Lesson 11: Site Characteristics

An evaluation of soils includes more than the horizons that make up their profiles. Soils are also part of the landscape. The landscape is what people see if they gradually turn in a circle and view everything there is between themselves and the horizon (the line where the earth and sky meet). The position of the soil in the landscape tells something about the age of the soil and the kind of geologic materials from which the soil formed. The characteristics of the landscape in which the soil evaluation is made are called **site characteristics**.

Site characteristics affect runoff, erodibility (potential for erosion), and internal drainage. They also affect management decisions about choice of crops, conservation tillage systems, mechanical practices, drainage, and irrigation. Site evaluation, then, is just as important in judging soils as the description of the properties of each horizon. Five major site characteristics are used in a site evaluation:

1. Landform
2. Slope
3. Aspect
4. Parent materials
5. Stoniness and rockiness

Landform

Landforms are distinct parts of the landscape that have characteristic shapes and are produced by natural geologic processes. To evaluate landforms, one needs to look in every direction around a site to assess the general lay of the land. Both slope steepness and slope shape (convex, linear, or concave) should be considered. The parent material may also be a guide, although the correlation between landform and parent material is not perfect.

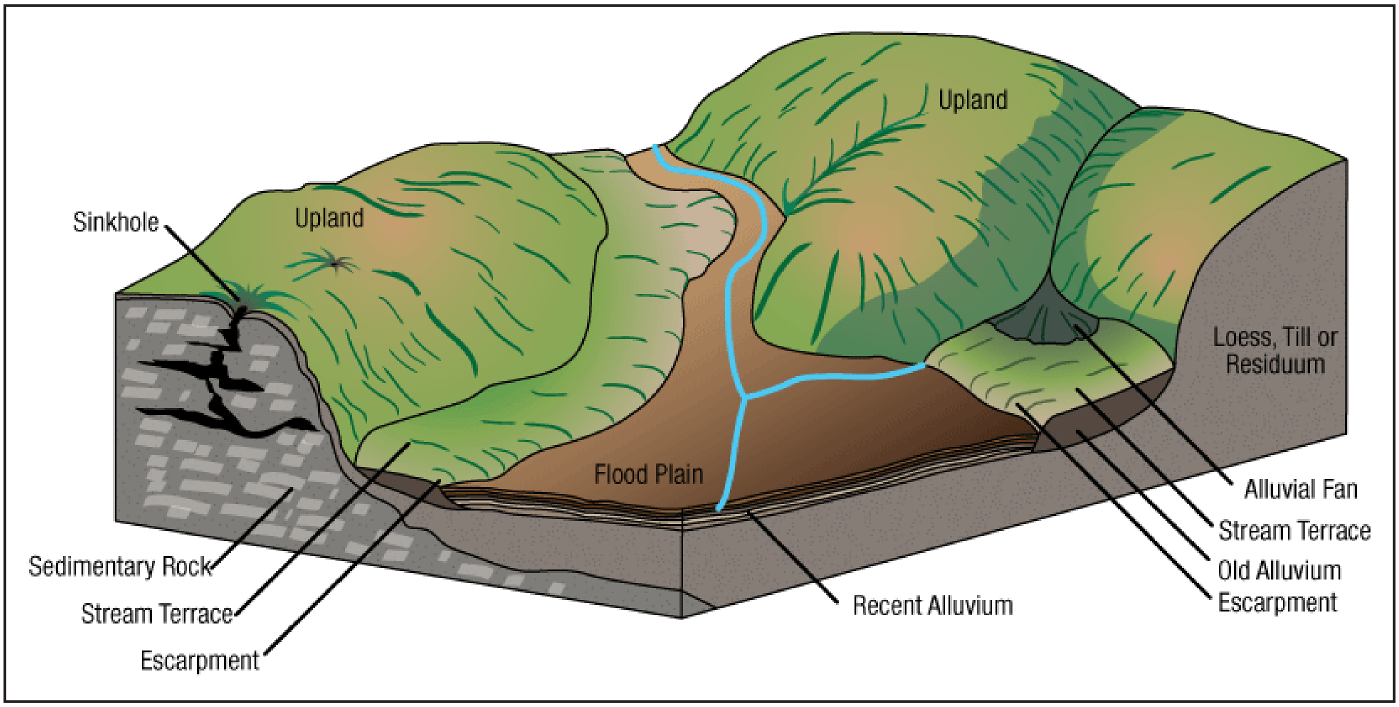
Although there are many specific landforms, only six general landforms that commonly occur in Missouri are discussed here. See Figure 11.1. They are:

- ◊ Uplands
- ◊ Foot slopes
- ◊ Alluvial fans
- ◊ Flood plains
- ◊ Stream terraces
- ◊ Sinkholes

Uplands

Uplands are the highest parts of the land surface. Most uplands are gently rolling to hilly, although some are nearly level plains. Uplands include narrow rounded ridges and

Figure 11.1 – Composite Diagram Showing Landforms



broad divides. Uplands commonly have parent material of loess, glacial till, colluvium, and residuum. Uplands also include high bench terraces with parent material of loess, colluvium, or residuum.

Foot Slopes

Foot slopes are at the base of upland hillslopes. They mark the change from upland to stream terrace or flood plain. They might be thought of as a transitional area between the uplands and the stream terrace or flood plain. There generally is a foot slope position on the landform, but many times it is very narrow and only a few feet wide. Foot slopes usually are concave. They collect more water than they shed by runoff. The parent materials of foot slope soils often accumulate by gravity (colluvium) from the upland slopes. Some foot slopes, however, may have parent materials that consist of loess, alluvium, or residuum.

Alluvial Fans

Fans also occur at the junction of sloping uplands and nearly level flood plains. They form where a rapidly flowing stream emerges from a narrow flood plain into a stream terrace or larger flood plain. See Figure 11.1. The fan is narrow and sloping at the upstream point of origin and broadens and flattens as the stream spreads sediment onto the larger flood plain. The surface of the fan is gently rounded. The parent material is alluvium. Many times it contains coarse sand, gravel, and even fragments as large as cobbles.

Flood Plains

Most flood plains are nearly level surfaces adjacent to stream channels. Every time a stream overtops its banks, the excess water flows out onto the flood plain. Flood water may not cover the entire flood plain in each flood, but all parts of the flood plain will be covered with water at least once every 100 years.

Although most flood plains are nearly level, some have slopes up to 5–6 percent. Scouring (cutting or eroding by fast moving water) by water in overflow channels may give the flood plain a rolling, hummocky appearance, especially adjacent to large rivers. The parent material on a flood plain is recent alluvium and commonly consists of sand, silt, and clay size particles. Any sediments deposited within the last 100 years are considered recent.

Stream Terraces

Stream terraces are abandoned flood plains. When a river cuts down through its existing flood plain, it establishes a new flood plain at a lower level. The old flood plain is abandoned and becomes a stream terrace that is no longer subject to flooding. In some places, the line separating stream terraces from flood plains is very difficult to determine because the change in elevation is so slight. However, a stream terrace should be above known flooding levels.

At the junction of a stream terrace and a flood plain is a rise, called an **escarpment**. In some places the escarpment is very obvious, but in other places it may be a very gradual rise that requires close observation to detect. Some rivers may have two or three separate terrace levels, each separated by an escarpment. See Figure 11.1. Such compound landforms resemble a giant set of stairs.

Lateral movement of a river channel may remove all of the flood plain on one side. The river channel then is at the base of a stream terrace or upland that never floods. Some streams flow next to a rock bluff. In such cases, the flood plain on one side of the river will be distinctly lower than the landform on the other side.

Because stream terraces are abandoned flood plains, their parent material is old alluvium, commonly overlain by a thin mantle of loess. Soils on stream terraces are older with more-developed horizons than soils on flood plains.

Sinkholes

Sinkholes are bowl-shaped areas caused by the weathering of the limestone bedrock that underlies the area. The bedrock cracks and water dissolves the limestone around the cracks. The cracks enlarge over long periods of time until water literally flows through these underground openings, causing the soil material above to fall in and fill the openings, leaving depressions on the surface. Sinkholes are common in some areas of Missouri, especially in the uplands of south Missouri and the upland areas adjacent to the Missouri and Mississippi Rivers.

The parent materials of sinkholes are colluvium or loess. Some sinkholes fill up with water after heavy rains. This is considered ponding (standing water for significant periods of time) rather than flooding. Typically, this will not result in as wet a soil as in ponding of flood plain soils. Most sinkholes that pond water usually drain quickly enough that the saturation of the soil does not cause reduction of iron and gray colors. In fact, many soils in sinkholes have well-drained profiles. See Figure 11.1.

Slope

Slope is important because it affects use and management of the soil. It is directly related to the soil erosion hazard, and it influences a farmer's choice of crops and conservation practices.

Slope Gradient

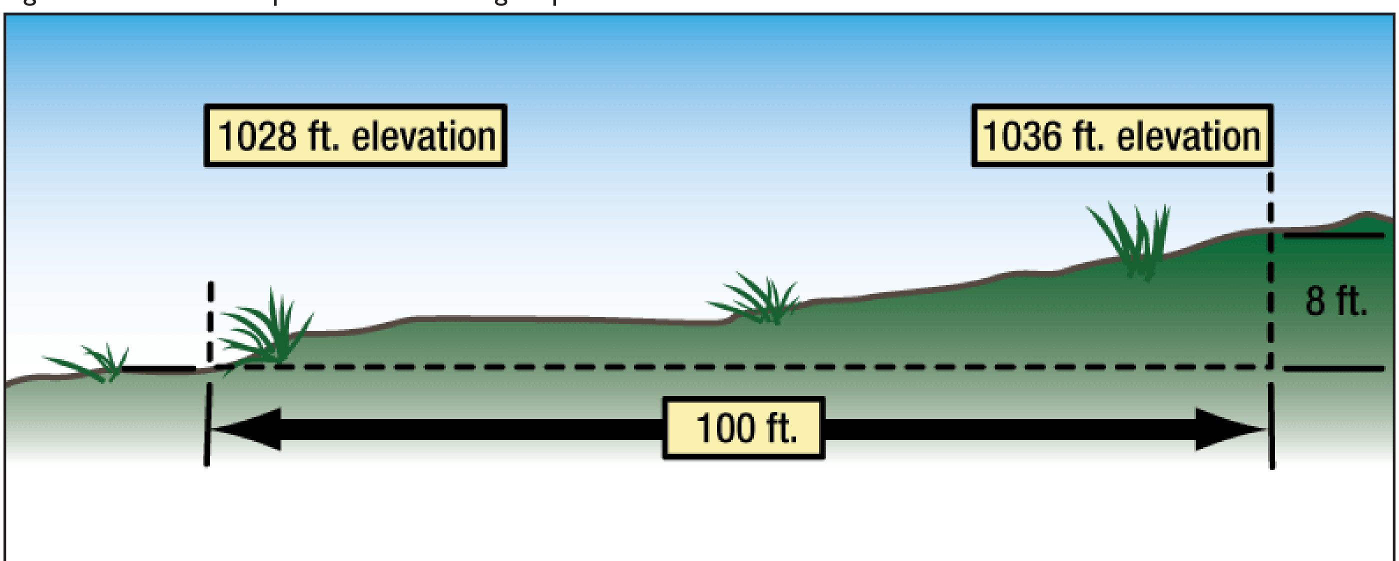
Slope, or slope gradient, refers to the steepness of the land surface. Slope is measured in percent calculated as the amount of vertical change in elevation over some fixed horizontal distance. Slope is always measured in the same direction as water runs over the surface. Slope is described as the "rise over the run." If two points are 100 feet apart (the run), and one point is 10 feet higher than the other (the rise), then the slope is 10 over 100, or 10 percent. See Figure 11.2.

Irrigation becomes difficult on steeper slopes, and so does the operation of farm machinery. In general, as the slope steepness increases, agricultural suitability decreases.

Slope Length

Slope has other characteristics besides steepness. One is slope length, which is the point of overland flow to the point of deposition. Long, uniform slopes are easier for equipment operation than short, broken slopes, but long slopes also allow runoff water to gather more volume as it flows over the surface. Long slopes are, therefore, more subject to erosion than short slopes. Diversion terraces or level terraces are an effective erosion control practice because they break up the long slopes into several short segments, thus decreasing the volume of the water, which reduces erosion.

Figure 11.2 – An Example for Determining Slope



$$\% \text{ Slope} = \frac{\text{Rise}}{\text{Run}} = \frac{1036' - 1028'}{100'} = \frac{8'}{100'} = 8\%$$

Slope Shape

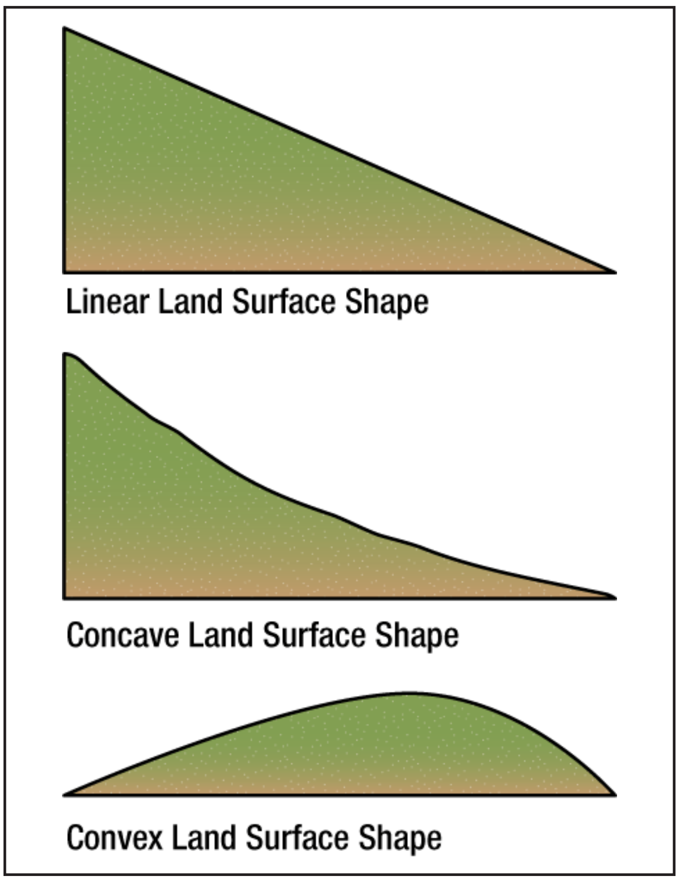
Another slope characteristic is slope shape. Slopes may be linear, concave, or convex.

◊ **Linear** means flat, or without curvature. Imagine a clipboard sitting on a table. The surface of the clipboard is flat, and as it sits on the table it is level. Now tilt it by lifting one end. The surface is still flat, but it now slopes at some gradient (percentage of rise or fall).

◊ **Concave** means saucer-shaped or bowl-shaped. The slope gradient progressively decreases over a concave slope.

◊ **Convex** slopes are like mounds, and are just the opposite of concave slopes. Rounded, convex slopes get progressively steeper. Many ridges have convex tops, linear sides, and concave foot slopes. See Figure 11.3.

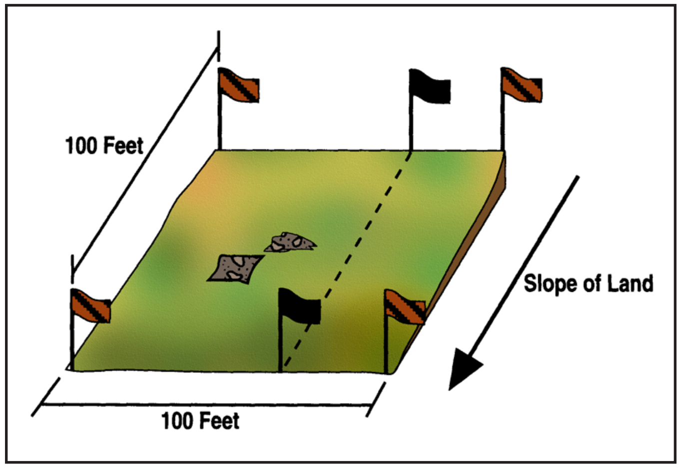
Figure 11.3 – Land Surface Shapes



Measuring Slope

Slope gradient can be measured with a number of surveying instruments. Soil scientists usually use an Abney level or a clinometer to measure slope. With practice, they can often estimate the slope gradient within 1 or 2 percent without instruments. Since these instruments may not be available and experience at estimating slopes may be limited, a different method can be used for judging slope. See Figure 11.4.

Figure 11.4 – Measuring Slope



At each soil evaluation contest site, two stakes are in the ground for evaluating the slope. The elevation of each stake and the horizontal distance between the stakes generally are given. To figure the slope:

◊ Calculate the difference in elevations.
◊ Divide the rise by the run.
◊ Figure the percent of the slope.

The stakes will not always be 100 feet apart, so the answer in percent needs to be calculated accordingly. For example, if the stakes are 100 feet apart and the rise is 10 feet, the slope is 10 percent. If the distance between the stakes is 50 feet in the example above, and the rise is 5 feet, the percentage of the slope will still be 10 percent, or the same percentage as a 100-foot run with a 10-foot rise (5 ÷ 50 = .10 = 10%). The final step is to determine the proper slope class* according to the chart in Table 11.1. (*Note: Percentages may vary with different types of landscapes.)

Table 11.1 – Slope Gradient

Classes of Slope Gradient	
Nearly level	0 – 2%
Gently sloping	2 – 5%
Moderately sloping	5 – 9%
Strongly sloping	9 – 14%
Moderately steep	14 – 20%
Steep to very steep	>20%

Aspect

Another site characteristic is the aspect of the slope. Aspect is the compass direction that the slope faces. The soil on a slope is influenced by temperature and exposure to the sun, dependent on the compass direction. Aspect will have little influence on nearly level to moderately sloping soils because the difference in temperature and exposure of the sun is slight.

Southerly aspects are more nearly perpendicular to the sun's rays and are exposed to the sun for longer periods of time each day than northerly aspects. Soils on southerly aspects tend to be warmer and drier than soils on northerly aspects. There generally is less vegetation on southerly aspects, therefore, the soil is often shallower and more susceptible to erosion than northerly exposures. For all theses reasons, soils on southerly aspects tend to have considerably lower productivity potentials than soils on northerly aspects.

In Missouri, the growing season on steeper northerly aspects is a little shorter, and it takes longer for the soil to warm up in the spring. In forested areas, especially those of south Missouri, the species of trees as well as the understory plants (small plants) on southerly aspects are different from those on the northerly aspects.

Easterly and westerly aspects are intermediate in their response to sunlight and moisture supply. In general, an easterly aspect will be more like a northerly aspect, and a westerly aspect will be a little more like a southerly aspect.

Parent Materials

Parent material is the geologic material from which soils have formed. Some soils formed in place by the weathering of bedrock. These are called **residual soils**, and the parent material is called **residuum**.

Other soils form in loose materials transported by water, wind, ice, or the force of gravity. These materials are called **sediments**, and there are several kinds. Sediments carried by a river and deposited on a flood plain or in a fan are called **alluvium**. Silty sediments carried by wind are called **loess**. In some areas in the Bootheel of Missouri and along its river, there are wind-blown sands that are called **eolian sand**. Sediments transported by glacial ice are called **glacial till**. Sediments transported by gravity are called **colluvium**.

Parent materials are determined by comparing upper horizons with C and R horizons. The problem is that once A, E, and B horizons are fully developed, the character of their original parent materials may no longer be clear. Usually, it can be assumed that the C horizon is still pretty much like the original parent material of the A, E, and B horizons. This is often the case in very deep soils that have nearly uniform textures.

In some soils, properties of the upper horizons are very different from those of the C and R horizons beneath them. These differences, combined with abrupt changes from B to C, or B to R, suggest two different kinds of parent materials. For these soils, it is not correct to say that the C or R horizons are like the original parent materials of the A, E, and B.

Many Missouri soils have a complex geologic history, but attempts should be made to determine all the parent materials that have influenced the entire soil profile. Sometimes all the horizons in a soil profile appear to have a single parent material. For example, alluvium may have distinct layers with different textures, but all layers formed the same way, and represent a single kind of parent material. The layers are a result of different episodes of flooding.

Sometimes there are two or more parent materials. Examples may include loess resting directly on glacial till, residuum, or colluvium, and colluvium resting on top of residuum. Abrupt changes in color, texture, and rock fragment content provide the major clues to these situations. See Plates 11, 24, and 25, pp. 50-C, 50-F, and 50-G.

There is a close relationship between the kind of parent material and the landform of a soil. Uplands usually have loess, glacial till, residuum, or colluvium as parent materials. Soils on flood plains develop from recent alluvium. Many stream terraces have a thin mantle of loess on top of old alluvium. Sometimes, however, it is difficult to distinguish between two similar kinds of parent material unless the geology of an area is familiar. Six kinds of parent materials are common in Missouri: residuum, alluvium (both recent and old), loess, eolian sand, glacial till, and colluvium.

Residuum

Residuum is the unconsolidated, weathered, or partly weathered mineral materials that accumulate as consolidated rock disintegrated in place. Different kinds of rocks give rise to different kinds of residuum and influence the size of the soil particles. For example, granite and coarse sandstones typically weather to loamy and sandy soils. Siltstones and fine-grain sandstones weather to silt loam and silty clay loam. Shales, limestones, and dolomites weather to silty clay or clay.

In the strictest sense, residual materials have not been moved from the place of weathering. If there were no exceptions, there would be very few truly residual soils in Missouri. Small movements due to windthrow (the action of wind uprooting trees), animal mixing (burrowing and digging), slope creep (slow downward movement), and localized slumping (small areas of soil that slide down a steep hill) occur almost everywhere, particularly in the upper foot or so of soil. Such movements do not exclude a material from being classified as residuum, especially if it can be determined that the entire profile formed from material weathered from the rock that underlies it. Generally, as depth increases in a residual material, there is a gradual increase in the amount and size of rock fragments, and they are less and less weathered. Some soils may have relatively unweathered rock fragments throughout, especially in southern Missouri where there is an abundance of chert (flint) in the limestone bedrock. Some of these fragments are rounded and others are sharp and angular. This gives a clue that the parent materials are different and that the rounded chert gravel may be of colluvial or alluvial origin.

Residuum is common on uplands and on some foot slopes. It may also be buried beneath a thin deposit of alluvium on stream terraces or fans. It may also be buried beneath a thin mantle of loess.

Alluvium

Alluvium refers to sediments, such as sand, silt, and clay, deposited on land by flooding.

Recent alluvium refers specifically to materials on the flood plains of modern rivers. All streams and rivers carry a load of suspended sediments, particularly during periods of heavy runoff. Each time a river floods, fresh sediments are added to the recent alluvium of the flood plain.

The consistency of alluvium is dependent on the speed of the water and the size of the particles deposited. When a river overflows, water moving over the flood plain flows much more slowly than water in the main channel. Suspended sediments then have a chance to settle out on the flood plain. The coarser sediments settle out nearest the river. Fine sediments are carried farther away and settle out in slow-moving, backwater areas.

Repeated episodes of flooding result in gradual accumulation of thick deposits of sediment on the flood plain. These deposits may have fairly uniform textures, or they may be distinctly stratified into layers of widely different textures. If any of the layers contain rock fragments, they usually are rounded. This is caused by the abrasive movements of fragments on the bottom of the stream channel over long distances.

Soils formed in recent alluvium are young soils, and may have simple A-C profiles. If the period between deposition of fresh sediments is longer, the soil may have an A-B-C profile.

An **alluvial fan** is formed as a modern stream emerges from steep terrain. The parent material, recent alluvium, is often stratified and commonly contains sand and gravel layers.

Old alluvium is associated with a stream terrace or an abandoned alluvial fan. The alluvium was originally laid down on a flood plain, but when the flood plain was abandoned by the stream, no further deposits of fresh sediments were made. Old alluvium may be more difficult to distinguish than recent alluvium, but overall the same properties of uniform texture, stratified layers, and rounded rock fragments are the best clues.

Loess

Wind-blown material is called **loess**. Loess consists of fine, dominantly silt-size particles, deposited by the wind. Where numerous sand grains are encountered in a profile, it commonly is the contact between loess and another parent material. The silts were formed by glacial grinding action, and were then carried in the melted glacial water of rivers and deposited on flood plains or in lake basins. Later the wind picked them up, transported them, and redeposited them on top of existing uplands or stream terraces. Soils formed in loess can be quite productive, but they are particularly susceptible to erosion. See Plates 2, 4, and 12, pp. 50-A and 50-C.

Loess originally covered nearly all of Missouri but has been removed from steeper sloping areas by geologic (natural) erosion. Loess is a common parent material on uplands in north and east Missouri. It is thickest near the Missouri and Mississippi Rivers and thins to the north and east. The texture of the loess also changes from coarse silt near the river, to fine silt and clay with increasing distance from the river. Many soils in southern Missouri are thought to have a very thin mantle of loess on top of residual or colluvial parent materials, particularly on stable summit divides.

Eolian Sand

Eolian is a term applied to materials deposited by wind action, and includes clays, silts, and sands. Clays and silts that are deposited by wind are most commonly referred to as loess. Sand deposits, such as dunes, are commonly referred to as **eolian sand**. Most of the eolian sand deposits of importance are in the Mississippi Delta areas.

Glacial Till

Glacial till is a parent material that consists of a mixture of clay, silt, sand, and gravel; it may have a few stones and boulders. Glacial till was transported during periods of glaciation. Much of the glacial till was moved long distances, but some is of local origin. It commonly is brown with some gray streaks, and contains many small soft masses of calcium carbonate. Most of the glacial till is a clay loam texture. Rock fragments tend to be rounded because of the grinding action of the glacier.

Colluvium

Colluvium is made up of loose soil material and rock fragments that have been transported down steep slopes. Colluvium can move several inches or feet, or to the base of the slope. Gravity is its main moving force, but water helps by weakening the strength of the soil mass upslope, or by carrying soil in local, unconcentrated runoff. Slope wash (by water) and slope creep (by gravity) help colluvium to form. Colluvium has a close resemblance to the parent material in which it formed, and it is very difficult to distinguish between the two in most places. Position and steepness of slope are the best clues for distinguishing between colluvium and the underlying parent material. Colluvium is common on foot slopes and very steep upland slopes. See Plates 9 and 28, pp. 50-C and 50-G.

Stoniness and Rockiness

Stoniness

Stoniness refers to the amount of individual rock fragments larger than 10 inches (25 cm) in diameter exposed at the soil surface. The classes of stoniness are based on a stone size with a diameter of about 12 inches. If stones average much larger in diameter, the area of stone coverage may be 2.5 – 5 times as much, depending on their size.

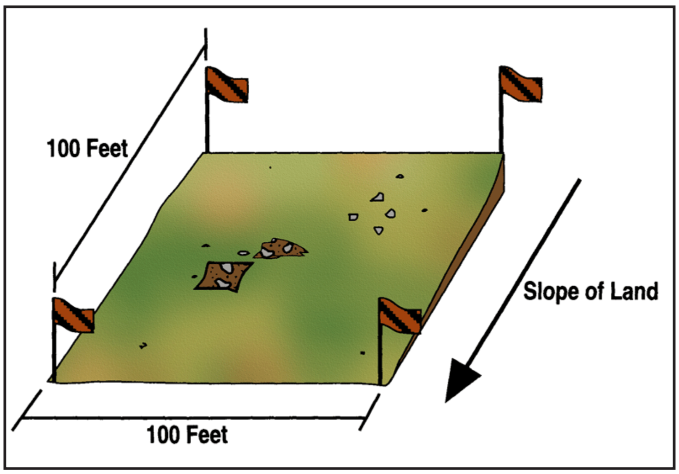
Stoniness is defined not only quantitatively but also in terms of its impact on agricultural management. Stoniness is evaluated according to the percentage of the soil surface covered by detached stones. Five general classes are used:

1. Not stony
2. Stony
3. Very stony
4. Extremely stony
5. Rubbly

Classes of Stoniness

For soil judging contests, this is based on a site area 100 feet square (10,000 square feet) marked by judges. See Figure 11.5. (Note: Distances given below do not quite match USDA guides, which are given in meters.)

Figure 11.5 – Stones at a Site



◊ **Not stony** – No stones or rocks are present, or there are too few (>100 feet apart) to interfere with tillage. Stones cover less than .01 percent of the area.

◊ **Stony** —There are enough stones to interfere with tillage, but not enough to make cultivated crops impractical. Stones cover .01–.1 percent of the area. Stones about 1 foot in diameter are spaced 30–100 feet apart.

◊ **Very stony** – There are so many stones that tillage of crops is impractical. The soil can still be worked for hay crops or improved pasture. Stones cover .1–3 percent of the area. Stones about 1 foot in diameter are spaced 5–30 feet apart.

◊ **Extremely stony** – Stones are so widespread that no agricultural improvements are possible. Some soils still have limited value as native pasture or range. Stones cover more than 3 percent of the area and are less than 5 feet apart.

◊ **Rubbly** – Stones cover more than 15 percent of the area and are less than 2.5 feet apart.

Rockiness

Rockiness refers to the amount of the land surface that consists of bedrock outcrops. A bedrock outcrop is not considered part of the soil, because (like stoniness) the pieces are so large that both fine earth and pore space are excluded from a large volume of the soil. Rockiness is an important site characteristic, however, because it influences cultivation and other forms of agricultural management.

Classes of Rockiness (Surface)

For soil judging contests, this is based on a site area 100 feet square (10,000 square feet) marked by judges.

◊ **Not rocky:** Rock outcrop covers <.1 percent of the area (<10 square feet or an area 2 x 5 feet).

◊ **Rocky:** Rock outcrop covers .1–2 percent of the area (10–200 square feet or an area 10 x 20 feet).

◊ **Very rocky:** Rock outcrop covers 2–10 percent of the area (200–1,000 square feet or an area 20 x 50 feet).

◊ **Rock outcrop complex:** Rock outcrop covers >10 percent of the area (>1,000 square feet or an area 20 x 50 feet, or one-tenth of the area). If rock outcrop makes up more than 10 percent of an area, it is usually mapped out on a soil map or included as a complex map unit (e.g., Clarksville-Rock outcrop complex).

Water Erosion

Water erosion is the removal of topsoil by runoff water on uplands. The hazard of soil erosion by water is a major concern for the management of cultivated soil because erosion damages both the productivity of the soil and the quality of the water in rivers and streams. Soil properties that affect water erosion are slope (steepness and length) and runoff. As both the steepness and the length of the slope increase, so does runoff and the rate of erosion.

Steepness and length of slope are the dominant soil properties causing erosion. When heavy rain falls on sloping soils, it does not have time to infiltrate the surface layer. So the steeper the slope, the greater the runoff. As the length of the slope increases, the runoff water increases in volume and speed, thus removing soil particles and carrying them down the slope.

Runoff is difficult to measure. Runoff is directly related to the surface soil texture, permeability and infiltration, soil depth, vegetative cover, and climate. See Table 11.2.

Table 11.2 – Soil Erosion

Soil Factors Affecting Erosion
Slope ◊ Steepness ◊ Length **Runoff** ◊ Surface texture ◊ Permeability and infiltration ◊ Soil depth ◊ Vegetative cover ◊ Climate

Texture

Of all the soil textures, silt loam is the most erodible. That is because the size of silt particles is just right for water to loosen and carry over the soil surface. Sand particles are too big to easily dislodge and move. Clays are so small and flat that they, too, are not easily dislodged.

Permeability and Infiltration

The infiltration (downward entry of water into the surface layer) of the surface horizon when the soil is thoroughly wet is closely related to the permeability. Deep, well-drained to excessively drained sands and gravel have rapid permeability and high infiltration rates. As soils become more clayey, the permeability rate is lower as is the infiltration rate of the surface. Addition of organic matter is the only effective way to improve the permeability and infiltration rate of the surface horizon.

Soil Depth

Another soil property that may affect erosion is soil depth. Soils that are shallow or very shallow (i.e., less than 20 inches to bedrock) are more erodible than deeper soils. The restrictive layers, like bedrock, fragipans, or heavy clay (e.g., montmorillonite) restrict water infiltration. The capacity of shallow soils to hold water is so low that the extra water quickly runs off. The less time it takes a soil to become saturated, the quicker erosion starts to take place. This increases the length of time during which additional rainfall could cause damaging erosion.

Vegetative Cover

Vegetation influences the erosion hazard. Solid-cover crops like pasture and hay reduce erodibility. They promote water entry, absorb the impact of falling raindrops, reduce the velocity of flow across the surface, and tend to bind soil particles together and hold them in place.

Forest clearcuts and clean-tilled row crops tend to increase erosion. In both cases, water drops strike soil particles directly, causing some breakdown of soil structure and reducing the rate of water entry into the soil. And without vegetation, there are no roots to hold the soil in place and no stems and leaves to slow down the velocity of water falling and running over the soil surface. Natural forests provide the best erosion protection, even on very steep slopes, because the O horizons have rapid infiltration rates.

Climate

Rainfall is an important climatic factor, but the total amount of yearly rainfall is far less important than the intensity of each storm. The intensity of individual rain storms affects erosion. Many storms are not particularly erosive because the rate of rainfall is slow enough to allow all the water to soak in.

Occasionally, however, it rains so hard that the soil cannot absorb the water fast enough. Runoff starts almost immediately, and the volume of runoff can be large. When this happens, tremendous volumes of soil not protected by vegetation can be lost by erosion. The result can be economic loss to farmers and degradation of the environment.

Summary

There are five major characteristics used in a site evaluation: landform, slope, aspect, parent material, and stoniness or rockiness. Landforms have characteristic shapes and are produced by natural geologic processes. Both slope steepness and slope shape are important considerations in a site evaluation. The six general landforms that commonly occur in Missouri are uplands, foot slopes, alluvial fans, flood plains, stream terraces, and sinkholes.

Slope is an important soil property because it affects the use and management of the soil. It is directly related to the soil erosion hazard, and influences a farmer's choice of crops and conservation practices. Percent slope is the percent of vertical change in elevation between two points, measured in the direction that the water flows over the surface. Steepness and length of slope are the dominant soil properties related to erosion. The steeper the slope, the faster the runoff, and the longer the slope, the greater the volume of water that removes soil particles and carries them down the slope.

Aspect is the compass direction that the slope faces. Vegetation on southerly aspects are exposed to the sun's rays for longer periods of time, which affects soil temperature, moisture, and vegetation.

Parent material can be identified by studying the landform and the properties of soil horizons (e.g., texture, color, rock fragments). Six kinds of parent materials are common in Missouri: residuum, alluvium, loess, eolian sand, glacial till, and colluvium.

Stoniness refers to the amount of rock fragments greater than 10 inches (25 cm) in diameter exposed on the soil surface. Stoniness has a great impact on agricultural management because it can interfere with crop tillage.

Slope (steepness and length) and runoff are the soil properties that affect erosion. As the steepness and the length of the slope increase, so does the runoff and the rate of erosion. Runoff is directly related to the texture, permeability of the surface horizon, soil depth, vegetative cover, and climate. Good vegetative cover can nearly eliminate soil loss, even on the steepest slope.

Credits

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