

## Trees, Water and the Landscape

### Goals

Understand the relationship plants have and how they affect their watershed and landscape formations.

Examine how grass affects ground runoff and soil discharge.

Discuss the affects of removing these plants to be used as energy.

### Essential Questions:

1. What role does grass and trees play in our watershed?
2. What role does grass and trees play in our land formations?
3. How does vegetation affect our climate?

Using the hydrologic models have students “rain” the same amount of measured water over each container. Prior to the rain event, have students note the difference between each box and make predictions about what will happen after it rains. With clear plastic cups at the end of each spout note how much water comes out of each and the color of the water (they are observing if soil has eroded with the water).

Discuss the impacts of the grass, litter & debris and concrete on the movement of water. Can grass be representative of trees as well? How would grass and trees be different in their affect on the movement of water? What would happen to our watershed if we clear-cut the forest? What would happen to the landscape over time if no vegetation grew there again? What if we also removed all the slash from the forest floor? What are some considerations we should keep in mind if we need to remove trees and slash from the forest?

Using the stream table, students can demonstrate the impact of erosion over time by using trees to stabilize banks. Many more activities can be used with the stream table to strengthen this lesson.

The Northwest Advanced Renewable Alliance (NARA) is a grant from the USDA that is working on turning slash left over from harvesting trees into jet fuel. About 50% of the tree is left behind after harvesting, some as roots and some as debris left on the ground. The debris serves as habitat for insects and small critters but also as ground cover that prevents erosion and retains moisture. Discuss with students the pros and cons of using this greener fuel – it’s more renewable then oil and utilizes an used source of biofuel, but is not without negative results too. Some points to consider when discussing with students the costs and benefits of removing slash for jet fuel are:

- Trees are a renewable source; oil is not



Northwest Advanced Renewables Alliance



McCall Outdoor Science School  
*an experience for all learners*

- People will continue to need to fly for work and for pleasure. Where did you fly last? How long would it take to drive if you weren't able to fly? If flying wasn't an option would you still have made the trip?
- Where else can the fuel source come from?
- Other biofuel options are corn, grass, algae and any crop plant (sorghum, soybeans, sunflower, canola, potatoes, beets, etc.).
- Corn and grass require a large quantity of space, water and chemicals to grow. This land is often more valuable as food cropland or forest habitat.
- NARA pulls the slash from commercial forests that are not open to public use; therefore this land could not be used for another purpose.

### **Background Information**

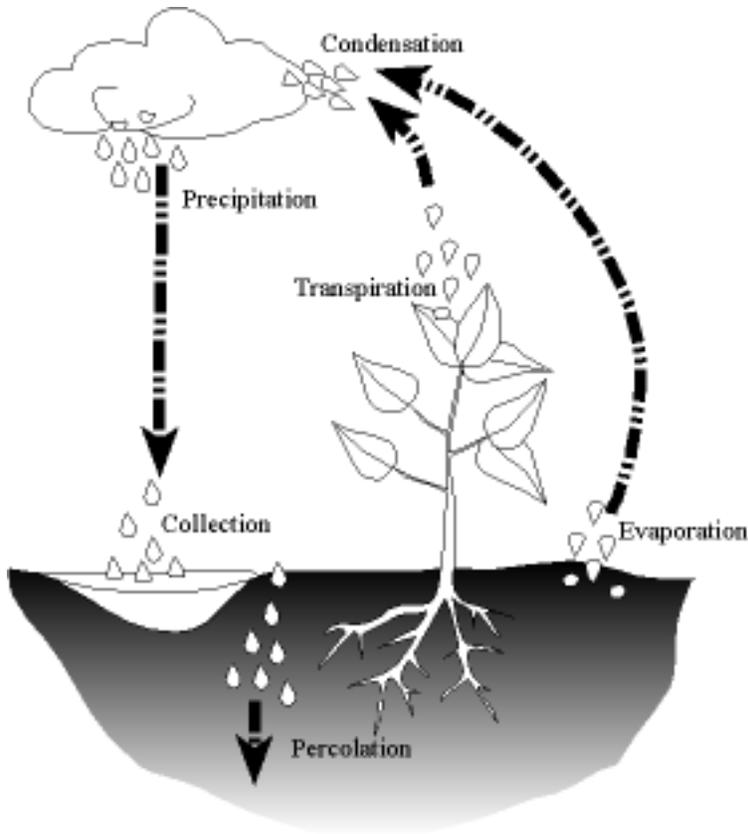
Trees absorb large amounts of water through their roots only to lose all but 10% of the total water absorbed to evapotranspiration. An average tree can transport up to 10,000 gallons of water. Being that only 10% is retained, 9,000 gallons are then lost to the air via evaporation. The captured 1,000 gallons is then used for photosynthesis and adding to its biomass. Obviously, this varies some from one species to another. This also varies seasonally. A tree may lose several hundred gallons on a hot, dry day but none in the winter. A tree can take up anywhere from 24 gallons to 120 gallons of water to make one pound of dry matter.

This movement of water through the air helps to cool it down, much like how swamp coolers work, or how the air is cooler next to a lake. Shade provided from trees offers another cooling aspect as well as the heat absorbed by the tree's leaves. Leaves are also an important air filter of pollutants.

<http://science.howstuffworks.com/nature/climate-weather/storms/trees-affect-weather1.htm>

[forestry.about.com/od/treephysiology/p/tree\\_water.htm](http://forestry.about.com/od/treephysiology/p/tree_water.htm)

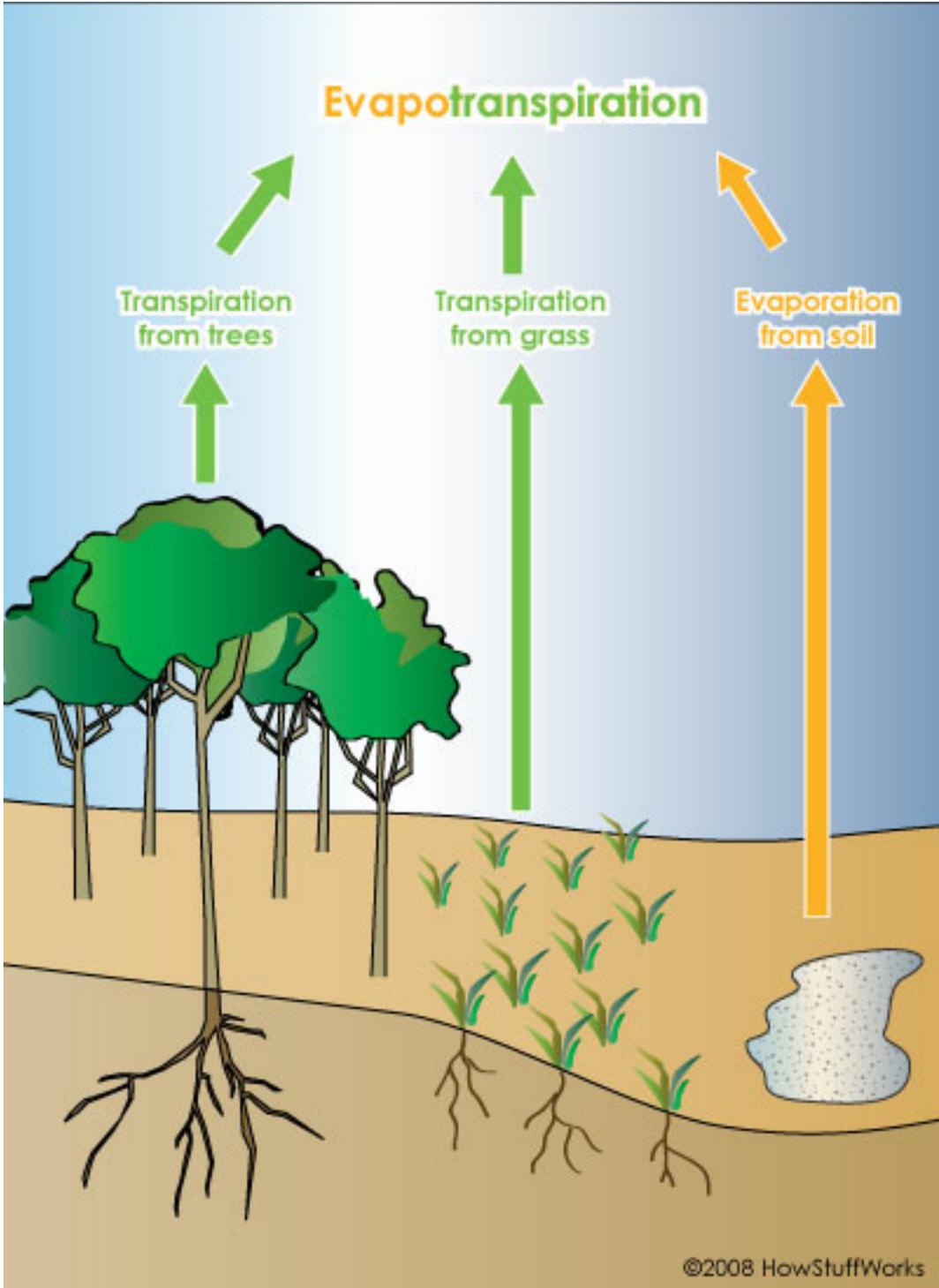




Northwest Advanced Renewables Alliance



McCall Outdoor Science School  
*an experience for all learners*



**NARA**

Northwest Advanced Renewables Alliance



**McCall Outdoor Science School**  
*an experience for all learners*