

Lesson 1: Open Space Inventory

Grade 7 Science

LESSON DESCRIPTION: Students learn about positive and negative human impacts on the environment and find local examples to share with the class. The class creates a large map that is an inventory of different kinds of open spaces by categorizing information from aerial photographs and observations.

FOCUS QUESTIONS: What are examples of positive and negative impacts of humans on the local environment? How do environmental scientists conduct land inventories?

OBJECTIVES - Students will:

- understand the differences between positive and negative human impact on the environment.
- gather information about the local environment in a systematic way.
- synthesize a local inventory of natural spaces.

COMMON CORE STATE STANDARDS

- **READING STANDARDS FOR LITERACY IN SCIENCE & TECHNICAL SUBJECTS 6–12**
 - * **CCSS.6-8.RH.4** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 6–8 texts and topics.
 - * **CCSS.6-8.RH.7** Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).

Teacher’s Note: Types of communities vary widely. Some schools are in rural areas while others are in cities or suburbs. As a teacher, you will need to think about the types of open spaces, natural spaces, and potentially natural spaces in your community and choose types that are suitable. For example, not all rural students will be able to relate to brownfields, but virtually every student in a city, even a small city, will. Brownfields are spaces contaminated in some way and abandoned, that could be reused for industry or open space. It is important for all students to know about brownfields, but including them is optional.

Additionally, some areas have a lot of open space that is not natural, like a golf course, and natural space that is not public. Awareness of types of open spaces and land ownership is an underpinning of these science lessons.

LENGTH OF LESSON: Six - eight days, Activity 1 takes 1 class period or this could be assigned as homework, Activity 2 takes 1 class period, Activity 3 takes 2 periods plus 20 minutes the next day and Activity 5 takes 2 class periods. Optional Activity 4 takes 1 class period.

MATERIALS NEEDED:

- Camera Hands – 2 copies per student for Activity 1, and 2 copies per student for Activity 3, or some other method for focusing observations.
- Impacts on Environment mini lecture – teacher outline and student blank, one copy per student
- Local Open Spaces chart – transparency, then copies for each group when column two is completed as a class
- Optional: information about local brownfields, available from city, township, or county government. Most cities have a brownfields board.
- Optional: Brownfields quiz, on copy per student and Answer Key
- Washable transparent markers in a variety of colors; dark fine tipped washable markers - one set per group of 4
- Maps and aerial photographs – the science teachers and the social studies teachers will be using maps and aerial photographs for their activities. In the pilot, we were able to get maps and aerial photographs for free from city engineering.

These are the maps used:

- 8 X 14 blank maps of the city, one for every four students in science
- 8 X 14 recreation maps of the city for teacher reference
- 3' X 4' blank map of the city - one for every science and social studies teacher, laminated for re-use
- 11 X 18 aerial photographs of the city, one per group of four - science
- 2.5' X 4' aerial photograph of the city, one for each science teacher

Maps and aerial photographs may be available from: city engineering departments, regional planning agencies, county offices, planning department of local government, Google Earth, Google Maps, local USFS office, local state natural resources office. If you laminate these and take care of them, you will not have to ask for them every year.

INTERNET RESOURCES:

<http://www.epa.gov/brownfields/index.html> U.S. Environmental Protection Agency background information about brownfields

http://en.wikipedia.org/wiki/Brownfield_land Wikipedia definition

<http://www.brownfields2008.org/en/index.aspx> What one Michigan city is doing

Teacher's Note: You will encounter a number of new vocabulary terms in this unit that may or may not be on the list below. In some cases, you may want to simplify terms you encounter in this lesson to suit 7th graders.

VOCABULARY:

observation	brownfield	open spaces
urbanization	effluent	inventory

INVOLVING FAMILIES/COMMUNITIES:

For Activity 3, students should take an adult with them to check out their assigned open space. Parents can help them find the space, evaluate whether the area is natural or could be natural, and whether the area is private or public.

PROCEDURES

Activity 1: Students will observe the environment, looking for positive and negative human impacts.

Teacher's Note: The Camera Hands method was developed by environmental educators who wanted to help people tune in to the environment. The success of this activity depends on you modeling the method. If hands don't work, cut two ends off a small box, like a jewelry box, or use a cardboard tube.

- 1. Anticipatory set – Tell Students:** One thing that scientists are good at is observation. For the next few weeks, you are going to learn some of the ways that a scientist observes and records the observations. We are going to learn to improve our observation skills by framing a scene.

Demonstrate using forefingers and thumbs of both hands to frame a scene, like a camera does. Show how you can pan the camera slowly until you find a scene. You can blink your eyes as you pan, then stop blinking when you find an appropriate scene. The picture can be a landscape, an object, or a close-up. When you find a scene, stop and describe it and sketch it on the board. Have the students practice or demonstrate some other method of focusing observation.

2. Take the class outside to look for two scenes, one showing a positive human impact or no impact, and one showing a negative human impact. Ask students to observe all of the details they can. While still outside, or back in the class, distribute two copies of the Camera Hands or a sheet of paper in landscape orientation divided into right and left halves. Students should label one Positive Human Impact and the other Negative Human Impact. Students should sketch each scene and write 4 -5 sentences describing it on the back.

Activity 2: Students will listen and take notes.

1. Ask students to share what they observed yesterday – what were the positive human impacts and what were the negative human impacts on the environment.
2. Give a mini-lecture about positive and negative human impacts on the environment, using the outline provided. Give each student a blank copy of the outline to take notes. Before giving the mini-lecture, look over the outline. Add your own insights and local examples.

Activity 3: Students will learn about different types of open spaces.

1. Divide students into groups of four and give each group an 11" X 18" aerial photograph of the local area and a sheet of scrap paper. A map of the area would suffice, but students are very intrigued by aerial photographs of where they live.

Teacher's Note: When you first hand out the aerial photographs, students will naturally want to find familiar places: the school, their homes, the mall, the factory. You might as well give them ten to fifteen minutes to explore and observe!

Teacher's Note: Be sure that all types of open spaces are listed: bike, walking, skiing, and snowmobile trails, railroad and power line rights of way, storm drains, highway medians, airports, golf courses, as well as parks, playgrounds, vacant lots, and waterways. You may want to call local government offices and ask to speak to a land use planner to inform them of the project and get more information. This person may have resources to share, including being able to speak to your classes.

2. Have students list at least five *open spaces* on the blank paper. Have groups share their observations with the class.
3. With student input, list Local Examples in the Local Spaces chart transparency.
4. Assign every student one of the Local Examples. The space should be near their home. For homework (over the weekend, if possible), they are to go to their assigned space with an adult, take a picture with camera hand (hand out more Camera Hands sheets) and describe the area in 4 – 5 sentences on the back. Also, students should decide if it is natural or if it could be natural, and find out if it is private or public and write that information on the back.
5. OPTIONAL: Have students take digital photos of the spaces and bring those to class to keep a photo album of the area's natural (or open) spaces.
6. On day two of the lesson, distribute copies of the Local Spaces chart with Column Two completed. Have students share what they observed and complete the other columns in the chart. Students should record the same information on their chart. Tell the students that the class will be creating a map that shows the different types of open spaces in the local area.

Activity 4: Optional – see Teacher's Note at beginning of lesson. Students will learn about potential natural spaces called brownfields.

1. Ask the students to listen very, very carefully to the following information. They will be quizzed on the information: **There are open spaces that usually show negative human impact. There may have been a factory there or a business, like a dry cleaner, that polluted the land. The ground is considered contaminated and unfit for residential use. The contamination is not so severe, however, that the U.S. Environmental Protection Agency has designated it a Superfund site or a hazardous waste site. These spaces can be designated by the local government as *brownfields*. Brownfields can be cleaned up and re-used. When a new store or factory is built on a brownfield, then that takes pressure off open natural land from being developed. Cities that favor green urbanism are using brownfields to create natural spaces within the city.**

Teacher's Note: You may decide to read this information twice to give students another chance to listen.

2. Distribute the Brownfields Quiz, have students take it. Correct in class, and have students change the false sentences to true sentences.
3. **Tell Students:** Our local government has designated some spaces as brownfields. I am going to put these on our large map of the area because they could be natural spaces.
4. Put up a large laminated blank map of the local area. Draw the brownfields on the map, or at least a few of them. As you put them on the map, describe the history of that brownfield.

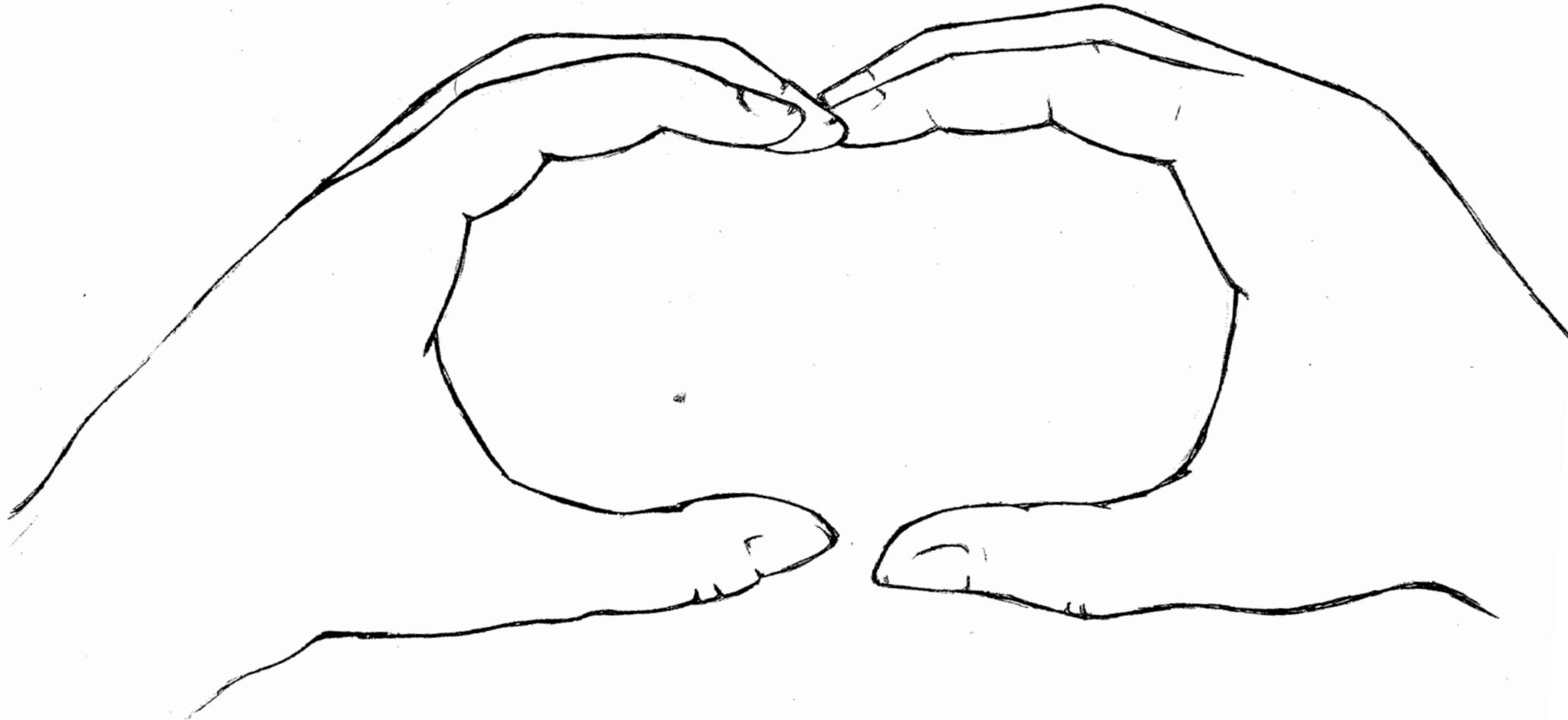
Activity 5: Students will create an inventory map of local natural or potentially natural spaces.

1. With student input, create a key for the different types of open spaces. Use the right hand margin of the Local Open Spaces chart. Suggestions: Use transparent colors for the different types of open spaces. For natural or potentially natural land, use a dark dashed or solid outline. For private land, draw light crosshatching over the color.
2. Put students back into their groups of four and give them an 11" X 18 aerial photograph. Give each group an 8.5" X 11" blank paper map of the local area. Assign each group one type of open space from the Local Open Spaces chart. Provide markers. Explain that this small map is their rough draft, and that all of information will be transferred onto the large class map.
3. Two groups at a time should be able to transfer information to the large map once you have checked their rough draft. Some groups will need more time than others. Completion of the class map may take place during spare minutes for the next day or two.
4. Decide on a title for the map, and include the date, teacher, and class (7th grade 4th hour Science). Have one student put this on the class map.

Pass the class map as soon as possible to the 7th Grade Social Studies teacher!!

CAMERA HANDS

Sketch the picture you took with your camera hands in the frame below. On the back, write about what you saw according to your teacher's instructions.



POSITIVE AND NEGATIVE HUMAN IMPACTS ON THE ENVIRONMENT

Mini-lecture outline

- I. Environment defined
 - A. Where organisms live - where there is food, water, and shelter
 - B. Land - What types of habitats? What food, water, and shelter?
 - 1. Forests
 - 2. Fields
 - C. Water – What types of habitats? What food, water, and shelter?
 - 1. Streams
 - 2. Lakes
 - 3. Rivers
 - 4. Oceans
 - D. Air – Does air provide food, water, and shelter? (List examples)
 - 1.
 - 2.
 - 3.

- II. Positive Human Impacts – humans are part of the ecosystem and must live within it
 - A. Preservation of habitats
 - 1. Wildlife refuges
 - 2. National Parks
 - 3. State and Federal forests – multiple use
 - 4. Local natural areas
 - B. Careful management of resources to prevent destruction
 - 1. Multiple use – USFS, DNR – though not all agree about practices
 - 2. Private landowners
 - C. Long range planning for needs of humans and other organisms
 - 1. Planning commissions plan for the future of a city
 - 2. State and federal land agencies (USFS, DNR) have long range plans
 - 3. Watershed authorities create long range plans

- III. Negative Human Impacts – humans are part of the ecosystem and often destroy it
 - A. Land
 - 1. Development – urbanization
 - 2. Invasive species
 - B. Water
 - 1. Pollution – industrial and municipal effluent
 - 2. Overuse – Mono Lake (Los Angeles water supply), Colorado River (dry at mouth)
 - 3. Invasive species
 - C. Air
 - 1. Pollution – particulates, chemicals

POSITIVE AND NEGATIVE HUMAN IMPACTS ON THE ENVIRONMENT

Mini-lecture outline

I.

A.

B.

1.

2.

C.

1.

2.

3.

4.

D.

1.

2.

3.

II.

A.

1.

2.

3.

4.

B.

1.

2.

C.

1.

2.

3.

III.

A.

1.

2.

B.

1.

2.

3.

C.

1.

LOCAL OPEN SPACES

OPEN SPACES	LOCAL EXAMPLES Location and/or Name	PRIVATE OR PUBLIC? (mark pri or pub)	NATURAL OR COULD BE? (mark n or cb)
Vacant Lots			
Parks			
Schools, hospitals, public buildings			
Trails, rights of way			
Wetlands			
Shorelines, streams			
Other			

Name: _____

BROWNFIELDS QUIZ

In the blank to the left, write T for True, F for false. Any questionable letter will be marked wrong!!!

- ___1. Brownfields are so contaminated that the U.S. Environmental Agency has designated them as Superfund Sites.
- ___2. When factories have been abandoned, the site may be designated as a brownfield site.
- ___3. A large parking lot that is not used much could be designated as a brownfield site.
- ___4. Brownfield sites are only used to build new factories.
- ___5. Brownfield sites are good places to build houses.
- ___6. Brownfield sites are good places to build parks.
- ___7. Green urbanism can feature natural areas created from brownfields.
- ___8. Abandoned brownfields are examples of the positive impact of humans on the environment.
- ___9. When new factories are built on brownfield sites, there is less pressure to use natural areas for factories.
- ___10. Brownfields restored to natural areas are an example of positive human impact on the environment.

ANSWER KEY

BROWNFIELDS QUIZ

In the blank to the left, write T for True, F for false. Any questionable letter will be marked wrong!!!

- F_1. Brownfields are so contaminated that the U.S. Environmental Agency has designated them as Superfund Sites.
- T_2. When factories have been abandoned, the site may be designated as a brownfield site.
- T_3. A large parking lot that is not used much could be designated as a brownfield site.
- F_4. Brownfield sites are only used to build new factories.
- F_5. Brownfield sites are good places to build houses.
- T_6. Brownfield sites are good places to build parks.
- T_7. Green urbanism can feature natural areas created from brownfields.
- F_8. Abandoned brownfields are examples of the positive impact of humans on the environment.
- T_9. When new factories are built on brownfield sites, there is less pressure to use natural areas for factories.
- T_10. Brownfields restored to natural areas are an example of positive human impact on the environment.