriver.org/education, then click on field trips.

Before the field trip, find a location where there are two different types of areas within the same habitat – an area dominated by invasive species and a restored area with relatively few if any invasive species (often a restored area). Friends of the Chicago River can help you identify a site.

Show students the two areas, pointing out which one has been restored. If students are unfamiliar with restoration and invasive species, describe the process to them. However, do not point out which is/are the invasive specie/s as that is one of the things the students will be discovering.

Divide students into small groups (four or so students). Each group should measure out a 1m by 1m square, placing flags in the corner. Students should then count the number of different species in the square. (Note: if you wish students to calculate two diversity indexes, make sure they count the number of organisms found for each of the different species.) Students need not identify the different species, but pay close attention to identify all the different species. Groups will repeat the process in each of the habitat type areas. Students will compare the number of different species in each of the squares, a measure of biodiversity, and answer some questions about their results.

Extension
With older students, students can calculate biodiversity in two ways: species richness and simpson's index. For the later, students MUST count the number of organisms of each species in the field.

Species Richness: S = Total number of different organisms present
It does not take into account the evenness of the organisms. This means that an area with 20 of one species and one of each of three species would have the same species richness as an area with 5 of each of four species.
Simpson Index: 1-D = 1 - Sum of $(n/N)^2$, where n= number of organisms of a particular species and N = total number of organisms. Note: you are summing your calculations for all the different species.
Considers both the species richness and the evenness of the species. It is a measure of the probability that two randomly selected individuals from an area will belong to the same species.

Student Data Sheet

1) How many species did you find in the non-restored plot? _____

2) Draw the most common plant.

3) About how much of the plot is covered in this plant? _____

4) How many species did you find in the restored plot? _____

5) Draw the most common plant.

6) About how much of the plot is covered in this plant? _____

7) Which square is more biodiverse (has more different kinds of plants in it)? Why do you think that this is the case?

8) Which plant do you think is the invasive species? _____

9) In what ways do you think invasive plant species affect the river?

Student Calculation Sheet

For each different species, count the number of organisms (number of different plants). Space is provided to draw each plant so that you do not double count species.

Unrestored Plot:

Plant 1: _____ Plant 2: _____ Plant 3: _____ Plant 4: _____

Plant 5: _____ Plant 6: _____ Plant 7: _____ Plant 8: _____

Restored Plot:

Plant 1: _____ Plant 2: _____ Plant 3: _____ Plant 4: _____

Plant 5: _____ Plant 6: _____ Plant 7: _____ Plant 8: _____

Species Richness: number of different species

Unrestored Plot: _____ Restored Plot: _____

Simpson's Index: 1 - Sum of $(n/N)^2$, where n= number of organisms of a particular species and N = total number of organisms. Note: you are summing your calculations for all species.

Unrestored Plot: _____ Restored Plot: _____

Your Conclusions: