Describe examples of the services provided by ecosystems.

- **Gas regulation**
- **Climate Regulation**
- **Energy**
- **Habitats**
- **Water Regulation**
- **Water Supply**
- **Erosion Control**
- **Soil Formation**
- **Nutrient Recycling**
- **Waste Treatment**
- **Pollination**
- **Biological Control**
- **Refuge**
- **Food Production**
- **Genetic Resources**
- **Recreation**
- **Cultural**
- **Carbon Sequestration**
- **Other**

Distribute this worksheet to groups. Participants are to discuss and describe many examples of the services provided by ecosystems. Discuss in large group.

- **Gas regulation:** Plants provide CO2 + O2 balance. *For example:* One tree produces enough oxygen for a family of four. For each ton of growing wood, an estimated 1.47 tons of carbon dioxide are removed from the air and 1.07 tons of oxygen are produced.

- **Climate Regulation:** Clouds, greenhouse gases, etc. *For example:* Forests are important sinks for greenhouse gases and provide natural barriers to wind, snow, rain and solar radiation.

- **Energy:** Provide thermal heat, wind, fossil fuels.

- **Habitats:** Regulate disturbances such as floods, drought, and winds.

- **Water Regulation:** Pervious surfaces allow for recharge, and transpiration.

- **Water Supply:** Drinking water for households, industry, and electric energy. *For example:* Forest soil absorbs runoff, filters water and traps/transforms contaminants.

- **Erosion Control:** Retention of soil within an ecosystem. *For example:* Trees and other plants reduce the impact of rain while root systems hold soil in place.

- **Soil Formation:** Weathering of rock and accumulation of organic material.

- **Nutrient Recycling:** Nitrogen fixation and cycling of nutrients.

- **Waste Treatment:** Detoxification by plants that absorb pollutants and decomposition.

- **Pollination:** Insects, bats, and birds allow for propagation of vegetation.

- **Biological Control:** Predator control of prey and vegetation control.

- **Refuge:** Refuge for nurseries and habitats for migratory species. *For example:* Forests provide a diversity of habitats over time.

- **Food Production:** Fish, game, and crops.

- **Genetic Resources:** Resources for medicine and breeding.

- **Recreation:** Hiking, hunting, fishing, etc.

- **Cultural:** Aesthetic values, artistic inspiration, and education. *For example:* Forests provide Christmas trees, artistic inspiration, and outdoor classrooms

- **Carbon Sequestration:** Carbon emissions that cause global warming are "stored" in forests and soils.

- **Other**

Activity 2: *Thank You Trees – Page 1 (1/2)*

Name_____

Draw a tree in your community. On each branch list a reason that trees are important.

List the benefits of trees:

Look at photos of trees and determine the benefits. Match these categories to the photos.

Pleasant Attractive Surroundings

- Screen unpleasant views.
- Frame attractive views.
- Cool the air and provide shade and lower average daily temperatures.
- Bring beauty and character to neighborhoods.
- Provide breaks for cold winter winds.
- Buffer and reduce traffic and other noise.
- Provide attractive habitat for desirable birds and wildlife.

Social Improvement

- Calm traffic.
- Separate pedestrians and traffic.
- Encourage walking.
- Reduce family and community crime and violence.
- Promote self discipline and reliance, exploration, and increased student concentration.
- Increase adult concentration and work levels.

Good Health

- One hundred trees remove 10,000 lbs of carbon dioxide and 400 lbs ozone.
- Clean pollutants out of the air and water.
- Improve health, reduce stress and disease, increased healing.

Create Pride in Your Community

- Help communities meet and work together and promote community interaction.
- Provide opportunity for personal renewal and restoration.
- Promote economic benefits.
- Save energy and cut heating and air-conditioning costs.
- Save costs of energy production.
- Reduce storm water runoff, erosion and damage to streams.
- Promote people involvement and spending in commercial sales.
- Increase property values and property tax revenues.

One large tree can provide the following benefits each year.

Planted on the west side of the home, a tree saves $29 in summertime air conditioning by shading the building and cooling the air (250 kWh). This is about 9 percent of a typical residential building's total annual air conditioning cost.

A tree absorbs 10 lbs. of air pollutants including 4 lbs. of ozone and 3 lbs. of particulates. The value of pollutant uptake by the tree is $45 using the local market price of emission reduction credits. Uptake of NO_2 by the tree (1.07 lb.) is equivalent to NO_2 emitted by a typical car driven 188 miles.

A tree intercepts an average of 760 gal. of rainfall in its crown, thereby reducing runoff of polluted stormwater and flooding. This benefit is valued at $6 based on local expenditures for water quality management and flood control.

Cleans 330 lbs. of CO_2 from the atmosphere through direct sequestration in the tree's wood and reduced power plant emissions due to cooling evergy savings. The value of this benefit is $5. The tree reduces the same amount of atmospheric CO_2 per year as released by a typical car driven 388 miles.

Adds about 1 percent to the sale of the property, or about $25 each year when annualized over a 40-year period.

Ecosystems provide economic benefits.

Corporate CEOs say quality of life for employees is the third-most important factor in locating a business, behind only access to domestic markets and availability of skilled labor. Owners of small companies ranked recreation/parks/open space as the highest priority in choosing a new location for their business (Economic Benefits of Open Space, Trust for Public Land, 1999). In the year 2000 alone, the economic value of insect-pollinated crops in the United States was estimated to be between $20 and $40 billion. Thus, the loss of pollinator species could lead to a series of devastating losses to our economy and food supply. (*Endangered by Sprawl: How Runaway Development Threatens America's Wildlife*, National Wildlife Federation, 2005—www.nwf.org)

"The real estate market consistently demonstrates that many people are willing to pay a larger amount for a property located close to parks and open space areas than for a home that does not offer this amenity," writes John L. Crompton, a professor at Texas A&M University who has published extensive research on parks and recreation. (*Why America Needs More City Parks & Open Space*, Paul Sherer prepared for Trust for Public Land, 2003—www.tpl.org)

American Forests (a conservation organization) estimates that trees in the nation's metropolitan areas save the cities $400 billion in the cost of building stormwater retention facilities. Yet natural tree cover has declined by as much as 30 percent in many cities over the last several decades. (*Why America Needs More City Parks & Open Space*)

A study of 27 water suppliers conducted by the Trust for Public Land and the American Water Works Association in 2002 found that more forest cover in a watershed results in lower treatment costs. According to the study, for every 10 percent increase in forest cover in the source area, treatment and chemical costs decreased approximately 20 percent, and approximately 50 to 55 percent of the variation in treatment costs can be explained by the percentage of forest cover in the source area. (*Protecting the Source: Land Conservation & the Future of America's Drinking Water*, Trust for Public Land, 2004—www.tpl.org)

Trees more effectively and less expensively manage the flow of stormwater runoff than do concrete sewers and drainage ditches. "By incorporating trees into a city's infrastructure, managers can build a smaller, less expensive stormwater management system," according to American Forests Urban Resource Center. (*Why America Needs More City Parks & Open Space*)