Unit E: Basic Principles of Soil Science

Lesson 6: Understanding Soil Degradation

Important Terms

- Accelerated erosion
- Alkalization
- Compaction
- Construction
- Contamination
- Desertification
- Natural erosion
- Salinization
- Soil degradation
- Soil erosion

What is soil degradation?

- Soil degradation is a lowering of the quality of soil or the loss of soil productivity.
- Soil degradation occurs because people do not understand soil and the consequences of certain of its uses.

What is soil degradation?

- Minimizing soil degradation is important in maintaining a good environment.
- Soil degradation results from:
  - Construction
  - Contamination
  - Erosion

How can construction result in soil degradation?

- Construction is altering land by building:
  - Roads
  - Houses
  - Offices
  - Factories
  - Other structures

Construction / Soil Degradation

- Construction degrades the soil by replacing productive land with structures that prevent the production of plants or animals.

Construction / Soil Degradation

- Construction degrades the soil when native grasses and trees are removed.
- This leaves the soil unprotected from erosion.

Construction / Soil Degradation

- Large equipment may move topsoil around and cover it with subsoil.
- Soil can be compacted when wet by heavy equipment.
- Digging deep into the earth brings up subsoil and parent material.
- When it is spread on the surface, fertility is lowered.

What are the sources of contamination and how do they result in soil degradation?

- Contamination results when chemicals, oil, and other substances leak into the land.

Contamination / Soil Degradation

- Some contaminants soak into the soil and destroy its ability to support plant growth.
- Other materials may pass through the soil and enter the ground water.
- This can contaminate water supplies.

Contamination / Soil Degradation

- Land formerly used as dumps, mines, and factory sites may be rehabilitated.
- This involves removing contaminated soil and covering what remains with non contaminated soil.
  - This process is expensive.

Contamination / Soil Degradation

- Soil may be contaminated by agricultural practices, such as:
  - Use of too much fertilizer.
  - Use of excess chemicals.
  - Use of irrigation water containing salt.

What is soil erosion and how does it result in soil degradation?

- Soil erosion is the process by which soil is moved.

Soil erosion / Soil degradation

Natural causes

- Natural erosion shapes the earth's landscape by rounding off mountains and filling in valleys which may form new, highly fertile areas.
  - An example is the Mississippi River Delta.

Soil erosion / Soil degradation

Human actions

- Human activity, such as construction and plowing may cause accelerated erosion, which removes topsoil at an excessive rate.
  - In many places, soil is being lost faster than it is being formed.
- This will result in loss of soil fertility and productivity.

What are other sources of soil degradation?

- Improper irrigation practices
- Growing crops without replacing plant nutrients
- Pollution of soils with chemicals, industrial waste, human waste and livestock waste
- Overgrazing and deforestation
- Compaction

Other sources of soil degradation

- Improper irrigation practices result in salinization, alkalization and water logging.
- Salinization is an accumulation of soluble salts.
- Alkalization is an accumulation of exchangeable sodium.
- Both of these are harmful to plant growth.

Other sources of soil degradation

- Growing crops without replacing plant nutrients and soil organic matter.
- These soils are “mined” of nutrients.
- As fertility drops, soil organic matter is lost and soil structure deteriorates.

Other sources of soil degradation

- Pollution of soils with chemicals, industrial waste, human waste and improperly handled livestock waste.
- A large accumulation of heavy metals, salts or an acute accumulation of chemicals can render soil unproductive.

Other sources of soil degradation

- Overgrazing, deforestation and other practices that remove productive plant cover cause a condition called desertification.
  - This problem is most common in low rainfall areas.
- Humus content and fertility drops.
- Surface soil is exposed and becomes subject to erosion.

Other sources of soil degradation

- Compaction is the packing of soil particles tightly together after years of tillage with heavy machinery.
- It can break down soil structure.
- Plant growth is reduced, organic matter drops, permeability is lost, and runoff increases.

Review / Summary

- Describe soil degradation.
- Explain how construction can result in soil degradation.
- Identify sources of contamination and explain how they result in soil degradation.
- Explain soil erosion and how it results in soil degradation.
- Identify other sources of soil degradation.