

**Youth City! speak**

**PILOT MODULE:**

**ECOSYSTEMS**



# CENTER FOR THE LIVING CITY

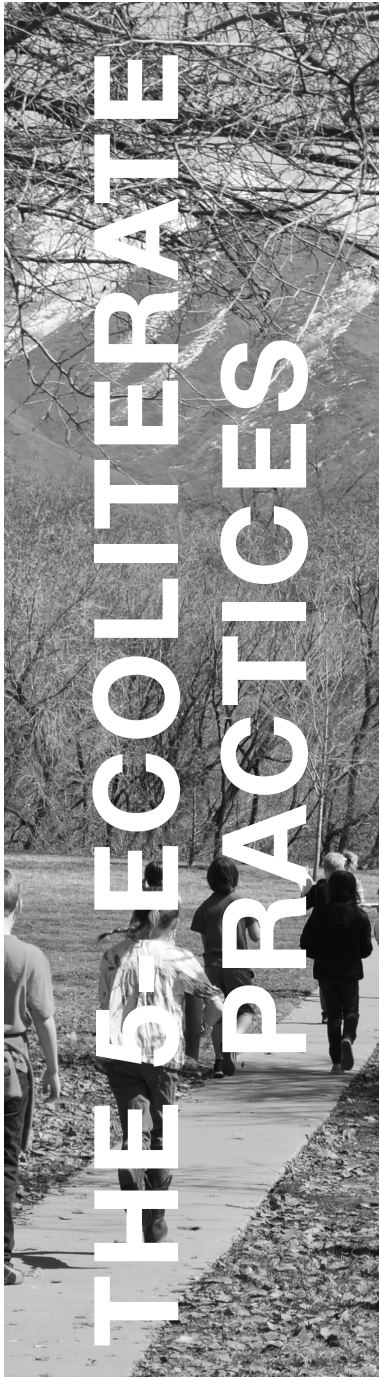
This is a project of the Center for the Living City for Salt Lake City's YouthCity program.  
This module is in its first round as a pilot module.

# ECOSYSTEMS

In this module, students will continue to build upon the past two modules: *Exploring our Connections to Nature + Your Home, Your Community, Your Impact*. This module is designed to encourage youth to critically assess the way their communities function, look, and feel. It will help youth make a positive impact in their community, neighborhood, or school and thereby give them a sense of ownership and pride in the future of their community.

The module is designed to present issues that will impact the future quality of life in 4 of the many realms of our environment; water systems, energy systems, food systems, and transportation systems. **The module's lessons explore the social, economic, and environmental dimensions of our everyday world. The Ecosystems module is broken up into lesson segments with several activities within each lesson topic:**

1. Water Systems
2. Energy Systems
3. Food Systems
4. Transportation Systems



# THE 5-ECOLITERATE PRACTICES

The 5-Ecoliterate practices are vital for cultivating ecoliteracy and ecological intelligence as defined by the Center for Ecoliteracy's book, *Ecoliterate: How Educators are Cultivating Emotional, Social, and Ecological Intelligence* (Jossey-Bass, 2012). These 5 principles are incorporated into the design and implementation of YouthCity Speak environmental education modules.



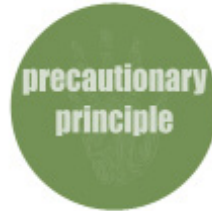
**1. Developing Empathy for All Forms of Life** encourages students to expand their sense of compassion to other forms of life. By shifting from our society's dominant mindset (which considers humans to be separate from and superior to the rest of life on Earth) to a view that recognizes humans as being members of the web of life, students broaden their care and concern to include a more inclusive network of relationships.



**2. Embracing Sustainability as a Community Practice** emerges from knowing that organisms do not exist in isolation. The quality of the web of relationships within any living community determines its collective ability to survive and thrive. By learning about the wondrous ways that plants, animals, and other living things are interdependent, students are inspired to consider the role of interconnectedness within their communities and see the value in strengthening those relationships by thinking and acting cooperatively.



**3. Making the Invisible Visible** assists students in recognizing the myriad effects of human behavior on other people and the environment. The impacts of human behavior have expanded exponentially in time, space, and magnitude, making the results difficult if not impossible to understand fully. Using tools to help make the invisible visible reveals the far-reaching implications of human behavior and enables us to act in more life-affirming ways.



**4. Anticipating Unintended Consequences** is a twofold challenge of predicting the potential implications of our behaviors as best we can, while at the same time accepting that we cannot foresee all possible cause-and-effect associations. Assuming that the ultimate goal is to improve the quality of life, students can adopt systems thinking and the “precautionary principle” as guidelines for cultivating a way of living that defends rather than destroys the web of life. Second, we build resiliency by supporting the capacity of natural and social communities to rebound from unintended consequences.



**5. Understanding How Nature Sustains Life** is imperative for students to cultivate a society that takes into account future generations and other forms of life. Nature has successfully supported life on Earth for billions of years. Therefore, by examining the Earth’s processes, we learn strategies that are applicable to designing human endeavors.



# WATER SYSTEMS

## LESSON: WATER SYSTEMS

### Eco-literacy Principles/Practices Covered



Age Levels: 8-14

### Abstract

This lesson is all about water and water culture. Students will learn about how water governs both human settlements and natural ecosystems. The lesson explores human uses for water and teaches youth to think critically about what habits may be wasteful and how to conserve the precious finite resource.

The intention of this lesson is for youth to develop a working understanding of not only the enormous role that water plays on our planet and the way it has shaped our places, but also the way they themselves and mankind affect this resource and how to be a steward to the water.

By exploring the countless uses for water on this planet and how it is shared by all species, students can begin to see how their actions can change the future. By helping students to recognize the endless web of connections to water, we can encourage a more conscious youth population.





## What to Expect

Students and instructors will be prompted to connect to the many elements of water in our lives so youth can understand them, the complexities around water, and learn from them.

## Expected Outcome

After completing the activities, students will:

- \* Have an integrated understanding of the importance of water and a new water culture;
- \* Understand the scarcity of water;
- \* Be able to make changes in their lives to conserve water on a daily basis; and
- \* Give examples of ways to conserve water.

## Introduction

Water is a *finite* resource. 97 percent of water on earth is salt water. Only 3 percent is fresh water and of that 3%, less than 1% is accessible. Salt water cannot be used for human consumption. We all use water everyday, the EPA notes an average of 50 gallons per person/day! It is one of the most basic necessities we need to survive. But what other things does water do for us that we may not even realize? Every ecosystem on the planet is somehow governed and sustained by water. The sheer lack of water or water quality plays a role in what plants and animals can survive in certain areas. Human life is negatively affected today in many places where clean water is scarce. Since the earliest days of human existence, water determined the location of settlements for both drinking and agriculture. It provided the earliest form of thoroughfare for transportation and trade. The role water plays on our planet and to life is incomparable to any other element.

***What is a finite resource?  
(or non-renewable resource)***

A resource that does not renew itself at a sufficient rate for sustainable rate in.

# WATER SYSTEMS

## **ACTIVITY: WATER CULTURE**—*WATER CONSUMPTION + PERSONAL ACTION*

This activity will give a glimpse of where water comes from in their local community.

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** inside/outside

**Preparation Time:** 5-10 minutes

**Time-Frame for Activity:** 90 minutes

### **Tools/Materials Needed:**

- [ ] Computer with internet for water footprint activity
- [ ] Home Water Audit Worksheet

**Videos:** Play these short video clips for students (optional)

**Is Water a Human Right?** – *Pipe Dreams? Water Rights, Pricing and Privatization* by IIEA: <https://www.youtube.com/watch?v=yhZcVRRMkbc>

**The Global Water Crisis** - *How much water do we really use every day?* By TakePart TV: <https://www.youtube.com/watch?v=On9WRrFHVjY>

### **Additional Links:**

*New Water Cultures* by Grey Water Action.org

### **Resources:**

Earth Day Network's Global Water Network- [globalwaternet.org](http://globalwaternet.org), accessed July 2014.





## Step 1: Why do we need water? How much water do you use every day?



Lead a discussion with students:

a. Why do we need water?

b. What do we use water for on a daily basis?

Example list:

- \* wash hands
- \* take a shower/bath
- \* brush teeth
- \* drink water
- \* do the dishes
- \* do the laundry
- \* water the plants
- \* water the lawn
- \* cook
- \* clean
- \* flush the toilet



c. What type of activities use water? Think about the economic and social ties to water.

*(Many activities use water that aren't commonly known. See if any students can guess them)*

- \* Farming and growing food;
- \* factories use water to manage them;
- \* coal plants and other energy plants use water;
- \* sanitation plants use water and also clean water for the tap that you drink; and
- \* can you think of any others?

### ***Water a human right?***

The right to water is the most basic human right. However, we often abuse this right and place a price on it. Many times we don't even see the hidden costs of water in our every day lives.

In many areas of the world water is scarce, polluted, and wasted. Water has become the center for many battles; battles related to environmental science, politics, and social justice. Water is the very essence of life and drives everything we do on a day to day basis.

Water is used in everything from the production of goods, to energy creation, to the growth of our food system, and basic survival. We must act now to instill a new water culture.

# WATER SYSTEMS

## Step 2: How is water used in your home?

Ask the students:

Do you know where your water in your house comes from? Be a detective and find out the name of the body of water where your water comes from. What watershed is it linked to?

Next, have students think about other ways water is used in their home. What things in their home are connected to water? Think about the materials the home is made out of, the products in the house, etc. How are they connected to water?

## Step 3: What's your water footprint?

Have students calculate their water footprint.

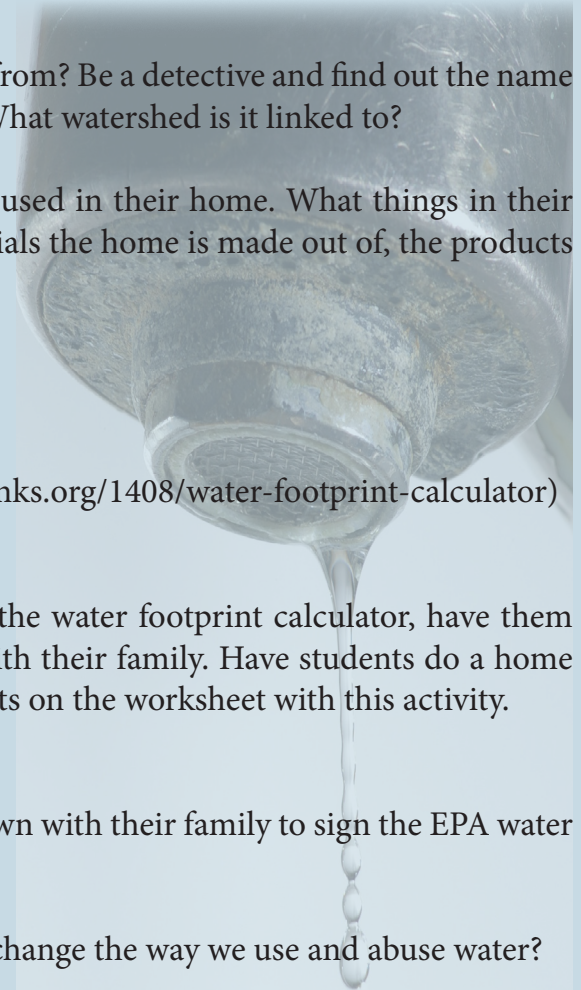
\* Water Footprint Calculator: (<http://www.gracelinks.org/1408/water-footprint-calculator>)

**Step 4: AT HOME:** After students have completed the water footprint calculator, have them take a closer look at their water footprint at home with their family. Have students do a home audit of their families' water usage. Follow the prompts on the worksheet with this activity.

## Step 5: AT HOME: Create a Water Action Plan

After the audit is complete, instruct students to sit down with their family to sign the EPA water pledge or create a personal water saving Action Plan.

What are some easy action steps that can be done to change the way we use and abuse water?





Here are some ways to reduce water consumption and waste:

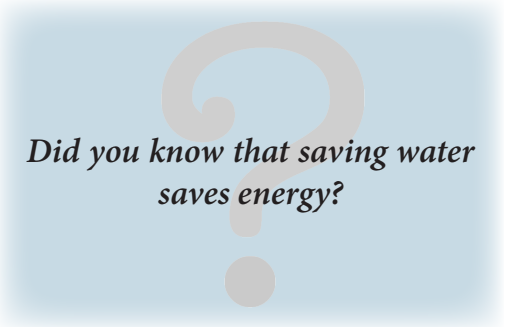
- \* Reduce the amount of time you spend in the shower.
- \* Water the lawn at night or xeriscape your yard. In the desert, it takes even more water to keep grasses green. Some homes have replaced grass with native desert plants.
- \* Repair leaky faucets and toilets.
- \* When washing the car, use a bucket and sponge and don't keep the water going.

**CHALLENGE:** Afterwards, have students create an Action Plan for them to challenge with their family members. Over the next few months, have students track with their family the way their consumption patterns have changed.

Also, have students and their parents sign the EPA water conservation pledge.

**Optional In-Class Activity: Arts + Crafts-** (45 minutes)

Using art supplies, have students decorate a recycled jar to hold their toothbrushes. This jar will be a reminder for turning off the water while they are brushing their teeth.



### Additional Exploration:

Utah Water Quality Kid's Page: <http://extension.usu.edu/waterquality/htm/kidspage>

video for kids K-4 on water conservation from Grace Communications Foundation:  
<https://www.youtube.com/watch?v=YdLhbxljlbI>

EPA Water Sense: <http://www.epa.gov/WaterSense/kids/games.html>

# Home Water Audit Worksheet

Come up with 5-10 ways that your family can cut back on water usage.

Have your family try out suggestions you have come up with to conserve water. Keep track of your water conservation for 2 months. Have your suggestions made a difference? Is there a difference in your family's water bill after your water conservation suggestions?

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

Graywater is wastewater that is created from residential use, such as washing dishes, laundry, and bathing. Graywater accounts for 50-80% of residential wastewater. Think of a way to collect the graywater from your home and choose 5 areas where you could reuse it.

1.

2.

3.

4.

5.

How many water fixtures in your home are leaking or dripping? Look and listen for leaks.



## STUDENT AND FAMILY PLEDGE TO FILTER OUT BAD WATER HABITS



Sit down with your family and share what you have learned. Then, as a group, go through the tips below for helping you use water more efficiently, and check each one that you are willing to pledge to do. When you are finished, you and each family member who is participating must sign the pledge at the bottom and record the date. Congratulations and good luck!

- Take shorter showers/use less water in the bathtub.
- Turn the water off while you brush your teeth or wash your hands.
- Use a broom to clean your driveway instead of a hose.
- Use a layer of organic mulch around plants to reduce evaporation and save hundreds of gallons of water a year.
- Install EPA's WaterSense®-approved aerators on your faucets and low-flow showerheads.
- Conduct a home water audit.  
To conduct a home water audit yourself, or with help from a professional, consult your utility company. Many water providers will conduct home water audits for free or will provide you with home water audit kits at little or no cost! If using instructions from the Internet, be sure the source is reputable and trustworthy.
- Check all water fixtures for leaks and fix/replace those that are leaky.
- Perform a dye test to see if your toilets are leaking (instructions below).  
To check if a toilet is leaking, remove the cover from the tank, add food coloring until the water in the tank is a dark color. Wait 30 minutes (without using the toilet). If any of the dye has entered the bowl in that time, your toilet is leaking.
- Aerate your lawn. Punch holes in your lawn about six inches apart so water will reach the roots rather than run off the surface.
- Water your lawn either in the morning or the evening, rather than the middle of the day, to help reduce loss of water due to evaporation.
- Other: \_\_\_\_\_

By signing our names below, we pledge to use water more efficiently  
by conducting the activities checked above.

**Student:** \_\_\_\_\_

**Family Members**

_____	_____	_____
_____	_____	_____
_____	_____	_____

**Date:** \_\_\_\_\_

**Please remember to bring your signed pledge back to class to share your commitments!**

For more information on water conservation and what you can do to protect your watershed,  
visit [www.epa.gov/WaterSense](http://www.epa.gov/WaterSense).



# WATER SYSTEMS

## ACTIVITY: EXPLORE YOUR LOCAL WATERSHED

*“As people alive today, we must consider future generations: a clean environment is a human right like any other. It is therefore part of our responsibility towards others to ensure that the world we pass on is as healthy, if not healthier, than we found it.”*

- The Dalai Lama

This activity will give a glimpse of where water comes from in their local community.

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** Inside/Outside

**Preparation Time:** 10-15 minutes

**Time-Frame for :** 90-120 minutes, depending on travel time

**Tools/Materials Needed:**

- [ ] clip board
- [ ] blank sheets of paper

**Video:** Play short video clip for students (optional)

*Water Sensitive Urban Design, by the Landscape Institute UK*





**Step 1:** Begin by taking students outside into a local park or green space. Sit them into a circle for a brief discussion about water and the *watershed*.

### ***What is a watershed?***

A watershed is a “bounded hydrological system”, meaning that the topography of the land makes it so all of rain that falls on the area of land eventually drains to the same place. Often mountain ranges divide watersheds, and somewhere in their valley’s lie the drainage point. Because all of the living things in the area are linked by their water source, communities tend to form within the boundaries of a watershed. Just as a neighborhood may depend on the same grocery store and be connected in that way, entire ecosystems are bounded by their association with their watershed. (Quoted source: John Wesley Powell)

*How does water get in your watershed?*

*How does it leave your watershed? Where does it go from there?*

**TIP:** Check out Earth Guide’s Water Cycle Diagram online.

**Step 2:** Go on a walk around your community to find sources of water—for example have students point out puddles, storm drains/sewers, rain barrels, rivers, aquifers, wells, and sprinklers. Discuss how the water is being used.

Ask students:

*Can you see an instance where water is being saved or used sustainably?*

*How is it being wasted?*

**TIP:** Have students write down or draw examples of sources of water on the walk. If you have cameras, students can take pictures of these to document them for a later discussion.

### **Discover your watershed!**

In Salt Lake City we live within the Wasatch Front watershed. Much of the water comes from the snow that builds on the mountain, melts, and flows down the canyons in creeks, to the Jordan River, and out to the Great Salt Lake.

Utah is a desert. Water sources in deserts are very precious and finite. You can imagine how important it is then to keep the land in the mountains and around the creeks and the river clean!

# WATER SYSTEMS

**Step 3:** Next, take the students on a walk to identify local streams, springs, or hidden waters beneath the city infrastructure. Can students name which creek they are looking at? Do they know where it came from in the watershed?

**TIP:** Have students check out Hidden Water after going on the walk. Also, check out Seven Canyons Trust for more information on hidden waters in the Salt Lake Valley.

**Step 4:** During your walk outside, what did you discover about the way water is used in your community? How can we change our water use to have a positive impact on nature?

**Note from the Seven Canyons Trust:**

In Salt Lake City, we use surface water for drinking, irrigation, industrial use, and to generate power. It is important that we respect the hydrological cycle by reducing our impact from urban storm runoff.

During storm events, water travels over impermeable surfaces such as roofs, parking lots, streets collecting pollutants, and sediments that can cause irreparable damage to the hydrology of the Wasatch Front.

By reducing the amount of runoff and treating storm water on site we are able to achieve four broad resource protection goals. These include flood control, channel protection, ground water recharge, and pollutant removal (EPA). The methods for protecting these resources include the reduction of runoff through rain catchment and green rooftops. The methods for treating storm water on site include the use of permeable pavement and different forms of bio-retention such as bio-swales, rain gardens, and infiltration islands.

Have students brainstorm this. As they learned in the module *Your Home–Your Community–Your Impact*, have the students create an action plan to address an issue they identify.







### *Did You Know?*

Until June of 1896 Salt Lake City produced energy from a coal-fired, steam-generated power plant. This process created air pollution that displeased the residents of Salt Lake. With a growing energy demand and a highly popular electric streetcar, something had to be done. Between 1894 and 1896 Robert M. Jones constructed the Stairs Plant in Big Cottonwood Canyon to meet the demand for clean energy. At a total cost of \$325,000 the plant started producing energy in June of 1896. At the time the Stairs Plant was the third largest power plant in the nation and the first long-distance transmission of alternating current in Utah.

The plant generated power and transmitted it over a 14-mile line to a substation in Salt Lake City. The greatest benefit of the stairs power plant was the Salt Lake trolley system. This is not the Trax system of today but was in fact over 147 miles of tracks served by dozens of trolleys on nearly every street in Salt Lake. The entirety of that infrastructure was powered by clean, renewable energy, a combination of sustainable energy and efficient transportation that goes unrivaled to this day. The Stairs Plant still functions and produces 1.2 Megawatts per year. In addition to the clean energy, the Stairs Plant also reminds users of Big Cottonwood Canyon how important our watershed is. The Stairs Plant is symbolic of the power of water and the importance of Utah's hydrology.

–Seven Canyons Trust

# WATER SYSTEMS

## **ACTIVITY: WATER QUALITY + WATER TESTING IN YOUR WATERSHED**

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** inside/outside

**Preparation Time:** 1-1.5 hours to organize activity and field trip; order water quality monitoring kits ahead of time.

**Time-Frame for Activity:** 2-3 hours

### **Tools/Materials Needed:**

- [ ] Water Quality Monitoring Kit: <http://www.lamotte.com/en/education/water-monitoring/3-5886.html>: low cost water quality monitoring kit for kids 8 and up.
- [ ] Bottles to collect samples
- [ ] Thermometer
- [ ] Cameras
- [ ] Sketch books/blank sheets of paper + writing utensil

### **Additional Links:**

Salt Lake County Watershed Map: Use this to show students the valley's watershed.: <http://slco.org/watershed/pdf/WaQSPUnitsMap.pdf>

### **Additional Explorations + Lesson Plans**

*Saving H2Os How Much Water do we Have?*





Have students do their own local water quality testing. Obtain water samples from different points along your local watershed. For this activity, you will need to plan a field trip with the students. This activity may also be broken up into different day sessions; one in a higher protected watershed area (Big Cottonwood Canyon or Little Cottonwood Canyon) and one in the urban environment. In Salt Lake City, this could be the Jordan River, Red Butte Creek, Parley's Creek, Mill Creek, City Creek, Red Butte Creek, or an artesian spring.

**TIP:** Make sure students wear proper hiking shoes. Cameras and sketch books are encouraged to record observations.

**Step 1:** Have students go on a hike in local watershed and record observations. Have a student leader or a couple students collect a sampling of the water into the bottle. Label the bottle.

**Step 2:** Then take students on a hike next to water that isn't in the protected watershed and that is near an urban area. Have students record observations. What is different? What is the same?

**Step 3: In-Class Testing-** After collecting the two samples, instruct the students to use the water quality testing kits. (Instructions for this are with the kit). Using the kits, students should test these samples for contaminants. Have them record the results. They will test for pH and make observations about water clarity, presence of organisms, etc. Ask students to compare and contrast their data for each water sample. NOTE: Temperature of the water affects water quality.

*Does the water quality differ when it is sampled close to human settlements?*

*What are some potential sources of pollution along the watershed?*

*How do student findings compare with the annual water quality report provided by your community water utility?*

Discuss what factors in the watershed influence water quality. Have students consider who lives, works, and plays in the watershed and then make a list of stakeholders who would need to be involved in watershed management issues. What role should students play in watershed management?

### Investigate your watershed water quality

Water quality is measurable.

Water quality can be directly related to human activities.

Water quality can be improved.

# WATER SYSTEMS

## STEPS TO TAKE ACTION:

**Time-frame: 60-120 minutes** (Depending on what the students focus on, this lesson can become a multi-month project the students can tackle)

### **Step 1: Identify concerns**

Have students identify areas of concern in their community, neighborhood or school boundary that deals with their watershed and water management. Make a list of all the ways the problem affects them and other people who they know. Have each student present the problem in a class discussion.

### **Step 2: List ideas for problem solving. Choose one.**

Have the students make a list of ideas, which would positively affect the specific area of concern they have identified relating to their watershed. Have each student present his or her ideas in a class discussion.

### **Step 3: List steps to solving problems**

In a class discussion, identify ways students could, with some assistance, actually implement some of the ideas for change they have.

### **Step 4: Begin steps to problem solve**

Turn the problem into a class project making students responsible for carrying through with the steps they identified in step 3. This is their chance to get actively involved and learn how to affect change in their community.

### **Step 5: Identify your audience**

Have the students identify sources they can contact for further assistance or information, such as community advocacy organizations, newspapers or government agencies. Utilize the available resources in getting attention for the project, find out how to influence a decision or change a bad situation.







# WATER SYSTEMS

## KEY TERMS: WATER SYSTEMS

**Bioretention:** A process where water is strained cleaned of contaminants as the water passes through natural filters such as sand, soil, grass, and gravel. This filtration system leaves the water far cleaner than it started, allowing it to safely reenter our aquifer without additional chemical treatment.

**Bioswale:** This is bioretention in action; a bioswale is a physical landscape element that removes pollution and contaminants simply by catching water and then slowly draining and simultaneously filtering it. Bioswales also have the added benefit of preventing flooding by capturing large volumes of water during heavy rain and spring snow-melt.

**Catchment:** An area or place that catches surface water and drains it to a single point, such as a basin or gully.

**Conservation:** Preservation and protection of materials or resources.

**Grey Water:** The water from your bathroom sinks, showers, tubs, and washing machines. Grey water may contain traces of dirt, food, grease, hair, and certain household cleaning products. While greywater may look “dirty,” it is a safe and even beneficial source of irrigation water in a yard. There are many simple, economical ways to reuse greywater in the landscape.

**Permeable/Impermeable Barrier:** A permeable barrier is a material that allows water to pass through it, often as part of a bioretention system, such as gravel, sand, or permeable asphalt. An impermeable barrier prevents water from passing through, such as concrete and most kinds of asphalt.

**Scarcity:** Deficient amount of something to meet the demands; not plentiful or abundant.



**Watershed:** The land area where all of the water above and below the ground drains to a common channel or body of water. The watershed has a network of streams that branch out like the branches of a tree.



**Surface-water Runoff:** The flow of water that occurs when water from rain, snow melt, or other sources flows over the earth's surface.



# WATER SYSTEMS

## LOCAL WATER SYSTEM RESOURCES

**Seven Canyons Trust:** [sevencanyonstrust.org](http://sevencanyonstrust.org)

A Wasatch Front organization whose mission is to uncover the water that once flowed freely from City, Red Butte, Parley's, Emigration, Mill, Little Cottonwood, and Big Cottonwood Creeks: restoring health, beauty, connection, and kinship between the seven creeks, their communities, and the natural environment.

**Jordan River Commission:** [jordanrivercommission.com](http://jordanrivercommission.com)

The Jordan River Commission was created by an inter-local cooperation agreement in August 2010. It was created to facilitate regional implementation of the Blueprint Jordan River, to serve as a technical resource to local communities, and to provide a forum for coordination of planning, restoration, and responsible development along the Jordan River corridor. The Commission is a capacity-building organization. They work to increase and improve our member agencies' ability to implement the projects identified in Blueprint Jordan River, to raise public awareness of the Jordan River corridor and the issues it faces, and to help promote coordination and communication among Jordan River stakeholders.

## LOCAL WATER MANAGEMENT AGENCIES

**Jordan Valley Water Conservancy District:** [jvwcd.org](http://jvwcd.org)

**Metropolitan Water District of Salt Lake City and Sandy:** [www.mwdsls.org](http://www.mwdsls.org)

**Salt Lake City Department of Public Utilities:** [www.slcgov.com/utilities/](http://www.slcgov.com/utilities/)

**Utah Division of Water Resources:** [www.water.utah.gov](http://www.water.utah.gov)





## WATER RESOURCE INFORMATION SOURCES

**Environmental Protection Agency/Water Sense:** [www.epa.gov/watersense/](http://www.epa.gov/watersense/)

**Red Butte Natural Area:** [redbuttecanyon.net](http://redbuttecanyon.net)

**Utah Museum of Natural History:** [nhmu.utah.edu/home](http://nhmu.utah.edu/home)

**Water Wise Utah:** [waterwiseutah.org](http://waterwiseutah.org)

## WATER RESEARCH LIBRARIES

**Western Waters Digital Library:** [westernwaters.org/index.php/index/](http://westernwaters.org/index.php/index/)

## OTHER LOCAL WATER ACTIVIST ORGANIZATIONS

**Friends of Great Salt Lake:** [www.fogsl.org](http://www.fogsl.org)

**Save Our Canyons:** [saveourcanyons.org](http://saveourcanyons.org)

**Utah Rivers Council:** [www.utahrivers.org](http://www.utahrivers.org)

# WATER SYSTEMS

## ADDITIONAL RESOURCES

**Roots of Success:** [rootsofsuccess.org/alumniresources/supplementary-resources/water/](http://rootsofsuccess.org/alumniresources/supplementary-resources/water/)

**In Time-** <http://www.intime.uni.edu/lessons/022mims/book.htm>

**Grace Links Conserve Water-** <http://www.gracelinks.org/1299/aqua-conserve-water> -

**The River Network's "Rivers, Energy & Climate Program"** - [rivernetwork.org](http://rivernetwork.org)

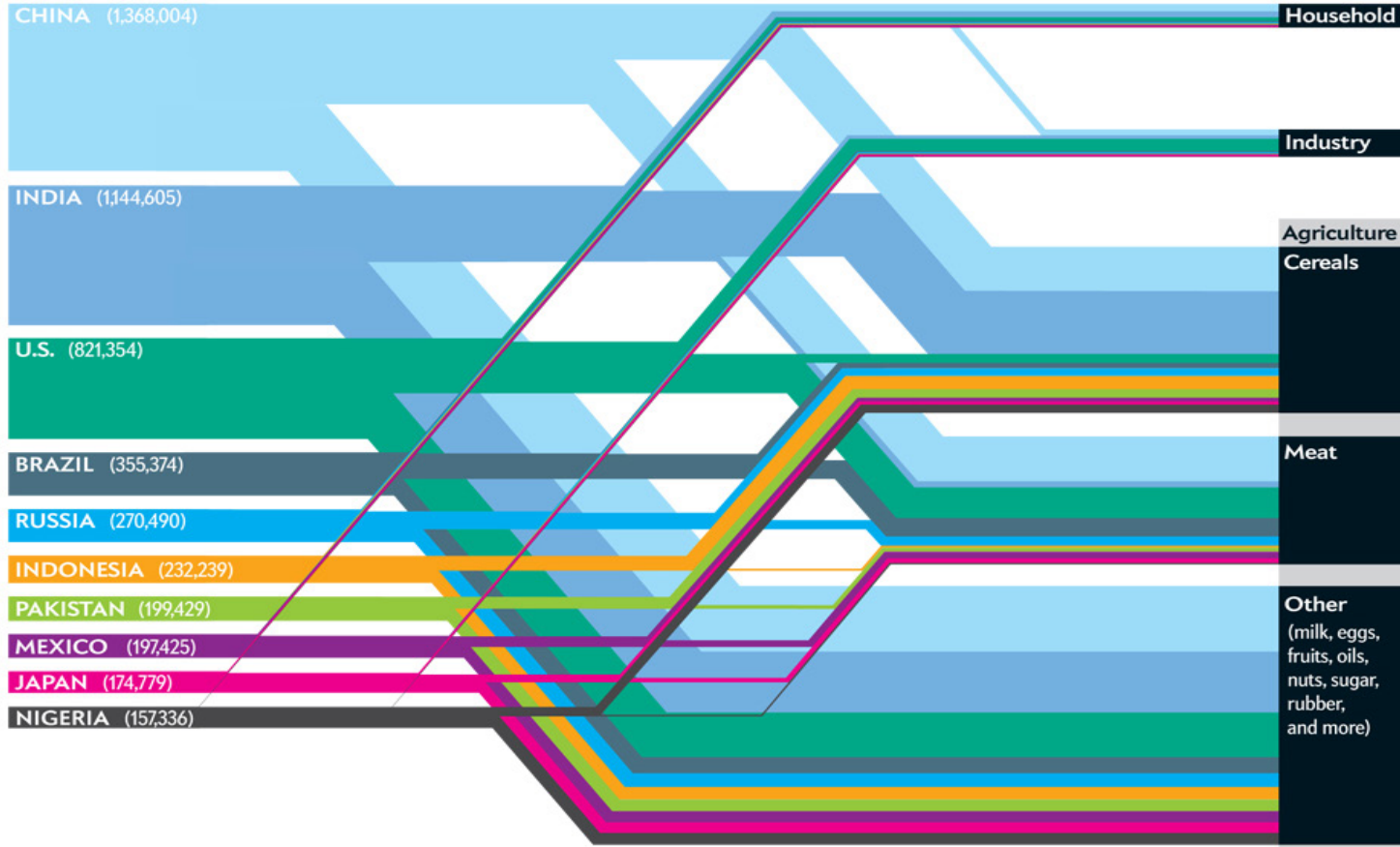
**Alliance for Water Efficiency-** [allianceforwaterefficiency.org](http://allianceforwaterefficiency.org)

**Water Footprint Network-** [waterfootprint.org](http://waterfootprint.org)

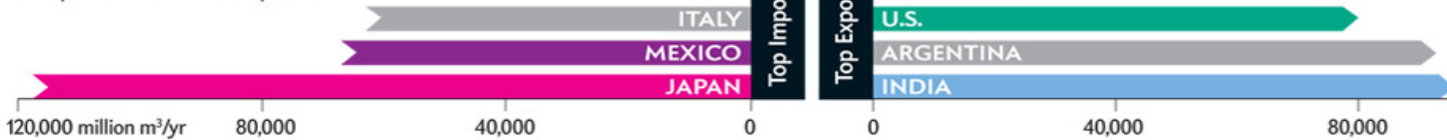




**Top 10 Freshwater Consumers** (million cubic meters per year)



**Largest Net Importers and Exporters of Virtual Water** (in crop, animal and industrial products)



Graphics by Jen Christiansen  
 Source: "The Water Footprint of Humanity," by Arjen Y. Hoekstra and Mesfin M. Mekonnen, in Proceedings of the National Academy of Sciences USA. Published online February 13, 2012

<http://www.scientificamerican.com/article/water-in-water-out/>

# ENERGY SYSTEMS

## LESSON: ENERGY SYSTEMS

Eco-literacy Principles/Practices Covered:



Age Levels: 8-14

### Abstract

This lesson breaks down different energy resources, categorized by renewable and nonrenewable. It gives students a simple explanation of each one, giving them a basic background on the two classifications of energy. The lesson explores , and asks students to think critically about what we use energy for and where our energy usage could be reduced.

Students will be asked to look at the energy usage that they themselves have control over, such as the lights in their bedroom. By just doing their part in reducing energy usage, they are reducing their footprint and positively impacting the planet. The module also asks students to look outside the box and consider other energy resources.







### **What to Expect**

The activities in this lesson will have students investigate energy. They will look closely at their own energy consumption habits, their home energy use, and the energy used in the world around them.

### **Expected Outcome**

Students will better understand where their energy comes from and what it means to use it, conserve it, and to waste it.

Students will understand what renewable and nonrenewable resources are.

Students will begin to take action to reduce their energy footprint.

### **Introduction**

Energy is in everything. In the US, an estimated 12,747 kWh is consumed by each person each year. How much is that? That's enough to power more than 250 light bulbs for the day! If almost 320 million people live in the United States, that means as a country, we use enough energy to power almost 80 billion light bulbs for a whole day! Where do we get all of this energy? What is all of this energy used for? Do we really need that much?

The global demand for energy is on the rise. Our everyday habits greatly contribute to the rise of energy consumption which contributes to global warming and climate change.

# ENERGY SYSTEMS

## ACTIVITY: ENERGY DETECTIVE

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** Outside/Inside

**Tools/Materials Needed:**

- thermometer
- toilet paper
- tape
- pencil

**Resources:**

In accordance to the Creative Commons License, this activity is adapted from the David Suzuki Foundation- *Connecting with Nature-Gone with the Wind* activity: [http://www.davidsuzuki.org/what-you-can-do/downloads/CWN\\_TeachersGuide.pdf](http://www.davidsuzuki.org/what-you-can-do/downloads/CWN_TeachersGuide.pdf) on July 2014, pg. 66.





## Outdoors/Indoors

**Step 1.** Take students outside and document the temperature. Then go inside. Ask the students what they noticed when they walked inside. Did they feel air conditioning blasting if it is hot outside? Or was the heat cranked up if it's cold outside? Compare the temperature outside to the temperature inside.

**Step 2.** Now have students begin to investigate the building. Are there any noticeable gaps or cracks to the doors or windows in the building? In winter, cold air can come inside the building through these tiny openings. In the summertime, hot air comes through the cracks and the air conditioning has to over compensate to keep the building a stable temperature.

What else impacts the temperature escape or entering in a building? Have students identify if the building is older or newer. Does the building have double paned windows? Does the building have shades on the windows?

**Step 3.** Lead a discussion with the students. Have them imagine the impact on the environment with the escape of energy to heat and cool the building. What are the economic impacts? What about social impacts?

For example:

Next, explain that when energy escapes there's more consumption of the Earth's resources. This leads to more burning of fossil fuels (non-renewable) and contributes to climate change.

Have students share their ideas where energy comes from. Explain that energy is either from nonrenewable resources and renewable resources.

**Have you ever felt an extreme temperature change when walking past a storefront?**

Many big box stores blast air conditioning in the summer with their doors open as a marketing strategy to entice people to come into the store.

Some cities, like New York City, have created ordinances making it illegal for chain businesses and big box stores to prop doors open while the air conditioning is on.

### Take Action

If you notice air conditioning blasting to the outdoors in your city, consider contacting a local public official or starting a campaign to educate people on this waste of a precious resource.

# ENERGY SYSTEMS

## *What are Renewable and Nonrenewable Resources?*

### **Renewable Resources:**

The five major renewable energy resources are solar, wind, water (hydro), biomass, and geothermal

**Solar Power:** The sun is a constant source of energy. It is a natural source of heat, but can also be harnessed and used to produce electricity using photovoltaic “solar cells”. Solar energy is often used to power buildings just by utilizing otherwise unused roof space and can replace the battery of a variety of devices. ie. solar panel

**Wind Power:** Wind energy is energy from moving air. A windmill is turned by the wind (generated from uneven heating of the atmosphere), turning the motor inside and generating electricity. Wind energy can be used to power buildings and infrastructure with a supporting climate. i.e. windmill

**Hydro Power:** Water can be used to harness mechanical energy. The water flows through a pipe and turns blades within it, which spin and generate electricity. Hydro energy is dependable and is widely used to power machinery and infrastructure.

**Biomass:** Plants absorb energy from the sun through the process of photosynthesis. When burned, this chemical energy is released. It is a renewable energy source because we can grow more plants--but it becomes nonrenewable if we consume the resource faster than it is reproduced, which is the case with fossil fuels. Biomass energy is useful for many things, such as conversion to a liquid fuel form that can power vehicles!

**Geothermal:** geothermal energy is the heat generated deep within the Earth. It can be used to heat buildings and generate electricity. The heat is continuously produced, making the resource renewable.



**Nonrenewable:**

These resources are finite fossil fuels--coal, oil, and natural gas; nuclear

**Fossil Fuels:** Natural gas, coal, and oil were formed from remains of ancient organisms that lived millions of years ago. As sand and silt buried the remains over time, the pressure and heat that built up forced them into “crude oil”, methane, and coal. These resources are found and extracted all over the world. Because the creation of fossil fuels is such a lengthy process and because of the high quantities humans consume, fossil fuels are considered a finite resource. i.e. natural gas plant, coal mine, oil rig, oil sands

**Nuclear Power:** Nuclear energy is the energy from the nucleus of atoms--the tiniest particles in the universe that make up everyone and everything. When that energy is released, it can be used for electricity. This happens through nuclear fission--the splitting of atoms, or nuclear fusion--the combining of atoms. This is not considered a renewable resource because the atoms are uranium atoms, which although plentiful, are finite on Earth.

**Step 4.** We use energy everyday. It's embodied in the food we eat, to heat and cool our homes, to get from one place to another, and in everything in nature. It's in everything we do. Unfortunately, we, as a society, tend to waste mass amounts of energy.

Ask students: Do you think we waste energy? Why should we reduce the amount of energy we consume? The way we consume energy today is unsustainable. If we don't live within the limits of nature, we will exploit our resources. So, we must all do our part and use only the energy we need and use it efficiently as possible.

**Step 5.** Now have the student think back to the way they felt when they walked from outside into the room. As investigators of their environment, have them become the solution to the energy loss in the building.

# ENERGY SYSTEMS

## Step 6. Investigative Tools

Each student will make a draft detector for their school and for at home.

Draft detector: Tape a piece of toilet paper or plastic food wrap that is 5 inches long to the side of a pencil.

## Step 7. Test the draft detector

Instruct students to test how easily the toilet paper moves. Next, divide students in groups and have them to make the invisible visible by using the detector next to closed windows, doors, fans, etc.

## Step 8. Tell their findings

Students will meet with the group to tell their story of what they found and what their ideas are to stop the energy from escaping (drafts).







# ENERGY SYSTEMS

## ACTIVITY: IN YOUR LIFE

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** indoors or outdoors

**Preparation Time:** 5 minutes

**Time-Frame for Activity:** Discussion: 20-35 minutes; Steps to Take Action: 45 minutes

**Tools/Materials Needed:**

[ ] paper

[ ] pen

**Videos:** Play these short video clips for students (optional)

**Veggie Oil Van:** <http://www.sciencechannel.com/video-topics/gadgets-and-tech/cool-fuel-veggie-oil-van.htm>

**High Altitude Wind Energy from kites:** [http://www.ted.com/talks/saul\\_griffith\\_on\\_kites\\_as\\_the\\_future\\_of\\_renewable\\_energy](http://www.ted.com/talks/saul_griffith_on_kites_as_the_future_of_renewable_energy)

**Solar Energy Systems:** <http://energy.gov/energysaver/articles/small-solar-electric-systems>





**Step 1.** Ask students to write down anything they use energy for throughout the day. Open a discussion of the things they may not realize require energy, or the things that are less obvious or indirectly related to them. This may include the heating and cooling of their school/home; the energy it took to make their clothing, packaged foods, etc; their parent's vehicles; etc.

**Step 2.** Discuss with students how they could use less energy, beginning with a brainstorm led by them. Ask students if they or their parents already have rules about this. How can you be more responsible with this precious resource?

**Step 3.** Have students come up with some ideas about where energy is wasted outside of their homes--in their neighborhoods, cities, and worldwide. Catalyze a system's thinking approach to how this waste affects the world and how it could be changed.

**Step 4.** Indoors (need computer to show video): Have discussion of ways students use renewable energy:

What are some of the ways you can use the energy from the sun, wind, and water? Show the videos to students and open the discussion--what if energy could come from other things?

**Step 5.** Have students come up with something they use energy for every day that they might be able to do without any assistance but their two hands. Compile a short list on the board and assign students to go home and see what they come up with! Invite students to share their results the following class.

### Lead a discussion

Is it better to be more energy efficient or should we change out behavior and habits?

Do you think people that have energy efficient homes or hybrid cars still have good energy conservation habits?

# ENERGY SYSTEMS

## STEPS TO TAKE ACTION:

Have students challenge their families to become more energy wise. These are some additional items students can do to start taking action with energy conservation.

**National Geographic's Energy Challenge:** [ ] computer with internet  
[environment.nationalgeographic.com/environment/energy/great-energy-challenge/personal-energy-meter/](http://environment.nationalgeographic.com/environment/energy/great-energy-challenge/personal-energy-meter/)

Investigate in your home. Do any of your appliances have an energy star label? What kinds of light bulbs do you use in your house?

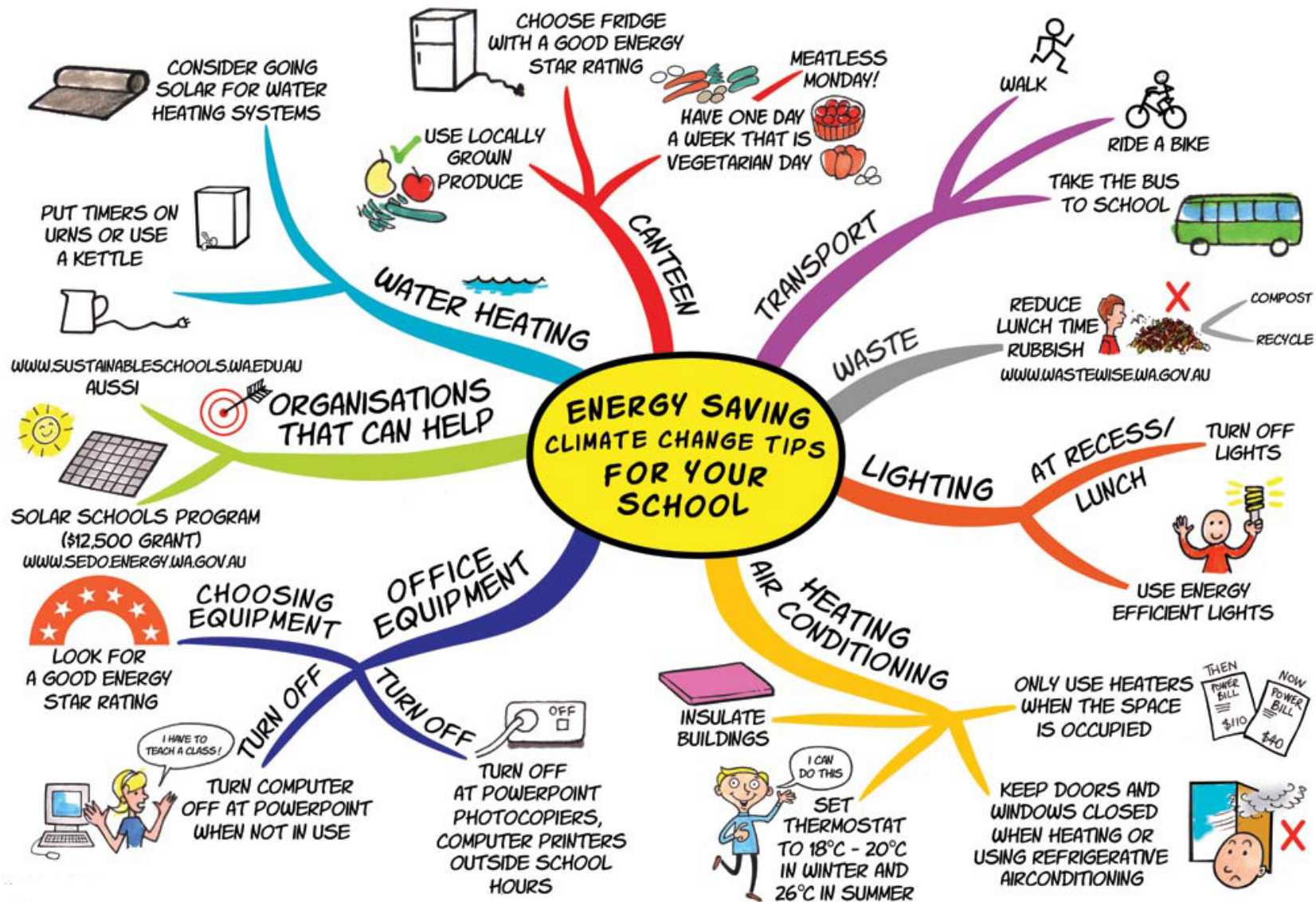
**TIP:** Do you leave appliances and electrical devices plugged in when you aren't using it? Some devices and appliances use energy even when they are turned off!

**TIP:** On a summer day, close your curtains and blinds during the day to help keep the heat out. In the winter, open the curtains and blinds to let the sun heat up your home.

**TIP:** Change out your light bulbs to energy efficient bulbs. Also, make sure to turn lights off when you're not home or when you aren't in a room. For example, an energy efficient compact fluorescent light bulb (CFL) uses 85% less energy than a conventional incandescent bulb to produce the same amount of light. Which means the CFL is much more energy efficient and will use less electricity.

Check out National Geographic's Light Bulb Savings Calculator: <http://environment.nationalgeographic.com/environment/energy/great-energy-challenge/light-bulb-savings-calculator/>





Ways to save energy at home, work, school, and the office from Direct Homes Ontario (<http://www.dhontario.com/climate-change-tips/>)

# ENERGY SYSTEMS

## ACTIVITY: LIGHT POLLUTION

This activity can be done as a field trip or for homework for students to see how lights impact the night's sky.

**Age Levels:** 8-14

**Accessibility:** Evening field trip or Homework with family members\*\*\*

**Setting:** Outside

**Preparation Time:** 15 minutes-however long it takes to organize field trip. This can also be done as an activity for students to do with family at night.

**Time-Frame for Activity:** 15-20 minutes for worksheet activity outside; 30 minute discussion with students after they complete the worksheet.

**Tools/Materials Needed:**

- [ ] worksheet
- [ ] pen/pencil

**Videos:**

Protect the Night: Sea Turtle: <https://www.youtube.com/watch?v=Rq-MVXdXc3Q>



## Who turned off the stars?



Light Pollution is a phenomenon that happens when the sky is too bright at night from the city lights, and sometimes it makes it hard to see the stars. This issue grows by about 4% every year.

Light pollution is artificial light that is allowed to illuminate, or intrude upon, areas not intended to be lit.

### Investigate light pollution

Assign students to complete the worksheet provided with a parent or supervisor, or host a field trip at night.

### Continued discussion:

Ask students:

What did you notice when looking out at the night sky?  
What types of lights cause light pollution?

What does light pollution do?  
It can effect our health  
It can effect animals

Difficulty seeing stars isn't the only side effect of light pollution. Can you think of an animal that might also want the sky to be dark? *Watch video: Protect the Night: Sea Turtle:* <https://www.youtube.com/watch?v=Rq-MVXdXc3Q>

What are some things you can do to help reduce light pollution? For example, one solution could be to have places turn the brightness of their lights down.

### Did you know...

Light pollution can be a hazard to our health.

Just about every organism on the planet lives its life according to the rhythms of daytime and darkness. When we get into an artificial rhythm, we interrupts these natural rhythms.

Did you know city lights from space are brighter than the stars in space?



# Light Pollution Worksheet

Instructions: Waith a parent or supervisor, go out at night to a place where you can see the sky well. Answer the questions below.

1. How many stars can you count? Are there too many to count, just a few, or is it hard to see any stars at all?

---

2. Are lights on throughout your neighborhood and city? What time is it?

---

3. Can you think of a building that may never turn its light off? Why?

---

---

4. Write or draw on the back of this paper an idea or rule that would help mitigate or fix light pollution. Should lamps have covers on the top? Maybe lights have to be off when no one is around. How might we fix the night so we can see the stars?





Light Pollution. Image by Craig Mayhew from [http://www.3ap.org/images/night\\_usa.jpg](http://www.3ap.org/images/night_usa.jpg)

# ENERGY SYSTEMS

## **ACTIVITY: HARNESSING WIND ENERGY**

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** Outside

**Tools/Materials Needed:**

- [ ] Protractors for class or individuals
- [ ] Ping-pong balls
- [ ] Thread

**Videos:**

Small wind electric systems: <http://energy.gov/energysaver/articles/small-wind-electric-systems>





## How much wind energy can you capture?

**Step 1.** An area with an average wind speed of 5 meters per second can use a windmill efficiently, but the windier the better. Find out what the wind speed is where you are today!

**Step 2.** To get started, tie a 14 inch string to the center of the straight side of a protractor. Tape a ping-pong ball to the other end of the string. This will serve as your wind speed measuring instrument.

**Step 3.** With a partner or group and a piece of paper, go outside to test it out.

**Step 4.** Stand so that the breeze is not blowing at your back and hold the instrument you made out straight. Wait till a breeze catches the ping-pong ball, and have a partner record the angle the string blows to on the protractor. Compare to the table below:

Angle	Meters/Second
90	0
80	3.5
70	5.4
60	6.7
50	8
40	9.4
30	11.6
20	14.8

**Step 5.** Would a windmill be able to be sustained in your area today? Go online as a class and look up your city's average wind speed. Would a windmill be able to keep up year round? <http://www.nrel.gov/gis/wind.html>

Is wind power a viable option for your city? What about solar? (see: <http://www.nrel.gov/gis/solar.html>)

### Did you know...

Between 2002 and 2007, the wind power industry in the United States grew by an average of 29 percent annually.

- Energy.gov

# ENERGY SYSTEMS

## KEY TERMS

**Climate change:** Any long-term significant change in the weather patterns of an area; also used figuratively. Climate change can be natural or caused by changes people have made to the land or atmosphere.

**Energy:** the ability to do work or cause change

**Energy efficiency:** Energy efficiency means getting more use out of the energy we already generate or using less energy to provide the same level of performance, comfort, and convenience.

**Renewable energy:** Energy generated from natural resources. These sources are considered renewable because they quickly replenish themselves and are usually available in a never-ending supply.

**Nonrenewable energy:** Energy generated from natural resources. These sources are considered nonrenewable because they cannot be replenished (made again) in a short period of time

**Solar power:** The conversion of sunlight into electricity.

**Wind power:** The conversion of wind energy into electrical power.



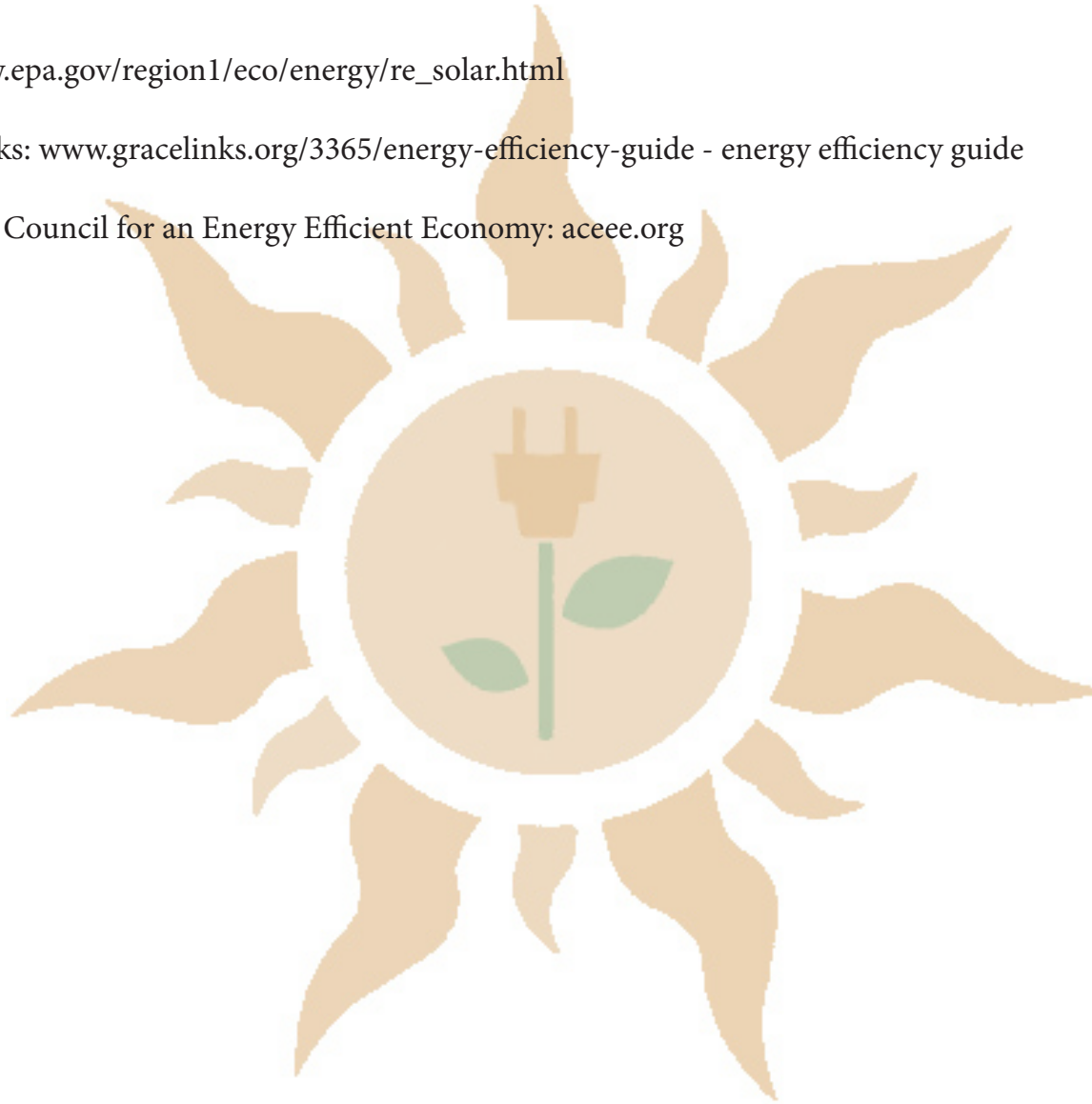
## ADDITIONAL RESOURCES



EPA: [www.epa.gov/region1/eco/energy/re\\_solar.html](http://www.epa.gov/region1/eco/energy/re_solar.html)

Grace Links: [www.gracelinks.org/3365/energy-efficiency-guide](http://www.gracelinks.org/3365/energy-efficiency-guide) - energy efficiency guide

American Council for an Energy Efficient Economy: [aceee.org](http://aceee.org)



# FOOD SYSTEMS

## LESSON: FOOD SYSTEMS

### Eco-literacy Principles/Practices Covered



Age Levels: 8-14

### Abstract

This module helps students understand where their food comes from, the way its produced, and the sustainability of the food system. The activities include discussion and exploration of the day to day consumption of the students and of people around the world. Students will find out to make conscious decisions about what they eat and see that they can positively impact the planet simply by eating low impact foods!



## What to Expect

Students will explore their local food system.

Students will make a hydroponic garden using a 2-liter bottle

Students will learn about their local food print and what they can do to eat sustainably.

## Expected Outcome

Students will develop a new understanding of where their food comes from, and leave this lesson thinking more critically about their food choices and how their impact could be reduced.

## Introduction

Food often travels for miles and miles around the world to get to our plates. When you begin to think about where food comes from when buying it at the grocery store, you realize all of the embodied energy that's within each bite. This lesson looks at the multidimensional and the interconnections that are in a food system, the social, political economic, and environmental contexts. A food system incorporates food, health, agriculture, community and economic development, and the environmental footprint. Food systems have embodied energy (the inputs and outputs) within all the processes and infrastructure involved in feeding a population. This includes harvesting the food, packaging of foods, where it's transported, the marketing that goes into the item, the consumption of the food, and how it is disposed of afterwards.



# FOOD SYSTEMS

## **ACTIVITY: LOCAL FOOD SYSTEMS**

**Age Levels:** 8-14

**Accessibility:** no limitations

**Time-Frame for Activity:** 60-90 minutes

**Tools/Materials Needed:**

- [ ] blank paper for mind map
- [ ] pencils/pens/ crayons

**Videos:**

**LOCAL: The Life of an Urban Farm:** <https://www.youtube.com/watch?v=ubOLBCOWHe8>

**2014 Youth Eco Summit- Local Food. why local food is better**

**Local food activist:** <http://www.makers.com/nikki-henderson>

**Additional Links:**

**Resources:** based off of **Healthy Community Food Systems' tools for rebuilding food systems**  
[http://www.healthycommunityfoodsystems.org/resources/Food-System-Tools/Rebuilding\\_20120425.pdf](http://www.healthycommunityfoodsystems.org/resources/Food-System-Tools/Rebuilding_20120425.pdf) - food systems tools from Healthy Community Food Systems



## Why is local food important?

Have a discussion about what local food is. Have students make a list of what they think is important about local food. (Can be a pros and cons list) For example:

- \* healthier;
- \* safer;
- \* economic benefit- money stays in local economy. gives jobs to our families;
- \* less pollution;
- \* food is more fresh; and
- \* organically grown= no preservatives and pesticides.

Do you have access to healthy and fresh food?

What is a food desert?

Have students see if they live in a food desert by using the USDA food desert locator tool:

<http://www.ers.usda.gov/data/fooddesert#.U9qE-tywYWk>

## Exploring Your Local Food System

**Step 1: Begin by looking at the whole system.** This means look at everything in your local community that is involved with food. Lead a discussion with students on what a food system is.

### *What is a food system?*

A food system is all things involved with food in your community. All the activities, resources, energy, and people involved in bringing food from that farm all the way to the table. It includes the social, political economic, and environmental contexts related to food. A food system incorporates food, health, agriculture, community and economic development, and the environmental footprint. Food systems have embodied energy (the inputs and outputs) within all the processes and infrastructure involved in feeding a population. This includes harvesting the food, packaging of foods, where it's transported, the marketing that goes into the item, the consumption of the food, and how it is disposed of afterwards.



### *What is a food desert?*

Food deserts are defined as urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food.

# FOOD SYSTEMS

## **Step 2: Start to look at how parts of the food system are connected.**

**TIP:** As you did in the Connections to Nature module, you can have students make a Mind Map.

What are the positive interactions you notice?

What interactions have some problems?

What are the seasons that food grows. Why is it that in the winter, we still have fresh produce in our grocery stores? Where is this coming from?

## **Step 3: Looking at the sustainability of the food system and the previous generations' actions toward our food system of today**

The choices we make today effect the children of tomorrow. And our impacts of today can have an even longer effect into the future. For example the way food is shipped around the world emits greenhouse gases that may contribute to climate disruptions that has lasting impacts.

**TIP:** Have students think back to the embodied energy activities they did in previous modules. Lead an activity looking at all the embodied energy within a food item of your choice. Have students discuss the social, economic, and environmental systems of that item.

## **Step 4: Next, write out long-term and short-term planning solutions. Brainstorm with the students.**

Short-term planning helps us to find solutions to creating and protecting local jobs around our food system.

Long-term planning is needed for us to act on creating a future local community that thrives, is sustainable, and fosters social and environmental justice

## **Step 5: Identify the values that surround a local food system**

Example questions to ask the students:

What are your personal values?

Do you shop at a farmer's market? Would you like to?

Do you have a garden? Would you like to?





# FOOD SYSTEMS

## **ACTIVITY: LOCAL FOOD PRINT**

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** Outside

**Preparation Time:** 3 hours (depending how long it takes to obtain the food items or to coordinate a field trip to the Farmer's Market or a Community Garden)

**Time-Frame for Activity:** 60-90 minutes

**Tools/Materials Needed:**

- [ ] local food to make a snack
- [ ] a farmer or community garden ambassador

**Videos:** Optional video clip to play for students

Reel youth: local food print: <https://www.youtube.com/watch?v=RL6PY3LFYgE>

**Additional Resources:**

**Salt Lake City Farmer's Market:** <http://www.slcfarmersmarket.org>

**Wasatch Community Gardens:** <http://wasatchgardens.org>

The mission is to empower people of all ages and incomes to grow and eat healthy, organic, local food.

**Salt Lake City Green- Sustainable Food:** [www.slcgov.com/slccgreen/food](http://www.slcgov.com/slccgreen/food)

**Salt Lake County Urban Gardening Program:** [slco.org/urbanfarming/](http://slco.org/urbanfarming/)





## What is your Local Food Print?

In this activity, you will explore the local food system and prepare a snack with the students.

### Step 1. Buy Local

As discussed in the previous activity, it is important to buy local to reduce our impact on the environment. Lead a discussion with students about the various local resources where you can buy local foods. This can be a farmer's market, a community garden, a restaurant that buys from local farmers, etc. What are the social, environmental, and economic benefits of buying local?

### Step 2. Explore the Local Food System

Work with students on having a local snack.  
Have students research where the ingredients were produced and purchased.

Divide class into groups with a parent, volunteer, or teacher. Have the students discuss local food ideas for a snack. The adult will help acquire the food and the students will present the item with the social, economic, and environmental connections to the community.

TIP: Organize a field trip to go to local farmer's market or a community garden to select food for your snack. Have a farmer discuss the food and where it came from.

### Step 3. Discuss what the students learned from eating local and make an action list to have a local food print.

Action Steps: <http://www.sustainabletable.org/1453/take-action-food>

# FOOD SYSTEMS



## STEPS TO TAKE ACTION:

These are tips to reduce your local food-print in your community and to help make your food system more sustainable.

1. Eat Local when you can.
2. Eat food that is in season.
3. Get to know your local farmer or community garden groups.
4. Start your own garden.
5. If your school doesn't have a garden, write a letter to the Principal, talk to your teacher about steps to make it happen.
6. Eat less meat.
7. Shop at stores that label food origins.
8. Shop in the perimeter of the store. This is where the fresh food is located.
9. Choose to eat at restaurants that buy from local farmers.
10. Join Community Supported Agriculture.



# EATING LOCAL

## EATING LOCAL MEANS MORE FOR THE LOCAL ECONOMY



Supporting local businesses is essential to keep a community growing and thriving

Food Miles is a term used to encompass how much carbon was used to transport the product. This travel also involves a massive waste of packaging materials

## LOCALLY GROWN PRODUCE IS FRESHER

Local produce has often been picked within 24 hours of being purchased



## VARIETY



The small enterprise Farmer has the freedom to produce niche crops that wouldn't be viable in a supermarket



## SEASONALITY



Eating locally encourages eating with the seasons, this is when produce and meats are at their most abundant and least expensive



## TALK TO THE FARMER

Know your Farmer - Know your Food  
Learn how to best use the produce directly from the grower



KNOW THE STORY OF YOUR FOOD



## TASTE

Locally grown fruits and vegetables have longer to ripen



BuckyBox | The Mission

# FOOD SYSTEMS

## **ACTIVITY: BE RADICLE—GROW YOUR OWN RECYCLED BOTTLE GARDEN**

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** indoor/outdoor

**Preparation Time:** 1-2 hours to obtain materials

TIP: Have the instructor make one first to test how long this might take a room full of students

**Time-Frame for Activity:** 90-120 minutes

### **Tools/Materials Needed:**

- [ ] 2-liter bottle for each student (recycled material)
- [ ] wick material
- [ ] growing media
- [ ] water
- [ ] plant seeds
- [ ] scissors
- [ ] aluminum foil
- [ ] nutrients/fertilizer (<http://www.epicgardening.com/hydroponic-nutrients-guide/>)
- [ ] pH kit (optional)
- [ ] seed starters (optional)

### **Video:**

2 Liter Bottle Hydroponics Tutorial by Epic Gardening:  
<https://www.youtube.com/watch?v=BUUpUfxqULXA>

### **Resource Used:**

Hydroponic 2 liter bottle garden: <http://www.epicgardening.com/hydroponics-for-kids/>



This activity's goal is to connect youth to the stages of growing food. By growing their own plant, students will actively connect to their own food system. While building this garden, youth will see the growth cycle of a plant, all of the energy and water that is a part of the plant's growth, and see where food really comes from.



For steps on how to build this, go to Epic Gardens Hydroponic 2 liter bottle garden:  
<http://www.epicgardening.com/hydroponics-for-kids/>

**TIP:** Watch the video tutorial provided on the left.

### General Steps:

#### Step 1. Prepare 2-Liter Bottle

- Draw Line
- Cut Bottle

#### Step 2. Prepare the Water

- pH Your Tap Water
- Add Nutrients

#### Step 3. Add Wick and Growing Material

- Add The Wick
- Prepare Your Growing Material

#### Step 4. Plant your seeds

#### Step 5. Finished Product

#### Step 6. Watch Your Plant Grow

**TIP:** Be sure to have enough light (6+ hours a day and water with the nutrient mix.

### *Did you know...*

A radicle is the beginning of the root to the seed that you planted.



Hydroponic Plant Activity for Kids, image from [epicgardening.com](http://epicgardening.com)

# FOOD SYSTEMS

## KEY TERMS: FOOD SYSTEMS

**Community Garden:** a single piece of land gardened collectively by a group of people.

**Community Supported Agriculture (CSA):** is a food production and distribution system that directly connects farmers and consumers. Consumers buy “shares” in a farm’s harvest in advance. You get the freshest, best produce the farm has to offer; the farm has a set of guaranteed sales and money up-front for seasonal expenses.

**Food desert:** Food deserts are defined as urban neighborhoods and rural towns without ready access to fresh, healthy, and affordable food.

**Hydroponics:** The cultivation of plants in a nutrient-rich solution, rather than in soil, and under controlled conditions of light, temperature, and humidity. Also called aquaculture.

**Local Food Movement:** collaborative effort to build more locally based, self-reliant food economies - one in which sustainable food production, processing, distribution, and consumption is integrated to enhance the economic, environmental and social health of a particular place.

**Food systems:** All things involved with food in your community. All the activities, resources, energy, and people involved in bringing food from that farm all the way to the table.

**Food justice:** Food Justice is communities exercising their right to grow, sell, and eat healthy food. Healthy food is fresh, nutritious, affordable, culturally-appropriate, and grown locally with care for the well-being of the land, workers, and animals. People practicing food justice leads to a strong local food system, self-reliant communities, and a healthy environment.

**Food Miles:** How far food has traveled to get to your plate.







## LOCAL RESOURCES

**Wasatch Community Gardens:** <http://wasatchgardens.org>

*The mission is to empower people of all ages and incomes to grow and eat healthy, organic, local food.*

**Salt Lake City Green- Sustainable Food:** [www.slcgov.com/slccgreen/food](http://www.slcgov.com/slccgreen/food)

**Salt Lake County Urban Gardening Program:** [slco.org/urbanfarming/](http://slco.org/urbanfarming/)

**Salt Lake City Farmer's Market:** <http://www.slcfarmersmarket.org>

## ADDITIONAL RESOURCES

**USDA Food Desert Resources:** <http://www.ers.usda.gov/data/fooddesert#.U9qE-tywYWk>

**Healthy Community Food Systems:** [healthycommunityfoodsystems.org/resources/Food-System-Tools/FoodChoices\\_20120502.pdf](http://healthycommunityfoodsystems.org/resources/Food-System-Tools/FoodChoices_20120502.pdf)

**Youth Food Bill of Rights:** [www.youthfoodbillofrights.com/for-educators.html](http://www.youthfoodbillofrights.com/for-educators.html)

**Eat Well Guide:** <http://www.eatwellguide.org>

**Sustainable Table:** <http://www.sustainabletable.org/920/handouts>

**Food Land People:** <http://www.foodlandpeople.org>

**Iowa Food and Fitness:** <http://www.iowafoodandfitness.org/news/88.html>

# TRANSPORTATION SYSTEMS

## LESSON: TRANSPORTATION SYSTEMS

### Eco-literacy Principles/Practices Covered



Age Levels: 8-14

### Abstract

This lesson teaches students how transportation shapes our cities. It makes students aware that not all forms of transportation are equal in impact, and they aren't equally represented by roads. Students will examine transportation locally and beyond, and learn that there are both efficient systems and ineffective ones.

Students are asked to look at their own ways of getting around (likely determined by their families) and start questioning the systems and system design in place where they live. This critical thought process will make them see their cities and homes more comprehensively, and broaden their understanding of consumption and its impacts.



## What to Expect

Contribute to a class table or graph that shows methods of transportation used to get to school.

Analyze data in the class table or graph.

Discuss the term, “active transportation.”

Use listening skills and strategies to understand informational text.

Use viewing skills and strategies to make observations and interpret video clips.

Examine the roads near their school and recommend changes that would both improve safety for cyclists and pedestrians, and encourage more students to use active transportation to get to school.

## Expected Outcome

Students will leave this lesson with an increased understanding of how their transportation choices and the choices our cities provide really effect not only the quality of the air, but also the quality of our lives.

The lesson will equip students with the ability to be critical observers of their places and sources of knowledge about transportation options and consequences for their peers.



# TRANSPORTATION SYSTEMS

## **ACTIVITY: MODES OF MOBILITY**

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** indoor/outdoor

**Preparation Time:** 5-10 minutes

**Time-Frame for Activity: 2 part activity- part 1:**  
7 days for students to track their transportation log.

### **Tools/Materials Needed:**

worksheet

journal or blank sheet of paper for students to keep a log of their transportation habits for one week.





## Part 1- Discussion of Transportation Modes

**Step 1:** In a discussion, have students identify as many modes of transportation they can think of. Have them differentiate public transportation and private transportation.

**Step 2:** Take a poll in the class to see what modes of transportation each student used to get to the class. In a discussion, ask which mode of transportation was most popular. Why? Is the most popular/common one in the class the best option for the environment? Why or why not.

**Step 3:** Students will keep a log of their transportation for 7 days.

Make an entry for every trip that you make away from your home.

What mode of transportation was used most often by the members of your team?

List all the modes of transportation used by your team or group.

As a team, what are some of the ideas that you came up with to reduce air pollution? Specifically, what are some alternative transportation measures you can take?

In a discussion ask:

Why do you think that people are willing to spend so much time and money working to pay for their cars?

What impact would using active transportation have on our health, wallets, quality of life, and the environment?

What barriers prevent more people, including youth, from using active transportation, mass transit, or carpooling?



## AS A TEAM:

1. Share your results with each other. What mode of transportation was used most often by the members of your team?
2. List all the modes of transportation used by your team or group.
3. As a team, what are some of the ideas that you came up with to reduce air pollution? Specifically, what are some alternative transportation measures you can take?

# TRANSPORTATION SYSTEMS

## **ACTIVITY: HOW TRANSPORTATION SHAPES OUR CITIES**

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** indoor/outdoor

**Preparation Time:** 30 minutes

**Time-Frame for Activity:** 2- 2.5 hours

### **Tools/Materials Needed:**

- blank sheet of paper
- camera (optional)
- photo of sites on 11x17 sheet of paper for each group
- trace paper for each student/group of students
- markers, crayons, pencils
- invite local planner

### **Videos:**

Livable Streets Education: <http://www.streetfilms.org/introducing-livable-streets-education/>

Livable Streets Education, Advice: <http://www.streetfilms.org/ps-87-first-graders-give-peds-cyclists-drivers-advice/>

### **Additional Links:**

Safe Routes to School, *What's wrong with this picture:* [http://guide.saferoutesinfo.org/engineering/whats\\_wrong\\_with\\_this\\_picture.cfm](http://guide.saferoutesinfo.org/engineering/whats_wrong_with_this_picture.cfm)

### **Resources:**

Activity adopted from successful project with Livable Streets Education on StreetsBlog NYC [streetseducation.org/curriculum](http://streetseducation.org/curriculum)





**Step 1:** Lead a discussion in class for 15 minutes discussing street design and how transportation shapes our cities. Then take students on a walk around the neighborhood. For this activity, please refer more to [streetseducation.org](http://streetseducation.org) and the additional links to the left. Tell students that they are going to do some street design of their own by looking at the roads near your school and recommending changes that would both improve safety and encourage more students to use active transportation like cycling to get to get around.

**TIP:** Watch the complete the streets video: <https://www.youtube.com/watch?v=sc-GKNecIbg>

**Step 2:** Split into 4 or 5 groups, each with a different focus:

- a. Walkability
- b. Safety
- c. Biking
- d. Buses
- e. Urban Design + Beautification

Have the groups go on a walk in the neighborhood with an adult/supervisor. On a sheet of paper, have the students list the pros and cons of each element of the street design that corresponds with their focus area. What are some areas of concern? For example, if the group is Biking, the students would look to see if there are bike lanes in the area. If not, is there a side walk? Is the road busy?

Have students in groups choose one “area of concern” they listed and determine a street design strategy would best improve safety in that location so more students would be encouraged to use active transportation to get to school. Students should describe the current safety concerns in writing and explain how their proposed strategy would improve the situation.

### *Did you know...*

Wide streets induce people to drive at higher speeds.

If you live on a street that is wide, are there many people riding their bikes in it? Are there a lot of cars? Are there speed bumps?

Street design is important for safety, beautification, and incorporation of many different types of transportation in a city.

Many cities across the country are working to ‘complete the streets’ and add in features for biking, walking, and traffic calming measures on wide streets.

Learn more about the complete the street movement here:

# TRANSPORTATION SYSTEMS

**Step 3:** Students draft their ideas for improvements on their streets. Have a photo printed on 11x17 sheet of paper for each of the groups' specific site. This will be used for their ideas for design change. Use trace paper for each group to draft ideas for improvements.

**Step 4:** Have students present their ideas/vision to the group.

**TIP:** Invite a local transportation planner, city official, etc. Have someone help the students then make a photo simulation of their ideas.

**Step 5:** Create a walk or bike ride around the site to talk about ideas students want to implement. Invite the community! Host a Jane Jacobs Walk and visit the website for steps on how to host a walk in your community: [janejacobswalk.org](http://janejacobswalk.org). Map out the route with Google maps or <http://www.communitywalk.com>







# TRANSPORTATION SYSTEMS

## **ACTIVITY: TRANSPORTATION POLLUTION + SOLUTIONS**

**Age Levels:** 8-14

**Accessibility:** no limitations

**Setting:** indoor/outdoor

**Preparation Time:** 30 minutes for Particulate Matter Boards

**Time-Frame for Activity:** 60 minutes

**Tools/Materials Needed:**

[ ] See [http://streetseducation.org/wp-content/uploads/2009/08/lse\\_ms\\_better-air-for-our-city\\_sample-lesson-1.pdf](http://streetseducation.org/wp-content/uploads/2009/08/lse_ms_better-air-for-our-city_sample-lesson-1.pdf)

**Videos:**

**video: stop the pollution pick a solution.** <http://www.streetfilms.org/less-cars-better-air-nyc/>

**Other Helpful Materials:**

**Air Pollution Fact Sheet by eco2school:** [http://eco2school.org/sites/default/files/what%20is%20air\\_pollution.pdf](http://eco2school.org/sites/default/files/what%20is%20air_pollution.pdf)

**Resources:**

Activity adopted from successful project with Livable Streets Education on StreetsBlog NYC [streetseducation.org/curriculum](http://streetseducation.org/curriculum)



## How do cars and other forms of transportation pollute our environment?



For example:

Gasoline production for cars pollutes our environment.

Cars often pollute oils and other debris on the road. When it rains, the pollution gets into the water and washed into our drains/storm sewers. The drains lead to other rivers and pollute the water down stream. this can kill other animals and plants that depend on clean water and healthy habitats.

Describe why air pollution is a big deal.

How does it affect the environment?

How does it affect our health?

How does it affect our economy? (see: <http://emb.gov.ph/eed/airpol.htm> )

Research how particulate pollution can affect your health.

Finally, show students how they can monitor the Air Quality Index on an ongoing basis, and consider reporting the air quality forecast each day in class.

### Create Particulate Matter Boards:

Create “particulate matter boards” to see if the air around your school is dirty.

Follow Livable Streets Education link for instructions:

[http://streetseducation.org/wp-content/uploads/2009/08/lse\\_ms\\_better-air-for-our-city\\_sample-lesson-1.pdf](http://streetseducation.org/wp-content/uploads/2009/08/lse_ms_better-air-for-our-city_sample-lesson-1.pdf)

### *Did you know...*

According to the Utah Division of Air Quality, if all drivers living along the Wasatch Front were to park their cars just one day per week, vehicle emissions would be reduced by 6,500 tons per year.

This means that every vehicle trip counts, and every mile you devote to smarter travel pays Utah back with cleaner, more breathable air!

# TRANSPORTATION SYSTEMS

## STEPS TO TAKE ACTION:

1. Walk, ride your bike, or take public transportation whenever possible.
2. Maintain vehicles.
3. Drive the speed limit.
4. Take UCAIR Pledge:
5. If your family has to drive, link trips together.
6. Car pool/ Car share
7. Advocate for extended public transportation hours of service
8. Write to local government about promoting public transportation passes for youth.
9. Make signs and tell people to not idle their cars.
10. Participate in Utah's Clear the Air Challenge: <http://cleartheairchallenge.org>





# TRANSPORTATION SYSTEMS

## KEY TERMS: TRANSPORTATION SYSTEMS

**Active Transportation:** a means of getting around that is powered by human energy, primarily walking and bicycling. Often called “non-motorized transportation,” we prefer the term “active transportation” since it is a more positive statement that expresses the key connection between healthy, active living and our transportation choices.

**Air Pollution:** Air pollution is a mixture of solid particles and gases in the air. Car emissions, chemicals from factories, dust, pollen and mold spores may be suspended as particles.

**PM 2.5:** “Particulate matter, or PM, is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets. Particles can be suspended in the air for long periods of time. Some particles are large or dark enough to be seen as soot or smoke. Others are so small that individually they can only be detected with an electron microscope.

Many man-made and natural sources emit PM directly or emit other pollutants that react in the atmosphere to form PM. These solid and liquid particles come in a wide range of sizes.

Particles less than 10 micrometers in diameter (PM10) pose a health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers in diameter (PM2.5) are referred to as “fine” particles and are believed to pose the greatest health risks. Because of their small size (approximately 1/30th the average width of a human hair), fine particles can lodge deeply into the lungs.” - EPA

**Protected Bike Lanes:** Bike lane that is protected from the street by a physical barrier. This is like a sidewalk for bikes. It keeps bikers safe from cars.





**Public Transportation:** a shared passenger transport service which is available for use by the general public, as distinct from modes such as taxicab, car pooling or hired buses which are not shared by strangers without private arrangement.

**Urban Design:** the process of designing and shaping cities, towns and villages. Urban design makes connections between people and places, movement and urban form, nature and the built fabric.

**Public Way:** any passageway (as an alley, road, highway, boulevard, turnpike) or part thereof (as a bridge) open as of right to the public and designed for travel by vehicle, on foot, or in a manner limited by statute (as by excluding pedestrians or commercial vehicles)

## **ADDITIONAL RESOURCES**

**Active Transportation:** <http://www.partnership4at.org/why/what-is-active-transportation>

**American Public Transportation Association:** <http://www.apta.com/resources/hottopics/sustainability/Pages/default-old.aspx>

Learn about efforts of public transit to integrate and balance the economic, environmental, and social needs of communities

**Ride for the Environment:** <http://bikeleague.org/resources/why/environment.php>

The League of American Bicyclists shares interesting statistics that make the case for biking over traveling by car. For example, 82 percent of trips five miles or less are made by personal motor vehicle. Such car trips are more polluting on a per-mile basis than longer trips.

**Bikes at Work:** <http://www.bikesatwork.com/carfree/automobiles-and-environment.html>

This page provides a brief summary of statistics related to the impact of automobiles on the environment.



# TRANSPORTATION SYSTEMS

**Streetfilms:** <http://www.streetfilms.org>

These short video clips from the Livable Streets Initiative address urban planning and transportation issues to help design streets for people and places, not cars and traffic.

The Top Ten Facts on Bicycling and Walking in the United States (PDF file)

This list provides interesting statistics related to active transportation issues.

**Where Can I Find Car Sharing?:** <http://www.carsharing.net/where.html>

Find out where you can participate in a car sharing program – access to a network of cars on a pay-per-use basis.

**Livable Streets Initiative-Streets Education:** <http://streetseducation.org>

<http://streetseducation.org/curriculum>: curriculum for each grade level in regards to transportation and our streets/design

**State of the Air:** [stateoftheair.org/2013/city-rankings/most-polluted-cities.html](http://stateoftheair.org/2013/city-rankings/most-polluted-cities.html)

**Clear the Air Challenge:** <http://cleartheairchallenge.org/challenge.php>

**United Nations Environmental Program:** <http://www.unep.org/resourceefficiency/Policy/ResourceEfficientCities/FocusAreas/SustainableTransportandAirPollution/tabid/101667/Default.aspx>

**Utah Clean Cities:** <http://utahcleancities.org/idlefree-utah>

