

## Introduction to Appropriate Technology (AT) Elementary Level STEM

Usually when we use the term “technology,” we think of computers, smartphones, or even driver-less cars. However, “technology” simply refers to a solution to a problem. It could be a tool or a system. “Creative thinkers” all over the world use scientific principles (ideas/facts) to invent “technologies” (very simple or highly specialized) which solve problems and improve the lives of the people who use them.

ECHO uses the term, **Appropriate Technology (AT)**, or technology that fits the particular culture or society where it will be used. An appropriate technology uses mostly local materials, can be repaired by a local craftsman if it breaks down, is affordable (not too expensive) and fits the lifestyle of the local people.

### Activities

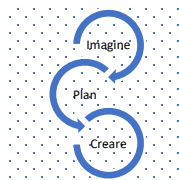
**MATCHING:** You saw several examples of **AT** as you toured the Global Farm. **Cut** the cards apart, **mix**, and then **match** the descriptions of human benefits and environmental benefits with the picture of the **AT**.

**Alternative Activity:** Fill in the blank chart.

**MAP:** **Mark** the location of the **AT and garden areas** by placing the number of the picture onto the map. Do not cut the picture cards apart.

**Alternative Activity:** Mount the map on a large piece of construction paper. Cut the picture cards apart, and arrange them around the map. Then, draw a line or use string to connect the picture with the correct location on the map.

### STEM Activities:



During your tour at ECHO-Florida, you have seen some of the challenges that small-scale farmers face. Design an appropriate technology that could be used to solve one of the challenges involved in obtaining food, water, or shelter.



During your tour at ECHO-Florida, you have seen some of the challenges that small-scale farmers face. Write an original script for a smartphone video featuring the Appropriate Technologies used in the garden areas. *Please do not plagiarize the text from the cards.* Use the map to plot out the route. If you like, contact the Tour Coordinator, Russ Luther at ECHO-Florida, to make a plan for filming.

Recent professional video filmed at ECHO-Florida

<https://www.youtube.com/watch?v=A09LBtASKsw>

## **ART Activities:**

Using the information from the card matching activity, create an illustrated poster comparing two of the Appropriate Technologies.

Illustrate an area of the Global Farm and show at least one Appropriate Technology that is used to help small-scale farmers.

Construct a diorama depicting one area of the Global Farm and show at least one Appropriate Technology that is used to help small-scale farmers.

Area	AT	How it works	Benefits to humans	Benefits to the environment
Lowlands/ Monsoon farm/ Mountain/ Semi-Arid	Drip Irrigation			
Semi-Arid Garden	Biogas digester			
Semi-Arid Garden	Tippy tap			
Community Garden	Keyhole Garden			
Monsoon Farm	Rope and washer pump			

**ANSWER KEY:**

Area	AT	How it works	Benefits to humans	Benefits to the environment	
Lowlands/ Monsoon farm/ Mountain/ Semi-arid	Drip Irrigation	A hose-like tube, perforated with small holes, carries irrigation water directly to the roots of plants with very little loss due to evaporation.	<ul style="list-style-type: none"> <li>-Easy way to carry water directly to crops</li> <li>-Increases crop growth during periods of low rainfall</li> <li>-Inexpensive; some companies give small systems to farmers free of charge</li> </ul>	<ul style="list-style-type: none"> <li>-Conserves water</li> </ul>	
Semi-arid	Biogas digester	As bacteria break down animal manure in a large closed barrel, methane gas is released and piped off into a holding barrel. A tube carries the methane gas to a small gas burner where it is used to cook food.	<ul style="list-style-type: none"> <li>-Clean burning fuel produces no smoke</li> <li>-Improves lung health for the entire family</li> <li>-The manure residue can be used as a valuable plant fertilizer</li> </ul>	<ul style="list-style-type: none"> <li>-Methane gas is a fuel that provides heat energy for cooking. Otherwise it would be released naturally into the atmosphere, unused.</li> <li>-Conserves trees because they are no longer needed for fuel.</li> </ul>	
Semi-arid	Tippy tap	As the bottle is tipped, a small amount of water flows out...enough to wet your hands for washing and rinsing.	<ul style="list-style-type: none"> <li>-Provides water and soap for handwashing, anywhere.</li> <li>-Health benefits; controls spread of disease</li> </ul>	<ul style="list-style-type: none"> <li>-Uses recycled plastic</li> <li>-Low water use, water conservation</li> </ul>	
Community Garden	Keyhole Garden	Used to grow plants in a high raised bed with enriched soil. Bricks are arranged to form a circular wall which is filled with compost, soil, and manure. A wire basket holds dead leaves and other plant materials to be composted. Nutrients flow directly into the garden soil.	<ul style="list-style-type: none"> <li>-In a dry area with poor soil, this acts as a very large container garden filled with enriched soil and is easy to water.</li> <li>-Physically challenged people can work in the garden without bending over.</li> </ul>	<ul style="list-style-type: none"> <li>-Bricks can be made from local soil</li> <li>-Recycles dead plant material</li> </ul>	

Monsoon Farm	Rope and washer pump	Lifts water from a well using washers strung on a rope and held in place by knots. The rope loop passes through a narrow pipe and each washer lifts a small amount of water. The water runs into a storage barrel mounted on a high stand. The rope loops over a bicycle wheel mounted at the top of the system. The pump is powered by turning the bicycle wheel by hand to keep the rope loop moving.	-Easy way to lift water out of a well using a small amount of human muscle power.	-Uses recycled materials; bike wheel, plastic for washers	
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**Cards for matching activity:** Cut the cards apart, mix, and then match the descriptions of human benefits and environmental benefits with the **AT** and its location on the farm.

Lifts water from a well using washers strung on a rope and held in place by knots. The rope loop passes through a narrow pipe and each washer lifts a small amount of water. The water runs into a storage barrel mounted on a high stand. The rope loops over a bicycle wheel mounted at the top of the system. The pump is powered by turning the bicycle wheel by hand to keep the rope loop moving.

-Easy way to lift water out of a well using a small amount of human muscle power

-Uses recycled materials; bike wheel, plastic for washers

As the bottle is tipped, a small amount of water flows out...enough to wet your hands for washing and rinsing.

-In a dry area with poor soil, this acts as a very large container garden filled with enriched soil and is easy to water.  
  
-Physically challenged people can work in the garden without bending over.

-Bricks can be made from local soil  
  
-Recycles dead plant material

Used to grow plants in a high raised bed with enriched soil. Bricks are arranged to form a circular wall which is filled with compost, soil, and manure. A wire basket holds dead leaves and other plant materials to be composted. Nutrients flow directly into the garden soil.

- Provides water and soap for handwashing, anywhere.
- Health benefits; controls spread of disease

- Uses recycled plastic
- Low water use, water conservation

As bacteria break down animal manure in a large closed barrel, methane gas is released and piped off into a holding barrel. A tube carries the methane gas to a small gas burner where it is used to cook food.

- Clean burning fuel produces no smoke
- Improves lung health for the entire family
- The manure residue can be used as a valuable plant fertilizer

- Methane gas is a fuel that provides heat energy for cooking. Otherwise it would be released naturally into the atmosphere, unused.
- Conserves trees because they are no longer needed for fuel.

A hose-like tube, perforated with small holes, carries irrigation water directly to the roots of plants with very little loss due to evaporation.

- Easy way to carry water directly to crops
- Increases crop growth during periods of low rainfall
- Inexpensive; some companies give small systems to farmers free of charge

- Conserves water

Biogas Digester: Semi-Arid



Drip Irrigation: Lowlands/Monsoon/etc.



Tippy-Tap: Semi-Arid



Key Hole Garden: Community Garden



Rope and Washer Pump: Monsoon Farm



Rope and Washer Pump –Washer





**MAP Activity:** Mark the location of the **AT and garden areas** by placing the number of the picture onto the map. Do not cut the picture cards apart.

**Alternative Activity:** Mount the map on a large piece of construction paper. Cut the picture cards apart and arrange them around the map. Then, draw a line or use string to connect the picture with the correct location on the map.

1. Rain Forest



5. Highlands



9. Rope and Washer Pump - Washer



2. Urban Garden



6. Lowlands



10. Rope and Washer Pump: Monsoon Farm



3. Tippy-Tap: Semi-Arid



7. Drip Irrigation: Lowlands/Monsoon



11. Key Hole Garden: Community Garden



4. Semi-Arid Gas Stove



8. Biogas Digester: Semi-Arid



# ECHO Global Farm Tour Map



# Answer Key -AT locations





