

UNIT V - NATURAL RESOURCES AND CONSERVATION

Lesson 1: Natural Resources

This lesson considers natural resources that humans use, differentiates between those that are inexhaustible and exhaustible, and addresses issues concerning conservation and preservation.

Natural Resources

Natural resources originate from the environment to provide essential materials in human lives; thus natural resources affect everyday life. Examples of natural resources are minerals, oil, trees, wildlife, fish, water, soil, air, fossil fuels, and sunlight.

Inexhaustible and Exhaustible Resources

Natural resources can be classified into two categories: inexhaustible and exhaustible. Inexhaustible resources are resources that renew themselves naturally and will not run out. Air and water are two good examples of inexhaustible resources. Inexhaustible resources can, however, be limited and damaged by human mistreatment. Water, for example, can be limited in certain areas during drought years. Water and air can both be polluted and become unsafe to use. Thus, even though a resource is considered inexhaustible, it is still important to manage it wisely. Inexhaustible resources can be used up, but they can be replaced through proper management practices. For example, wildlife is considered an inexhaustible resource. Early in American history, wildlife such as bison and bald eagles were hunted almost to extinction. Due to great conservation efforts, both species are thriving and are no longer considered endangered. People successfully **renewed** these important wildlife resources.

Trees are another inexhaustible resource. Individual trees may be used, but trees can be renewed by replanting. Trees in a natural forest that are left to grow eventually become mature forests. A forest is similar to a city because it provides food and shelter for its inhabitants. Forests provide many ecological benefits to humans. In cities, trees help purify the air, provide shade for buildings, and serve as a sound barrier against traffic noise.

Exhaustible resources cannot be replaced or renewed when they are used. Once they are

used up, they are gone forever, for all practical purposes. Exhaustible resources must be monitored and used carefully to avoid their complete loss.

An example of an exhaustible natural resource is the soil. It is estimated that 6.4 billion tons of soil are lost each year to erosion. Erosion is the wearing away, loosening, or dissolving of earth or rock material. This means that the soils become less fertile for growing crops and other plant life. The soil also becomes unable to filter toxins that might pollute the water and other parts of the environment. Soil is considered exhaustible because it is not practical for humans to make “new” soil, and it takes approximately 500,000 years for soil to regenerate itself.

Crude oil is an exhaustible resource that is distilled into various products such as fuels, lubricants, and chemicals. Once crude oil supplies are depleted, all the products made from crude oil will no longer be available unless research develops synthetic products.

Other examples of exhaustible resources include coal and minerals such as gold, copper, and iron ore. Each of these materials is used extensively in the United States. Research is ongoing to find other ways to produce products that have been made from exhaustible resources in the past. Finding other sources would help reduce dependence on a decreasing supply of exhaustible resources.

Conserving Natural Resources

Natural resources must be used wisely. Overuse of resources can create problems with the natural environment. For example, dumping trash or raw sewage into a lake or stream can destroy the habitat for fish. Over time, the fish may fail to reproduce, which upsets the balance of nature. Other examples of the abuse of natural resources can be identified in many communities. Each person should take steps to conserve natural resources so they can be enjoyed by many generations to come.

Natural resources interact with and depend upon one another. For example, wildlife can be affected by the quality of water available. Soil quality affects the growth of trees and crops. Forest or tree growth impacts the air quality.

EXPLORING AGRICULTURE IN AMERICA

When one natural resource is affected adversely, others suffer.

Conservation and Preservation

It is important to understand the difference between conservation and preservation. Conservation involves the careful use and management of resources to avoid wasting them for future generations. People depend on natural resources for food, clothing, shelter, energy, and enjoyment. Wasting natural resources endangers them to the point that they must be preserved.

Preservation involves maintaining a natural resource that already exists by prohibiting its use and returning it to a natural state. Careful monitoring will preserve many forests, wetlands, and prairies by replenishing them and protecting them from overuse.

In general, people involved in agricultural endeavors are very concerned with the conservation of natural resources. Agriculturalists know that natural resources are vital to farming, agribusiness and industry, and human enjoyment as well. Thus, people in agriculture take great pains to conserve natural resources for their continued use as well as for the enjoyment of generations to come.

Protective Agencies

There are many U.S. government agencies within the Department of the Interior that have been established to manage natural resources. These agencies monitor the use of air, water, forest, and mineral resources to ensure they are protected. The U.S. Department of Agriculture is also responsible for protecting natural resources. In addition, the Environmental Protection Agency (EPA) monitors the safe use of resources in the environment.

Several U.S. agencies and a description of their responsibilities are identified below.

The Bureau of Land Management is an agency of the Department of the Interior. It manages public lands, issues rights-of-way for crossing federal lands under another agency's jurisdiction, surveys federal lands, and maintains public land and mining claim records. One important concern for

the Bureau of Land Management is overseeing mined lands so that our exhaustible mineral resources are mined properly and conserved to the point that they will be around for generations.

The Department of Fish and Wildlife is an agency under the Department of the Interior. It is responsible for conserving, protecting, and enhancing fish, wildlife, and plants and their habitats. It does this by managing and caring for wild birds, endangered species, certain marine mammals, and inland sport fisheries. It also enforces federal wildlife laws and manages wetland areas.

The National Park Service is an agency under the U.S. Department of the Interior. Its mission is to "...promote and regulate the use of the...national parks...which purpose is to conserve the scenery and the natural and historic objects and the wildlife therein...." This agency manages and administers the national parks located in the United States. It also assists states and local governments in the development of park areas.

The Environmental Protection Agency ensures environmental safety and protection by research and legislation. Also, it sets safety standards in air, water, land, chemicals, and many other areas that affect all life-forms. It is the EPA's mission to "...protect human health and to safeguard the natural environment—air, water, and land—upon which life depends."

The Forest Service is under the Department of Agriculture. It manages public lands in national forests and grasslands. As stated under law, its mission is to "achieve quality land management under sustainable multiple-use management to meet the diverse needs of people...."

The Natural Resources Conservation Service provides technical expertise and field experience to help land users solve their natural resources challenges and maintain and improve their economic viability. It is under the Department of Agriculture, and its stated mission is to "provide leadership in a partnership effort to help people conserve, improve, and sustain our natural resources and environment."

The Ozark National Scenic Riverways is important to mid- and south Missouri. It was the

UNIT V - NATURAL RESOURCES AND CONSERVATION

first protected riverway in the country and was established as a national park in 1964. It offers various outdoor activities within its 30,000 acres and 134 miles of managed riverways.

The Missouri Department of Conservation's mission is to "protect and manage the fish, forest, and wildlife resources of the state; to serve the public and facilitate their participation in resource management activities; and to provide opportunity for all citizens to use, enjoy, and learn about fish, forest, and wildlife resources." It fulfills this mission by providing hunting, fishing, and trapping permits across the state as well as implementing and conducting conservation and educational efforts across the state of Missouri.

The Missouri Department of Natural Resources serves Missouri's citizens by dealing with energy and mineral resources. It also works to protect land, air, and water resources as well as to preserve the state's historic and cultural heritage. Its stated mission is to "preserve and protect the state's natural, cultural and energy resources and inspire their enjoyment and responsible use for present and future generations."

Pollution

Pollution is the presence of substances in water, soil, or air that affects its usefulness or makes it offensive. Pollutants in the soil, water, or air can damage those resources for animal, plant, and human consumption.

There are two forms of pollution: point source and nonpoint source. Point source pollution can be traced to a specific point of discharge and is readily identifiable. For example, an oil spill from a large oil tanker would be point source pollution. Nonpoint source pollution occurs from sources that cannot be directly traced to a specific point of discharge. For example, smog in the air caused by vehicle emissions would be nonpoint source pollution. Pollution is a very serious problem and regulations must be followed to reduce pollution so that the quality of our resources is maintained.

Summary

Natural resources include all living and nonliving things that are commonly found in nature. Inexhaustible resources renew themselves and will not run out but are still limited in some cases.

Inexhaustible resources can be replaced. Exhaustible resources are not replaced when they are used. Conservation of natural resources requires the active participation of individuals working together to wisely manage needed resources. There are several agencies in the U.S. government that regulate the use of natural resources. These include the Bureau of Land Management, the Department of Fish and Wildlife, the National Park Service, the Environmental Protection Agency, the Forest Service, the Natural Resources Conservation Service, and the Ozark National Scenic Riverways. State agencies include the Missouri Department of Conservation and the Missouri Department of Natural Resources. Pollution, which involves making natural resources ineffective or unusable, can exist from point sources and nonpoint sources. Wise use of natural resources, including avoiding or reducing pollution, will ensure their availability for future generations.

Lesson 2: Soil Conservation

Soil is a vital natural resource that is needed for the production of food and fiber crops and is the basis for all life on earth. Nearly every product people use or consume can be traced back to the soil. Soil is not considered to be an inexhaustible resource, because it takes several hundred years to form 1 inch of soil.

Factors in Soil Erosion

Soil erosion is the movement of soil from one place to another by wind or water. It is possible that soil erosion can remove 1 inch of topsoil on steep land in a single heavy rainfall. Movement of soil by erosion creates many problems. When soil is lost, not only is the productivity of the land destroyed, but also the soil itself may become a pollutant to water sources. Many factors contribute to the speed and scope of soil erosion.

Human activity, such as plowing the soil or constructing new buildings and highways, can cause soil erosion. It is often referred to as accelerated erosion because the soil is removed at a much faster rate than by natural processes.

Water erosion occurs when excess rainfall cannot be absorbed into the earth and runs off the

EXPLORING AGRICULTURE IN AMERICA

surface, carrying large amounts of soil with it. Water erosion can also occur from a raindrop splash. As a raindrop hits the ground, it can cause the soil particles to become separated and thrown about. This action can also cause the soil to become less permeable because the soil becomes compacted and the water does not absorb as easily, resulting in more runoff. Wind erosion is caused by small particles of the soil being carried away by gusts of wind. Wind erosion occurs in dry climates where the soil is loose and not covered by vegetation or trees.

Natural events such as earthquakes, floods, and tornadoes can also create soil erosion. These events are beyond human control but can have a tremendous impact on erosion.

Land slippage, referred to as landslides or mudslides, occurs on wet, sloping land. When saturated with water, soil becomes too heavy to maintain its structure and slips down the face of the steep slope. In addition to carrying away large amounts of soil, landslides and mudslides also carry buildings, trees, and other important structures.

Soil Erosion and Food Production

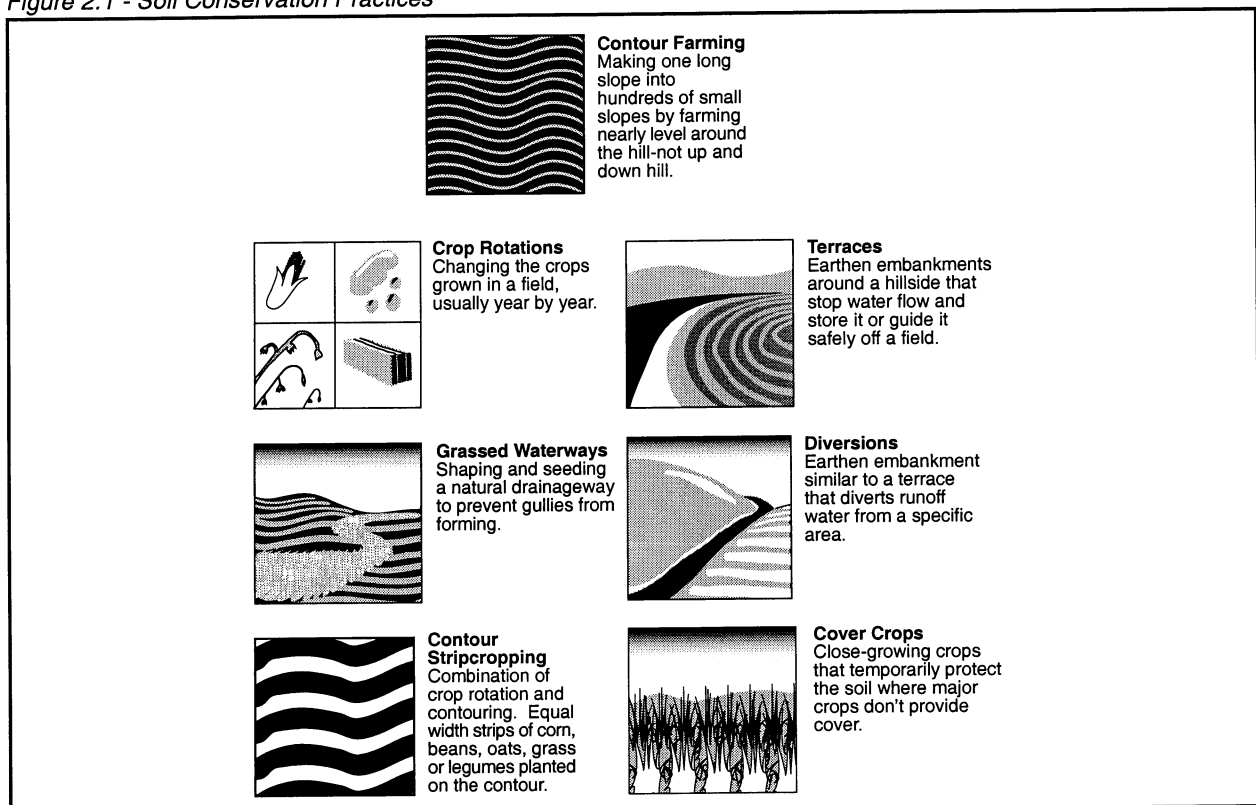
The erosion of soil has a great impact on food production. Soils that have been eroded lose their nutrients and ability to hold water. Thus plant life is unable to thrive and grow. When plants cannot grow, crops cannot be produced, affecting food production.

Healthy plants provide the necessary nutrients to maintain the health of animals whose survival depends upon eating plants. When soils erode to the point where healthy plants cannot grow, animals cannot receive the proper nutrients from those plants. Thus, animals cannot thrive and grow, affecting the production of animals raised for food.

Soil Conservation

Soil conservation involves the protection, wise use, management, and improvement of the soil. Knowledge of conservation practices in urban as well as agricultural areas is essential to ensure the viability of the soil for future use.

Figure 2.1 - Soil Conservation Practices



UNIT V - NATURAL RESOURCES AND CONSERVATION

Soil Conservation Practices

Agriculturalists have made great strides in reducing soil erosion through extensive research, education, and implementation of soil conservation practices. Following are just a few examples of how farmers and ranchers are working to reduce soil erosion.

Contour planting involves tilling and planting crops around or across hillsides rather than up and down the slopes. This reduces the amount of soil that will slip down the slope. Crop rotation practices involve planting different crops in the field each year. This reduces soil loss because the residue produced by changing crops holds the soil in place and enhances fertility. Terracing involves placing a ridge of earth across a slope. This will cause a more gradual drop for the flow of water and prohibit rapid runoff. Grass strips placed near plowed areas will slow and filter water flow and prevent gully formations outside planted areas. Diversion ditches can be built around slopes to help control the amount of runoff. Strip cropping involves planting alternating strips of crops on sloped land to slow water flow and help hold topsoil in place. Cover crops, such as forages, can be planted after fall harvest to protect soil from erosion in fallow seasons. Figure 2.1 illustrates these soil conservation practices.

Summary

The loss of productive soil affects the world's food supply. Soil erosion can be controlled through soil conservation practices. Efforts to implement conservation practices will be beneficial for everyone.

Lesson 3: Water Quality

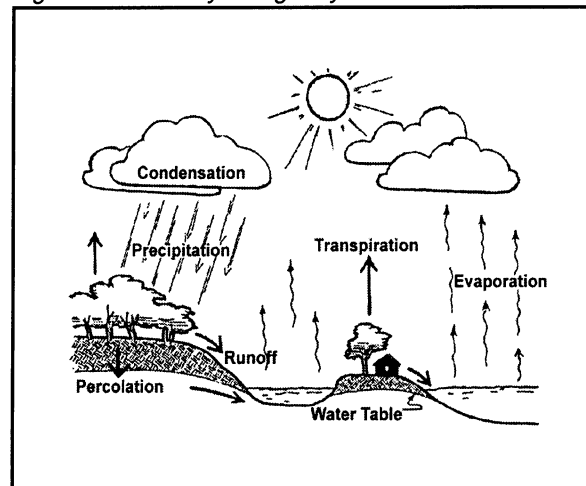
Water is an important resource to sustain life. It is another precious natural resource that is used in many ways

The Hydrologic Cycle

The process whereby water moves from place to place on the earth is known as the water cycle, or hydrologic cycle. This process keeps the total amount of water fairly constant on or around the earth. This means that the general supply of

water on the earth is neither added to nor reduced; it is just regenerated by natural processes. Through natural processes, water evaporates from plants, soil, and water surfaces into the atmosphere. Water vapor collects and is stored in clouds. When the temperature drops, the water vapor condenses. The condensed water vapor, called precipitation, falls to the earth in the form of rain, sleet, hail, or snow, depending on the temperature. After the precipitation falls to the earth, the process repeats itself. This process is called the hydrologic (water) cycle. See Figure 3.1.

Figure 3.1 - The Hydrologic Cycle



Water Quality

Water quality is defined as the condition of water for a particular use. Water has different quality standards depending upon the use for which it is intended. For example, water used for drinking purposes would be regarded more strictly for quality standards than water used for industrial purposes. Many people take their sources of drinking water for granted. The quality of this water is often hard to determine unless tests are conducted. It is important to have well water and city water tested by professionals to ensure that it is safe to drink.

Factors Affecting Water Quality

Many factors affect the quality of the water supply. It is important to test for each of the factors affecting water quality to ensure that the drinking supply is fit and safe for use.

EXPLORING AGRICULTURE IN AMERICA

Odor and taste are obvious indicators of quality. Normal processes in the earth can cause the water to have an “earthy” odor. Pollutants can cause the water to smell or taste bad. Any water that has unusual odors or tastes should be tested to ensure that it is safe to drink.

Color is another factor in water quality. The most desirable water for drinking is clear. However, sediments, minerals, and organic matter may give water a rusty or murky color. Color in water does not immediately mean that the water is unfit to drink.

Another important factor in water is pH. Water with a high pH indicates a presence of calcium or other minerals. Water with a very low pH indicates the presence of acids. It is important to maintain a pH of around 7.0, which is neutral, to prevent excess damage to water pipes.

Water quality is also defined by hardness. Hard water is an indication of calcium and magnesium in the water. Hard water causes buildup in pipes, sinks, and showers. More soap is needed to wash in hard water. Laboratory tests can determine the hardness of water.

Water turbidity is the amount of materials suspended in the water. Materials such as soil and microorganisms give water a cloudy appearance. Turbidity can be removed by filtering out the suspended materials.

The presence of heavy metals such as mercury and lead can affect the water quality, causing it to be toxic to animals and humans. Old lead plumbing systems can create the presence of lead in the water. If lead is indicated, old plumbing systems should be immediately replaced.

Chemical residues can also affect the quality of water. All drinking water should be tested for the presence of chemicals. The effects of very small amounts of chemicals in water are not yet known; however, it is a good practice to buy bottled water if household water is found to have any chemical residues present.

Bacteria can also affect the quality of water. Water containing coliform or E. coli bacteria is polluted with human or animal waste and

considered unfit for human consumption. Boiling water can destroy the presence of bacteria.

Types of Water Pollution

There are many types of pollutants that can enter water sources, both aboveground and underground. Pollutants can cause water to be unusable or hazardous to humans, animals, and plants.

Sediments are tiny soil particles that become suspended in water from the direct result of soil erosion. Sediments can cloud the water, preventing light from passing through. This is especially harmful to aquatic life. Cloudy water from sediments will not allow light to pass freely. Water plants and algae are unable to use the light for growth, causing them to die.

Pathogens such as parasites, bacteria, worms, and viruses are organisms that cause disease. Pathogens such as the coliform and E. coli bacteria are dangerous water pollutants. These pathogens can cause disease or death of the humans and animals that drink the polluted water.

Organic wastes are wastes from living materials. Organic wastes pollute water sources through their own decay. Decaying organic material such as rotting wood has large amounts of bacteria present. These bacteria use up the oxygen in the water. Thus living organisms, such as fish species, die from lack of oxygen in water found to have high amounts of organic wastes.

Inorganic substances are water pollutants from nonliving materials. Heavy metals, salts, and industrial wastes can all be inorganic water pollutants. The presence of such materials makes water unfit to drink and can damage wildlife.

Organic chemicals such as oil, detergents, pesticides, paint, and plastics are chemicals created from organic materials. When humans are careless in disposing these materials, pollutants can enter the water supply. These pollutants also damage wildlife and make water unfit to drink.

Thermal pollution is a final form of water pollution that can damage organisms and wildlife living in

UNIT V - NATURAL RESOURCES AND CONSERVATION

the water. Thermal pollution occurs when large amounts of water are released into a water source, causing the stream or lake to change temperatures. For instance, electric power plants use water to create electricity. When the process is finished, the water used is much warmer than the natural water in a pond or stream. If power plants release this warm water into a pond or stream, it could heat the water temperatures enough to kill living species.

Summary

The supply of water in the earth is sustained by the hydrologic cycle. Pollution of water resources from sediment, pathogens, organic wastes, inorganic materials, organic chemicals, and thermal pollutants are serious problems throughout the world. Monitoring water quality involves determining the condition of water for particular uses. For example, water for human consumption must be of higher quality, that is, free from odor, off-taste, color, abnormal pH, hardness, turbidity, heavy metals, chemical residues, and bacteria. It is important to continually monitor this water to ensure the safety of humans, animals, and plants.

Lesson 4: Air Quality

The quality of the air must be protected to ensure the health and well-being of all living things. This lesson addresses various sources of air pollution and focuses on how these toxins are monitored.

Air Quality

Air quality can be defined as the purity of the air that is used by living organisms. Air that is considered high in quality is free of pollution. Air with low quality contains materials that are toxic for living organisms to breathe. It is important to maintain the quality of air because it affects the health of humans, animals, and plants as well as the environment.

Types of Air Pollution Affecting Air Quality

There are different types of pollutants emitted into the air that affect the quality of air. Once they reach certain levels they can become hazardous to human, animal, and plant health.

Gaseous Pollutants

Gaseous pollutants include carbon monoxide, nitrogen dioxide, sulfur dioxide, and hydrocarbons. These pollutants are produced from automobile exhaust and the burning of coal, oil, and natural gas. Gaseous pollutants are a serious problem on expressways and urban streets when traffic is slow and carbon monoxide fumes accumulate. Passengers and pedestrians can become drowsy and have slower response times when exposed to carbon monoxide.

Natural gas water heaters and furnaces may also cause a buildup of carbon monoxide inside a closed building. Without proper ventilation, this odorless gas can be fatal to inhabitants.

Burning coal that is high in sulfur content releases large quantities of sulfur compounds into the air. High levels of sulfur dioxide in the air contribute to "acid rain." Acid rain contains high levels of sulfuric acid and can contribute to the destruction of trees and other plants near industrial areas. Acid rain falling into ponds or lakes also changes the acidity of the water, which is harmful to fish and plant life.

Nitrogen dioxide is produced from burning gasoline and diesel fuel in automobiles and trucks. Many large cities suffer from nitrogen dioxide pollution because of the large number of vehicles used for transportation. Smog that contains these pollutants can result in breathing problems and eye irritation.

Hydrocarbons are evaporated petroleum products that can become a gaseous pollutant. Two major sources of hydrocarbons are gasoline engines and petrochemical refineries. Hydrocarbons come from fuel tanks, carburetors, crankcase vents, and exhaust systems. All new automobiles are designed with emission controls to recycle hydrocarbon vapors back through the engine.

Odor

This type of air pollution is unique from other types. Extreme odors make it difficult and at times harmful to fully enjoy the environment. Irritants in the air can cause illnesses in many people. Some food processing plants and chemical plants emit strong odors that affect large areas. Confinement livestock production units

EXPLORING AGRICULTURE IN AMERICA

and waste handling facilities can also produce offensive odors. Pungent smells of any kind can be offensive and may be considered a form of air pollution.

Particulate Matter

Particulate matter is solid material that is light enough to be carried in the air. Sources of particulate pollution include human-generated process from coal- and oil-fueled generating plants, automobiles, jet aircrafts, diesel-powered engines, and wood-burning stoves. Natural particulates such as dust, smoke, and soot produced from burning also contain small particles of ash.

Sources of Pollution

Air pollution and the types of pollutants listed above occur from two major sources: human activities and natural processes. Human activities such as factory emissions, automobiles, boats, lawn mowers, home heating systems, burning trash, burning coal and wood for energy, and even aerosol cans contribute to pollution of the air. It is important to monitor and control activities causing air pollution to reduce the human contribution to air pollution.

Natural events are also a source of air pollution. Volcanic eruptions naturally emit large amounts of soot and ash into the air that can travel great distances. Wind erosion creates dust particles that pollute the air. Plant pollens and the decay of natural materials also contribute to some pollution of the air. Although natural events are impossible to control, they still contribute to some air pollution.

Maintaining Air Quality

It is important to maintain the quality of air in the environment to improve human and plant health. Human lungs take in pollutants with the air that is inhaled. Thus, air quality must be maintained to reduce respiratory problems and diseases such as cancer. Plants use carbon dioxide in the air to grow and create food. They give off oxygen used for humans in this process. In order for plants to grow and produce food, the quality of the air must be maintained.

Air quality must be maintained to keep the earth's climate stable. High amounts of pollution in the air hold heat close to the earth, a process called global warming. The process creating this climate change is known as the greenhouse effect. This problem has the potential to change animal and plant life.

Air quality is important to maintain the beauty of the surroundings. Materials such as smog or other pollutants in the air make it appear smoky and hazy. The environment becomes dirty and the surroundings are no longer pleasing to the eye.

Air quality should be maintained to reduce damage to property. Materials in the air can make property rust and corrode, causing damage and an unpleasant appearance.

Ensuring Air Quality

The government has passed stricter laws in recent years to ensure that pollution by human sources is reduced and air quality is maintained. New sources of fuel and energy are being developed and improved that will ensure air quality for future generations.

Car manufacturers are required to meet specific emission control standards set by the Federal Motor Vehicle Control Program. These standards limit the amount of gaseous and particulate pollutants that enter the air. Vehicle inspection stations monitor the exhaust systems on vehicles. The use of public bus and rail transportation is encouraged.

Another method used to ensure air quality has been the development of alternate fueling and energy sources for vehicles. Ethanol, a form of alcohol produced from corn, is being added to gasoline to improve fuel efficiency and reduce pollutants in gasoline. Vehicles that mainly rely on electricity as their source of energy are being used as a pollution-free alternative to gasoline-powered automobiles.

Various energy sources are being used as pollution-free alternatives to burning wood, coal, oil, or natural gas to produce energy. Solar power converts and stores the heat energy from the sun in solar cells into useful electrical energy. Wind

UNIT V - NATURAL RESOURCES AND CONSERVATION

and water power are also alternative sources of natural energy and result in little to no pollution of the air.

Summary

Clean, fresh air is essential for human, plant, and animal life. There are many types of air pollution that affect the quality of the air we breathe. Pollutants include gases, odors, and solid particles suspended in the air. These pollutants originate from either human processes or natural processes. Although natural processes are difficult to control, human processes can be altered to reduce pollution in the air. It is important to maintain the quality of the air in order to ensure the health of living things, the stability of the climate, maintain natural beauty, and reduce property damage. To control pollution and improve the quality of the air, many new processes and products are being used. Some examples are motor vehicle emission controls and exhaust inspection, increased use of public transportation, use of more environment-friendly fuels such as ethanol, and use of alternate forms of energy.

Lesson 5: Wildlife Management

Wildlife includes all animals that live in the natural environment without human intervention. Domestic animals require care by humans and may struggle to survive in nature.

Wildlife Management

Wildlife management refers to the practices involved in caring for wildlife and their environment to ensure the continuation of the species. Some species of wildlife have been hunted to near extinction. Wildlife environments are destroyed by building houses, cutting down trees, and farming and mining the lands inhabited by wildlife. Many wildlife management practices have been implemented to ensure the continuation of species nearly destroyed by humans.

Factors Affecting Wildlife Habitat

Human advancement and habitation often come at the expense of wildlife habitats. A major impact on wildlife habitat is that of urbanization.

Wildlife habitats are often destroyed to expand cities and towns. As the human population grows, more space is required for buildings. Cutting trees, damming rivers, and clearing land for the construction of human habitats have a negative impact on the habitats of the wildlife native to the area.

Tilling the land for planting crops and pasture for livestock has an effect on wildlife habitat. Tilling the land can destroy wildlife nesting areas and reduce available food. Lands converted to pastures for livestock grazing also affect wildlife habitat. Pastureland for grazing livestock reduces the vegetation and shrubbery that form natural wildlife habitats.

Manufacturing and industry create wastes, polluting the air that wildlife breathe and water they drink. Excessive wastes can often destroy many species of wildlife.

Mining lands for minerals and other resources affects wildlife habitat. Before lands were mined, they were a source of wildlife vegetation. Mining also causes runoff of minerals and pollutes lakes and streams that could poison wildlife.

Cutting trees in forests affects wildlife habitats. Forests provide crucial environments for many species of wildlife. Clearing these trees reduces areas in which many species can live.

Large recreation areas created for humans affect wildlife habitat. Ski slopes, theme parks, athletic fields, and parking lots for these facilities require large spaces of land formerly used by wildlife.

Wildlife Management Agencies

Wildlife management is conducted on federal, state, local, and individual levels. Many agencies have been established to ensure the maintenance, protection, and production of wildlife and wildlife habitats.

One of the most important of these is the U.S. Fish and Wildlife Service. This federal agency is responsible for the management and protection of wildlife species and habitats in the United States. Major duties of this agency include protecting and preserving endangered species, controlling natural wildlife refuges, monitoring migratory bird populations, managing the nation's fisheries,

EXPLORING AGRICULTURE IN AMERICA

protecting wildlife habitats, conducting research efforts, enforcing wildlife management laws, and administering federal aid to wildlife management programs.

A federal agency that has a more indirect responsibility for maintaining wildlife habitat is the U.S. Department of Agriculture (USDA). This agency controls the Conservation Reserve Program. This program takes highly erodible land out of production for 10 years and plants a vegetative cover. This reduces land erosion and restores heavily cropped areas for natural wildlife habitats.

The Bureau of Land Management manages several million acres of federal public lands. Management of wetland areas and prairie restoration has become an important concern for this agency.

The Forest Service manages millions of acres of public forest lands. The forests, which are important sources for fish and wildlife habitat, are managed to ensure the survival of species once endangered by clear-cutting of forests.

Each state has local agencies that govern the management and protection of wildlife specific to its region. The Missouri Department of Conservation is responsible for managing hunting and fishing. Employees enforce wildlife management regulations and monitor wildlife habitat throughout the state. The Missouri Department of Natural Resources protects the air, water, land, mineral, and energy resources. This agency includes five divisions: Environmental Quality; State Parks; Energy, Geology, and Land Survey; Administrative Support; and the Environmental Improvement and Energy Resources Authority.

Each agency offers educational materials and activities directed toward maintaining wildlife habitat, species preservation, and enhancing the beauty and enjoyment of wildlife for future generations.

Wildlife Management Practices

Human progress and development have done much to destroy wildlife and its habitat. With the development of government agencies and a

concerned population, many management practices have been implemented to preserve wildlife.

Habitat management practices include creating food plots, water resources, and nesting areas useful to wildlife. This involves planting food, providing water for wildlife to drink, cutting small areas of timber, and clearing undergrowth to open up areas for wildlife.

A practice that is essential to the maintenance of wildlife species is disease control and prevention. Species such as waterfowl that tend to flock together in large groups can be threatened by large outbreaks of disease. Therefore it is essential to reduce potential disease factors. Ensuring that the species' natural habitat is not polluted is one way to prevent diseases. Preventing overcrowding and poor nutrition can also help to reduce disease in wildlife species.

Hunting helps to manage wildlife species by keeping down populations to manageable numbers. Overpopulation of wildlife can create hunger and disease among a species. Hunting regulations are closely monitored to protect wildlife populations from overhunting or overfishing.

Artificial stocking involves raising species and stocking areas with wildlife where no wildlife previously existed. Wild turkeys, once a very rare species in areas of the United States, now flourish due to artificial stocking.

Funds from federal, state, and local organizations help to establish and maintain all of the programs and practices involved in wildlife management. As with wildlife, money is a resource that must be managed properly.

Summary

Wildlife management includes all activities that care for wildlife and its environment to ensure the continuation of wildlife species. Agencies such as the U.S. Fish and Wildlife Service, the USDA, the Forest Service, the Bureau of Land Management, the Missouri Department of Conservation, and the Missouri Department of Natural Resources are involved in wildlife management. These agencies conduct practices such as managing habitat,

controlling and preventing the spread of disease, regulating hunting practices, stocking wildlife species, and managing funds that support wildlife management practices. The proper management of wildlife is essential to ensure the success of this vital renewable resource.

Lesson 6: Conservation Issues in Agriculture

Up until 1935 when the Soil Conservation Act was passed, farming practices were unregulated, resulting in extensive erosion and destruction of ecosystems. Through careful management of agricultural conservation practices, the overall quality of the land has improved.

Agriculture-Related Conservation Issues

People involved in agriculture and the production of food are faced with many difficult issues concerning the conservation of our natural resources.

Maintaining productivity of the soil is a conservation issue. Soil erosion is a major concern because it pollutes the environment and decreases crop productivity. Agriculturalists are concerned with maintaining the soil for the productivity of future generations.

Proper waste disposal is an agriculture-related conservation issue. Wastes from livestock facilities must be handled and disposed of properly to avoid contamination of water resources.

Pollution control is a major conservation issue in agriculture. Chemicals help crops grow and keep them free of weeds and insects, thus ensuring a plentiful and high-quality food supply. However, such chemicals serve to pollute the air and water.

The depletion of forests is a major issue concerning those involved in wildlife management and those who harvest timber. Wood and wood products are valuable resources, but cutting old growth forests destroys wildlife habitats and endangers many species of wildlife. In addition, trees are the major source of oxygen for human respiration. Cutting forests depletes the human oxygen supply.

Conservation Legislation

Conservation legislation in general is designed to provide educational activities, technical assistance, and additional funding to support efforts of producers who alter their production practices to conserve our natural resources.

The 1985 Farm Bill created the Conservation Reserve Program, which sets aside land to be maintained as natural vegetation for a 10-year time span. This land, designed to remain idle, serves as a natural habitat for wildlife populations originally displaced by cropping procedures. It also allows the land once eroded by heavy cropping practices to regain its production capabilities.

The 1996 Federal Agriculture Improvement and Reform Program modified and extended agriculture-related conservation programs. It also created several new conservation programs intended to protect wildlife and grazing lands. The new Environmental Quality Incentives Programs created by this act encourage farmers and ranchers through technical assistance, education, and incentive payments to adopt practices that reduce environmental and resource problems. The Conservation Farm Option offers payments to producers who implement practices that address soil, water quality, wetland, or wildlife habitat concerns. The Flood Risk Reduction Program offers incentives to farmers who forego planting crops in acreage that is frequently flooded. The Conservation of Private Grazing Land Initiative offers funds and educational support to owners of private grazing lands to maintain wildlife habitats in such areas.

Natural Resource Conservation in Agriculture

Persons involved in agriculture production have become increasingly committed to the conservation and maintenance of the soil and wildlife habitats.

Global Positioning System (GPS) is an advanced technology implemented in 1993 that uses sophisticated satellite equipment with remote sensors to closely monitor nutrients, water, soil, and other factors in the soil. This technology is referred to as precision farming. This system allows producers to precisely monitor the need for

EXPLORING AGRICULTURE IN AMERICA

fertilizers and chemicals in specific areas of fields. This results in reduced amounts of chemicals, thus reducing pollution and other harmful effects. Precision farming allows producers to make very precise and accurate decisions about farming practices and becoming more efficient and environmentally friendly as a result.

Crops are being genetically altered to be resistant to certain pests, resulting in reduced use of pesticides. Alternative methods of pest control such as biological predators are used more often to further reduce the need for pesticides.

Pesticide manufacturers are now reclaiming pesticide containers to reduce amounts of pesticide residues that could possibly contaminate the water and soil. Conservation tillage practices such as no-till, strip-till, crop rotation, and terracing help to prevent runoff of soil and chemicals into streams and rivers. Rotational livestock grazing practices reduce overuse of the land.

Many landowners set aside acreage to form natural habitats for wildlife and to reduce erosion. Alternative sources of power such as wind and solar power are being developed to operate agriculture equipment, thus reducing the air pollution caused from equipment emissions.

Summary

In the past, people were not very concerned with the conservation of their natural resources for future generations, due to a lack of knowledge regarding conservation issues. As a result, many issues concerning the conservation of resources in agriculture arose. People concerned with natural resource conservation, the general public, and people who make their living from agricultural practices have differing points of view on agriculture-related conservation issues regarding soil productivity, pollution control, waste disposal, and destruction of forests. Legislation efforts such as the 1985 Farm Bill and more recently the 1996 Federal Agriculture Improvement Reform act have been designed to support producers in their conservation efforts. New technologies and practices such as precision farming, genetically modified crops, biological pest control, pesticide container reclamation, minimum tillage, rotational grazing, set aside acreage, and alternative power

sources have been developed that reduce pollution and make crop production more precise.

Credits

Applied Environmental Science, National Council for Agricultural Education, 1996.

Camp, W., and R. Donahue, *Environmental Science*, Albany, NY: Delmar Publishers, 1994.

Deal, Kevin, *Wildlife and Natural Resources Management*, Albany, NY: Delmar Publishers, 1996.

Dombeck, Mike. Chief, U.S. Department of Agriculture Forest Service.

Environmental Protection Agency Mission Statement <<http://www.epa.gov/history/org/origins/document.htm>> 15 May 2000.

Lee, Jasper, *Natural Resources and Environmental Technology*, Danville, IL: Interstate Publishers, 2000.

Missouri Department of Conservation. <<http://www.conservation.state.mo.us/about/>> 15 May 2000.

Missouri Department of Natural Resources. <<http://www.dnr.state.mo.us/homednr.htm>>

National Park Service Organic Act, 16 U.S.C.1.

Ozark National Scenic Riverways. <<http://www.americanparks.com/parklist/moozark.htm>> 30 May 2000.

Porter, Lee, Turner, and Hillan, *Environmental Science and Technology*, Danville, IL: Interstate Publishers, 1997.

U.S. Department of Agriculture National Resources Conservation Service. <<http://www.nrcs.usda.gov/AboutNR2.html>> 15 May 2000.