

Unit I: Other Farm Related Subjects

Lesson 1: Understanding the Importance of Managing Soil and Water

Terms

- Crop residue
- Degradation
- Domestic wastewater
- Erosion
- Freshwater
- Grey water
- Hazardous waste
- Irrigation
- Minimum tillage
- No-till
- Sewage
- Solid waste
- Spent water
- Stewardship
- Streambank management
- Strip cropping
- Terrace
- Tilling
- Topsoil
- Wastewater
- Water conservation

Why is managing soil important?

- There are many philosophic and economic reasons for managing soil and minimizing its degradation.
- Degradation is lowering the quality of soil.
- The soil is no longer as productive or useful as it once was.
- The reasons for soil management can be categorized into several groups.

Why is managing soil important?

- Humanitarian reasons
 - These reasons concern human welfare and social reform, in particular providing an adequate supply of nutritious food for the hungry.
 - Providing enough for domestic use requires high soil productivity.
- Economic reasons
 - Economic reasons concern expenses incurred on the farm to produce food and the costs of goods of the consumer.

Why is managing soil important?

- Stewardship reasons
 - Stewardship refers to our responsibility to manage natural resources to assure an adequate supply for future generations.
 - Stewardship involves the practices of wise use, conservation, and preservation.

Why is managing soil important?

- Environmental reasons
 - Soils should also be conserved for environmental reasons.
 - It is a societal benefit to have a clean environment with adequate supplies of pure drinking water, clean air, productive soils, and recreational areas

Why is managing soil important?

- Aesthetic reasons
 - This final category concerns maintaining the environment as a beautiful site to experience.
 - Most people would like to avoid unsightly scars and bare, eroded soils on the landscape.

What is soil erosion and what can be done to prevent it?

- *Erosion* is the wearing away of soil by water, wind, and other sources.
- Soil erosion is the greatest threat to soil productivity and one of the largest sources of pollution in our water.
- *Topsoil*, the most valuable layer of soil, is usually the first to disappear due to erosion.

What is soil erosion and what can be done to prevent it?

- Water erosion often begins with raindrops.
- To a soil particle, a raindrop is like a bomb falling from the sky.
- Raindrops can reach speeds of 30 kilometers per hour.
- When rain falls, millions of drops fall to the ground and splash soil particles as high as 1 meter into the air and splatter them as far as 1.5 meters away.
- As the water runs off the land, it often carries soil along with it into other water sources.
- The steeper the slope, the faster the water will run, which in turn digs up and carries away more soil.

What is soil erosion and what can be done to prevent it?

- Wind is also responsible for soil erosion.
- Soil particles that are unsheltered can be picked up and carried away.
- Any exposed soil surface is vulnerable, especially in dry conditions and dry climates.
- Wind can carry soil over a greater distance than water in a short amount of time.
- When it is dry and windy, huge clouds of soil can blow across the land and cause dust storms.

What is soil erosion and what can be done to prevent it?

- Erosion can cause many problems.
 - Erosion carries away the most fertile, productive soil.
 - It breaks down the soil and reduces the organic matter.
 - When water carries soil away into other water sources, the soil becomes a pollutant known as sediment. If you've ever seen a muddy lake or river, you've seen the effects of soil erosion.
 - Fertilizers and pesticides can be carried along with the soil into water sources.

What is soil erosion and what can be done to prevent it?

- As runoff increases, the soil is cut through, leaving rills (channels) that can become gullies.
- Crops and vegetation of any kind can be damaged, covered with soil, and uprooted because of erosion. This results in crop loss, reduced productivity, and reduced yields.
- Soil erosion can also damage structures by washing away roads and weakening building foundations.
- On steep slopes, erosion can cause landslides to occur.

What is soil erosion and what can be done to prevent it?

- Soil is a very precious natural resource that takes a considerable amount of time to form.
- We must do what we can to conserve soil.
- While soil erosion can never be stopped, it can be controlled.

What is soil erosion and what can be done to prevent it?

- One of the best ways to control soil erosion by water and wind is to protect the soil with healthy vegetation.
- Roadside ditches, waterways, and sloping areas are often planted with grass or other plants to help hold the soil in place.
- This vegetative area can also help hold back and filter out fertilizers and pesticides that could otherwise become water pollutants.
- Planting trees also provides a sheltered area for soil.

What is soil erosion and what can be done to prevent it?

- Construction sites often cover bare soil with straw until something more permanent is established to protect the soil.
- Straw bales are sometimes used in rows to form a small wall to slow water runoff.
- Once the construction is done, grass and other plants are usually put in place to control erosion.

What is soil erosion and what can be done to prevent it?

- In the past, farmers plowed their fields after harvest to mix the plant stems and leaves, known as *crop residue*, with the soil.
- This is called *tilling*.
- Today, many farmers leave the crop residue on the ground to help keep the soil in place.
- Farmers use a variety of tillage methods based on the conditions of the land.
- Since they make their living from the land, farmers understand the importance of protecting the soil.

What is soil erosion and what can be done to prevent it?

- ***No-till*** farming involves leaving crop residue on a field at all times. The soil is not turned over or worked when the new crop is planted.
- ***Minimum tillage*** involves working the soil but leaving some crop residue in place as the new crop is planted.

What is soil erosion and what can be done to prevent it?

- Terracing is a management practice used on sloping land such as hillsides.
 - A *terrace* is a ridge that follows the contour of the land to slow runoff.
 - Terraces serve the same purpose as speed bumps in parking lots.
- *Strip cropping* is an erosion control method in which different kinds of crops are planted in strips across a hillside.
 - These strips that are contoured with the slope of the land help slow runoff.

What is soil erosion and what can be done to prevent it?

- *Streambank management* practices are used to help prevent soil from eroding along the banks of water.
- Rocks are often put strategically in place along rivers, streams, and lakes to control soil erosion.
- Planting willow trees can also help control erosion around water because the roots will hold the soil in place.

EXAMPLES OF SOIL EROSION



Rills



Gullies



Landslide



Outwash

EXAMPLES OF SOIL EROSION



Wind Erosion



Wind Erosion

SOIL CONSERVATION PRACTICES



Healthy vegetation along a road to control erosion.



A newly installed terrace to slow water runoff.



No-till soybeans growing through corn crop residue.



Covering newly prepared lawn with straw to control erosion.

SOIL CONSERVATION PRACTICES



Strip cropping.



Rocks placed along a streambank to control soil erosion.

Why is managing water important?

- Water has many uses. It plays an important role in many aspects of human life. Several areas in which water exerts an influence are:
 - Life Processes—water is essential for living organisms in carrying out the functions of life.
 - Plants use water in major life processes such as photosynthesis and temperature regulation through transpiration.

Why is managing water important?

- Animals use water in metabolism and in body fluids.
- Humans need water to stay alive.
- The human body is 65 percent water, with blood and plasma being 92 percent water, and muscle tissue being 80 percent water.
- The body maintains a certain water content; death results in more than 20 percent of the water is lost.
- If not enough water is supplied naturally, a crop producer may have to irrigate land.
- ***Irrigation*** is the addition of water by mechanical means.

Why is managing water important?

- Daily Living—water is used in daily living activities.
 - The amount people use varies from one location to another.
 - A family in the city uses 800 liters of water every week on average. The main uses include drinking, washing, and cooking.
 - A family in the village uses 1300 liters of water every week on average. The main use is for farming.

Why is managing water important?

- Climate—water moderates the temperature of the earth.
- Because water has a high heat capacity, it can regulate and transfer heat.
- Cities near large bodies of water have climates moderated by the water.
- Extreme temperature changes are found in locations on land far away from water.

Why is managing water important?

- Manufacturing—the making of steel, refining oil, producing paper, processing food, and many other activities in manufacturing require large amounts of water.
- More efficient manufacturing processes can reduce the amount of water required.
- Some paper mills use nearly 150 kiloliters of water to make 900 kilograms of paper.

Why is managing water important?

- Transportation—rivers, oceans, canals, and other bodies of water are used to transport raw products and manufactured materials.
- Rivers and canals often use barges guided by tug boats.
- In transportation, water is not used or changed into another form.

Why is managing water important?

- Recreations—swimming pools and water parks often require the use of scarce freshwater from wells or other sources.
- *Freshwater* is water that has little or no salt, with the salt content being less than 3.0 parts per thousand.
- Where possible, water is reconditioned and used in recreational facilities.

How can we conserve water?

- While we use a lot of water for many different things, we need to remember that water is a limited natural resource.
- No “new” water is made.
- The water we have is recycled by means of the water cycle.
- We have access to only a small amount of fresh water.
- Many areas have enough water to supply their needs.
- However, water shortages may occur due to factors such as drought, flood, pollution, population growth, industrial needs, and others.
- When this happens, or better yet before it happens, conservation of water is needed.

How can we conserve water?

- Water conservation is using water-saving methods to reduce the amount of water needed and increase the water supply for optimum long-term economic and social benefits.
- Conservation of water can ensure that supplies of fresh water will be available for everyone, today and tomorrow.
- Every drop counts.
- Every individual can make a difference.

How can we conserve water?

- Conserving water makes sense, but it often involves changing habits which have evolved over time. Habits can be very hard to break.
 - Begin by simply turning off water whenever it is not being used.
 - Fill the bathtub with less water.
 - A capped bottle filled with rocks (or something to weigh it down) will take up space in the toilet tank and reduce the amount of water available to flush.
 - The volume of water needed to water plants or the lawn can be reduced by watering the early morning or late evening and by watering less often and more carefully.

How can we conserve water?

- Fix leaky faucets.
- Keep a bottle of cold drinking water in the refrigerator instead of running water until it becomes cool.
- When washing dishes by hand, use a sink full of rinse water rather than letting the water run.
- Use a hose with no leaks and an on/off nozzle or use buckets when washing automobiles and buildings.

Why is managing waste important?

- All processes that occur produce some kind of waste.
- It is important that means for managing the waste in an efficient and sanitary way are developed and conducted.
- There are several different kinds of wastes that are generated through a variety of activities.
- It is important to be able to identify them in order to know the proper management technique to follow.
- Some of the types of waste are:

Why is managing waste important?

- Wastewater—**wastewater** is used water that contains dissolved or suspended matter.
- It is produced by homes, factories, farms, and other places where water is used.
- Wastewater can damage the environment.
- Streams and lakes can be destroyed by wastewater.
- Factories and farms treat water before it is released to assure that it causes little or no damage.
- Water released into a stream or lake should not appreciably change the natural conditions in the stream or lake.
- There are different kinds of wastewater. They are:

Why is managing waste important?

- Spent water—***spent water*** is water that has been used and can no longer serve the purpose for which it was used because of contamination.
- Domestic wastewater—***domestic wastewater*** is the wastewater produced by humans in their daily lives.
- Grey water—***grey water*** is the water produced by bathing, cooking, and washing dishes and clothes.
- Sewage—***sewage*** is the wastewater produced by residential and commercial sources.

Why is managing waste important?

- Solid waste—***solid waste*** is garbage, refuse, sludge, and other discarded material.
 - Solid wastes are non-liquid materials that do not dissolve in water or other solvents.
- Hazardous waste—***hazardous waste*** is waste that is potentially dangerous to human health or the environment.
 - The materials may be solid, liquid, or vapor wastes.

Review/Summary

- Why is managing soil important?
- What is soil erosion and what can be done to prevent it?
- Why is managing water important?
- How can we conserve water?
- Why is managing waste important?