



Unit E: Basic Principles of Soil Science

Lesson 7:

Understanding Soil Erosion and Management Practices



Important Terms

- Accelerated erosion
- Conservation tillage
- Cover crops
- Diversion ditches
- Geologic erosion
- Glacier erosion
- Grassed strips
- Gully erosion
- Land slippage
- Mulching
- Natural erosion
- Rill erosion



Important Terms (Cont)

- Runoff
- Saltation
- Sediment
- Sheet erosion
- Silt fences
- Soil erosion
- Strip cropping
- Surface creep
- Suspension
- Terrace
- Water erosion
- Wind breaks
- Wind erosion



What is soil erosion?

- Soil erosion is the process by which soil is moved.
- When soil is eroded, it may become pollution in the water or air.
- The land where it came from, loses fertility.
- Vegetation and other coverings help prevent soil erosion.



What is soil erosion?

- There are two basic classes of erosion.
 - Natural erosion
 - Accelerated erosion



What is soil erosion?

- Natural erosion occurs naturally and has made beneficial changes in the earth such as rounding off mountains and filling in valleys.
- The redepositing of soil forms new, highly fertile areas



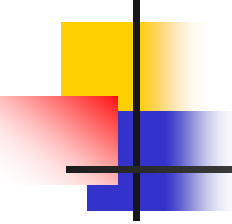
What is soil erosion?

- Natural erosion is sometimes referred to as geologic erosion.
- This means it has occurred on land not disturbed by humans.



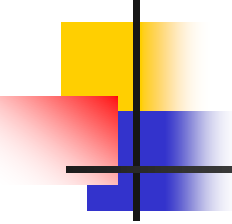
What is soil erosion?

- Accelerated erosion removes topsoil at an excessive rate and usually results from human activity on the land.
- Such activity includes construction and plowing.
- Accelerated erosion causes large losses of soil fertility.



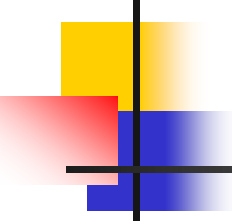
What are the causes of soil erosion and steps in the erosion process?

- Erosion is caused by many different weather factors:
 - wind
 - water
 - glacial movement



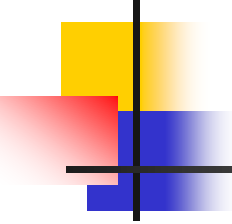
What are the causes of soil erosion and steps in the erosion process?

- When land is cleared of protective covering, it is much more susceptible to erosion.
- The erosion process involves three distinct steps.
 - 1st Loosening of soil particles.
 - 2nd Moving of soil particles.
 - 3rd Depositing of soil particles.



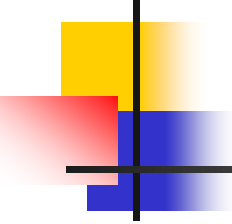
What are the causes of soil erosion and steps in the erosion process?

- There are four basic types of erosion.
 - Wind erosion
 - Water erosion
 - Glacier erosion
 - Land slippage



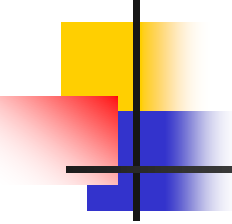
What are the causes of soil erosion and steps in the erosion process?

- Wind erosion is the loss of soil due to the movement of wind over the land.
- It usually occurs in dry climates where the soil is loose.
- Wind erosion occurs on:
 - newly-plowed fields.
 - construction sites
 - land where vegetation is grazed too short.



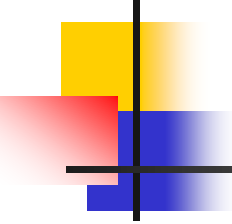
What are the causes of soil erosion and steps in the erosion process?

- Water erosion is the loss of soil due to water movement.
- Water erosion occurs when excess rainfall creates runoff that carries soil away.



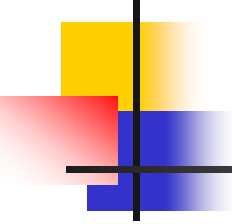
What are the causes of soil erosion and steps in the erosion process?

- Runoff occurs when rain falls faster than it can be absorbed into the soil.
- Runoff water carries soil particles into streams and rivers
- This causes water pollution and sediment.
- Sediment is the deposition of soil in the bottom of streams, riverbeds, ditches, etc.



What are the causes of soil erosion and steps in the erosion process?

- Glacier erosion occurs when the front edge of a glacier may push soil, rocks, fallen trees, and other materials.
- Soil erosion from glaciers is of minor importance except in areas where glaciers exist.



What are the causes of soil erosion and steps in the erosion process?

- Land slippage occurs on sloping land that is wet.
- Soil that is saturated with water, slips down the hillside or mountain slope.
- Land slippage is also known as mud slides or landslides.
- Banks along highways, streams, and oceanfronts are often subject to slides.



Types of Soil Erosion

1. Wind Erosion
2. Water Erosion
3. Glacier Erosion
4. Land Slippage



What are the ways that different types of wind erosion occurs?

- Wind erosion causes air pollution, produces highway safety hazards, and fills drainage ditches. It occurs when persistent or frequent high-velocity winds and a dry, residue-free soil surface exist. Soil is moved by saltation, suspension, and surface creep.



What are the ways that different types of wind erosion occurs?

- ***Saltation*** occurs when the wind lifts medium-sized soil particles into the air. They are too heavy to remain in suspension, so they fall to the ground loosening other soil particles. This process repeats itself.



What are the ways that different types of wind erosion occurs?

- *Suspension* occurs when very small soil particles become airborne and enter the main airstream. They are carried in the same general direction as the wind. Because the soil particles are small, they remain in suspension.



What are the ways that different types of wind erosion occurs?

- *Surface creep* occurs as saltation takes place. The soil particles that are too heavy to be moved by saltation are moved along the surface by the impact of soil particles being displaced by saltation.



What are the ways that different types of wind erosion occurs?

Types of Wind Erosion

1. Saltation – soil particles bounce along the soil surface
2. Suspension – soil particles remain suspended in air for long distances
3. Surface creep – due to impact saltation, heavy soil particles move along the surface



What are the different types of water erosion?

- Three kinds of water erosion can occur.

They are:

- Sheet erosion
- Rill erosion
- Gully erosion



What are the different types of water erosion?

- Sheet erosion results when thin layers or sheets of soil are worn away.
- Sheet erosion can occur on nearly level land or on sloping land.



What are the different types of water erosion?

- If muddy water is moving off a field, sheet erosion is occurring.
- It may go unnoticed since no channels form.
- However, it may be just as problematic as erosion that is more apparent.



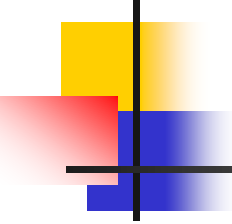
What are the different types of water erosion?

- Rill erosion usually occurs on sloping land where small channels are formed by running water.
- The signs of rill erosion can be masked by normal tillage practices.



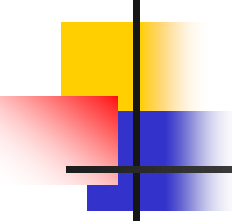
What are the different types of water erosion?

- Gully erosion occurs when rills continue to wash away and become more severe.
- It is more likely on steeper slopes and cannot be smoothed by normal tillage practices.



Practices that can be implemented in urban areas to reduce soil erosion.

- In urban areas, the main concern is keeping the soil covered and controlling water runoff. This applies to construction sites, roads, parking lots, and recreational areas.

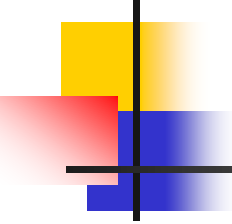


Practices that can be implemented in urban areas to reduce soil erosion.

- Mulching is placing a layer of straw, burlap, or other material on the top of soil to protect it from wind and water.
- Mulch helps hold water and reduce the impact of water flow.

Mulching



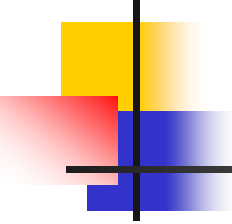


Practices that can be implemented in urban areas to reduce soil erosion.

- Silt fences are placed at the bottoms of slopes to hold the soil yet allow the water to flow.
- This keeps sediment out of streams and lakes and prevents the loss of soil.
- Silt fences may be made out of bales of hay, plastic strips, or other materials.

Silt Fences



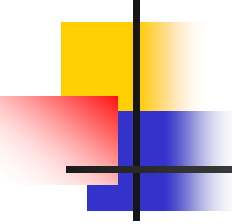


Practices that can be implemented in urban areas to reduce soil erosion.

- Cover crops - vegetation can be planted on excavated soil to hold it in place.
- Winter grass can be planted in the fall on new lawn areas to prevent erosion until the following spring when a permanent sod can be established.

Cover Crops



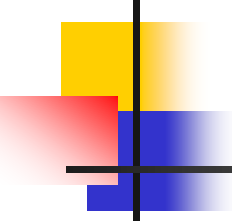


Practices that can be implemented in urban areas to reduce soil erosion.

- Building on the contour streets, buildings, and other structures can be located on the contour of the land to slow water flow.
- Stabilizing banks Creeks and roadsides often have banks that will quickly erode.
 - Rip-rap, fabrics, straw, vegetation, and concrete are some materials used to stabilize banks.

Stabilizing Banks



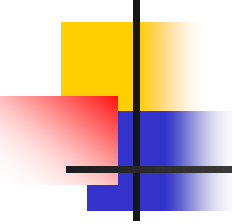


Practices that can be implemented in urban areas to reduce soil erosion.

- Planting trees and shrubs
 - Trees and shrubs can be planted in areas where erosion is possible.
 - The roots hold the soil.
 - The limbs and leaves on the tree slow the impact of rain and fallen leaves cover the ground.

Planting Trees





Practices that can be implemented in urban areas to reduce soil erosion.

- Storm water management
 - Curbs, ditches, and other structures may be installed to properly manage excess precipitation.

Storm water management





Practices in agriculture that help minimize soil erosion.

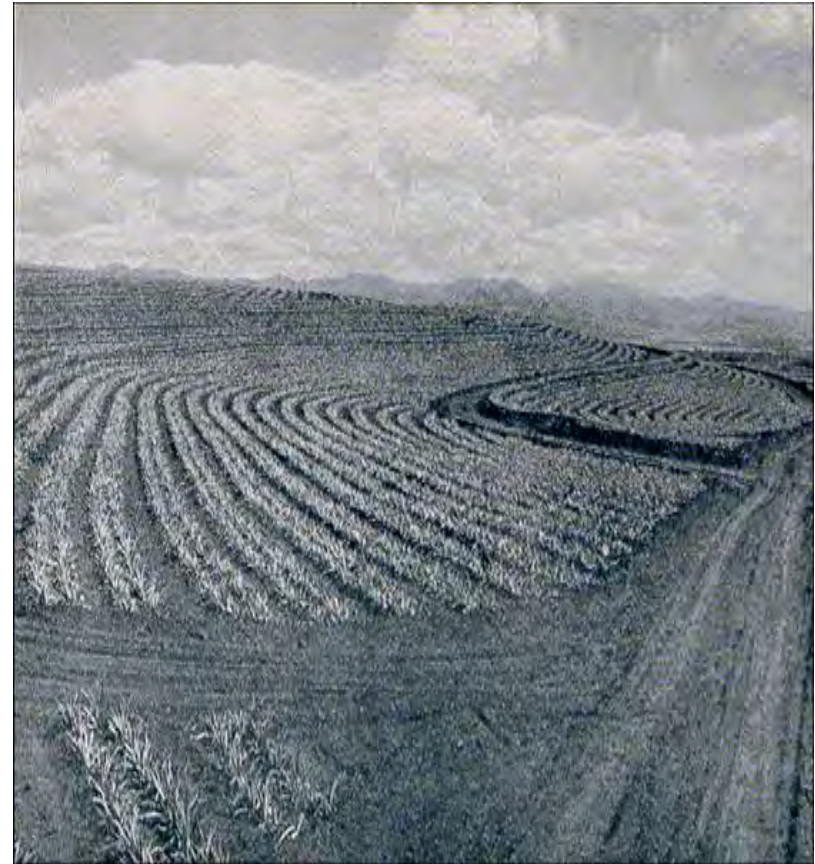
- Agriculture utilizes the soil for growing crops.
- This creates loose soil that can be easily eroded.
- Several management practices can be implemented to reduce soil erosion.



Plant on the contour

- Plant on the contour this involves planting around slopes rather than up and down them.
- This helps slow the flow of water and allows it to be absorbed rather than runoff.

Contour Planting





Rotate crops

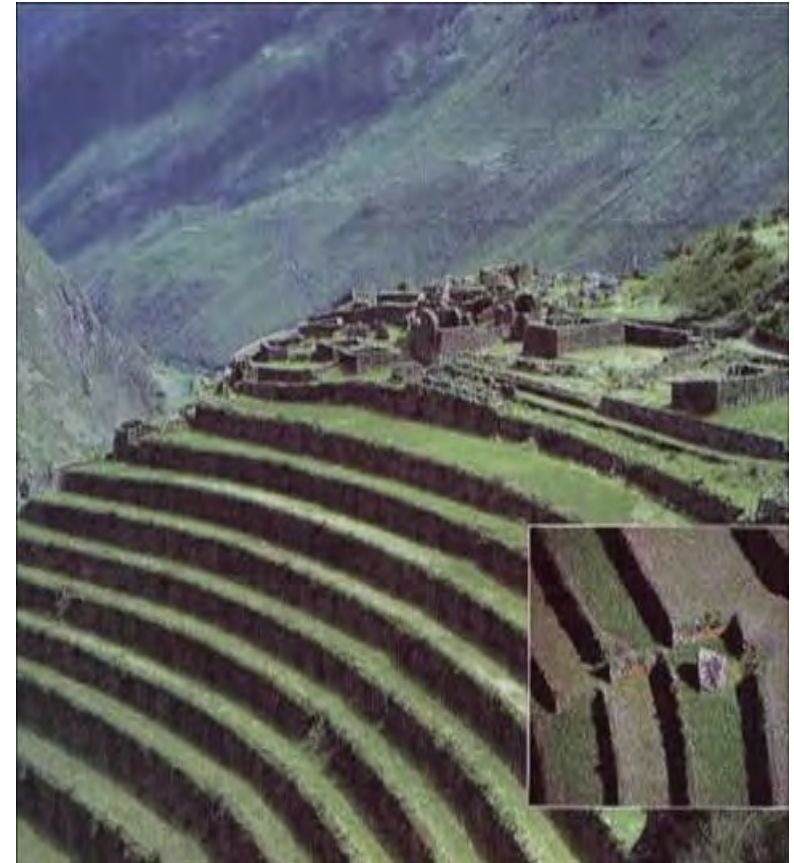
- Rotate crops: planting different crops on land from one year to the next helps reduce soil erosion.
- It leaves residue on the surface to help hold the soil in place.



Terraces

- Terraces: A terrace is a ridge or row of earth mounds placed across a slope.
- Terraces allow a gradual drop for the flow of water.
- This helps prevent rapid water flow and aids in holding soil in place.

Terraces





Grassed strip

- Grassed strip - Small strips covered with grass may be left near plowed areas.
- This slows the flow of water and helps keeps gullies from forming.

Grassed Strips





Diversion ditches

- Diversion ditches - Small ditches may be built across slopes to slow water movement and divert it in to a safe outlet.
- They are similar to grassed waterways, but may be lined with riprap or other material.

Diversion Ditches





Strip cropping

- Strip cropping is planting alternating strips of crops on sloping land.
- The strips slow the flow of water and hold the topsoil in place.

Strip Cropping





Vegetative covers

- Vegetative covers - Fields may be planted in winter-cover crops after fall harvest.
- The cover crop adds fertility and protects the soil from erosion.



Conservation tillage

- Conservation tillage involves planting crops with little or no plowing.
- Crop residue from the previous year is left on the surface to protect the land.

Conservation Tillage





Wind breaks

- Wind breaks - Rows of trees may be planted to slow blowing wind and help prevent wind erosion.

Windbreaks





Agricultural Management Practices Used to Minimize Soil Erosion

1. Plant on the contour
2. Rotate crops
3. Terraces
4. Grassed strips
5. Diversion ditches
6. Strip cropping
7. Vegetative covers
8. Conservation tillage
9. Wind breaks



Review

- What is soil erosion?
- What are the causes of soil erosion and steps in the erosion process?
- What are some ways in which different types of wind erosion occur and the associated problems?
- What are the different types of water erosion?
- What are some urban management practices that can reduce soil erosion?
- What are some agriculture management practices that will minimize soil erosion?