CONSERVATION OF THE SOIL

Lantern Slide Talk

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The soil, which we often speak of as the "dirt", is really one of the most valuable things we have, perhaps the most valuable. And why? Because in it we grow our crops - wheat and rye for our bread, corn and other cereal grains for our food, fodder for our cattle, vegetables for our table, trees for fruits and nuts, forests for wood. Without the soil these things could not grow, and without these things we could not live. That is why the soil is so important for us. Let us see how the soil is made, and so, let us go back to the beginning.

The earth is very old. Geologists, (those who study the earth) believe that it is at least 3,000,000,000 years old,(three thousand million years). At the beginning it was a ball composed of gases - nothing solid. Gradually those gases became liquids and last of all solids. (Just as water may be vapor, then on cooling liquid and then, with further cooling, solid ice.) But it took about a thousand million years for the earth to cool enough to become solid - at least for a crust to be formed upon it.

It is the crust of the earth on which we live that we wish to know more about. Although we do not notice it except in earthquakes, this crust is always in very slow motion, either up or down. This is caused by a gradual cooling and shrinking of the crust like the skin of an apple which is drying. How do we know the crust is in motion? By measurements. For instance, a part of the Scandinavian peninsula above Stockholm, Sweden,has risen 7 feet in 150 years, the Netherlands are slowly sinking, the coast of New Jersey is sinking at the rate of 2 feet in a century, and there are many other examples. But two feet a century is really very little. Can you figure out by arithmetic how much that is a year? and how much a month? But if this keeps on for a million years the change in level is very great. Such a small rise, even though it is only 2 feet in a hundred years, would produce mountains in 50 thousand years - not a very long time in the history of the earth.

This movement of the crust causes unevenness in the earth's surface, but there are two things (agencies) which also are working all the time which tend to make the earth's surface even. These things are called weathering and erosion. Weathering is the constant chemical and physical action of air, water, and sun on the earth's crust, causing crumbling of rocks and thus wearing down unevenness in the earth's surface. One of the results of weathering is the formation of soil which is made up of tiny rock particles, together with decayed vegetable and animal remains. Gradually, as a result of weathering, a blanket of soil covers over the hard rocks of which the earth is formed.

Another force or agency is continually carrying away the soil, at least the most fertile parts of it, which are at or near the surface of the ground. This agency is called erosion. Erosion is caused by (1) wind carrying soil from place to place, as in the awful dust storms of the middle west; (2)water of rivers, the ocean or of lakes, the currents of which carve out the land, carrying it off and putting it somewhere else; and (3) ice of glaciers - great sheets of ice which, advancing slowly but surely, smooth off rough places on the earth's surface, round out valleys and carry large quantities of rocks and soil from place to place.

These two things, weathering and erosion, are continually working together and tend to wear down the land, while the movements of the crust work in the opposite direction, tending to make the land's surface uneven.

The combined work of weathering and erosion causes denudation - that is, wearing away of the soil down to bed rock. If the soil removed by the Mississippi River were taken equally from every part of its drainage area, the surface of the Mississippi Valley would be lowered one foot in 6000 years. You say this is a long time. But in the history of the earth it is a comparatively short time.

We said that soil is extremely valuable to man because he grows his crops in it. He can not live without these crops. Therefore, he must try to save the soil and prevent erosion from carrying it off. This we call "conservation of the soil". There are many ways in which we can conserve the soil and prevent erosion. These are shown among the following slides.

1. This map of the U.S. shows the places where erosion of the soil is greatest and where it is lightest. For example, is there much erosion around New York City? Can you name a state where there is moderate erosion? Severe? How about Florida? California? (See the legend at the lower left hand corner.) What state or states have a good deal of very rough land which is not good for farming? Ans. (Colorado, Arizona and New Mexico).

2. This shows how the wind can carry fine particles of soil. Because of its light, sandy soil and open location this New Jersey field should hever have been planted with corn, but the soil should have been kept covered with good soil binders - grasses or trees.

3. Sometimes the dust storm gets so bad that it makes what is called a "Black Blizzard" as is shown here in the Southwestern U.S.

4. Here is a hillside worn away by a "black duster": no longer good for farming.

5. A farm, partly buried as the result of a "black duster".

6. Here is a sandy field in Texas planted with Gama Grass to prevent erosion by the wind.

7. Shows erosion of valuable soil through rain making gullies. Thus the good soil is beginning to be carried off.

8. This formerly bore a valuable crop of grass. Now, look at it! Rain water has carved small canyons in it.

9. Here is some of a Nebraska farm partly buried in soil carried by a flood in 1935. Erosion has carried away good soil to a place where it isn't needed.

10. Many acres have been ruined by erosion in these hillsides.

11. Here is much land near a stream which has been covered over with poor soil brought down by the stream in flood time. Many acres here are now worthless.

    Now, how can we prevent erosion? First, by planting the gullies and bare land with grass, vines, or some other growth that will hold the soil down by a thick mat of roots.

12. Here is a gully where much soil has been carried off. Now it has been smoothed off and planted with seed.

13. This shows the same gully 1 year later. The plants are holding down the soil.

14. Another gully in the Connecticut River Valley in New Hampshire which could be graded and seeded to prevent erosion. Gullies often start where the land surface happens to be lower. Here the rain water runs off and gradually digs a ditch for itself. Gullies may start in paths, automobile ruts, cattle tracks or furrows which happen to run up and down a hill.

15. This river in Vermont has stolen good soil from its banks - as much as 25 feet a year.

16. Here is the same bank now planted with willows. Now it resists any further erosion.

17. Poor, eroded soil in Georgia rapidly being washed away.

18. Same place planted with Kudzu vine (one of the pea family) the next year, holding down the soil and (by its root tubercles) making it more fertile.

19. A new road has been made here laying bare much soil which would quickly be eroded,

20. if it were not planted with grass and other plants as shown here. The roots of the plants keep the soil in place.

21. One of the best "ground covers" is grass, because it has a thick mat of roots, stands dry weather well, and is useful because cattle feed upon it.

22. Another slide showing grassland in Texas. There is no erosion here!

23. In order to provide a good seed bed, the land must first be plowed, that is turned over, the grass roots being now upside down. The plow is not unlike a snow plow, although it is smaller, the cutting edge is sharper and it is made of iron or steel. It is drawn by horses as in this slide, but more often, nowadays, it is drawn by a "tractor" driven by a gasoline engine.

24. Here 6 horses are drawing the harrow. For, after plowing, the land must be "harrowed", that is, the big furrows must be broken up into fine soil.

25. This plowing, (being done, by the way, by a tractor,) is proceeding along the contour of the land, that is, on sloping land it goes sideways, at right angles to the slope, making little ridges which hold the water back and prevent it from washing down the slope (see slide 7). This is called "terrace farming". This Pennsylvania farmer is showing his children how to plow a terrace.

26. This is an aeroplane view of "strip cropping" in Pennsylvania. The bands of green are grass, while the yellow bands are grain fields. In this way a strip of land is planted to grass or some "cover" crop which acts as a soil binder, the next strip is planted to grain, etc. These strips follow the contour lines.

27. But on hillsides terraces are formed with different kinds of crops. These terraces, since they run sidewise, prevent the run-off of the rain and thus prevent the formation of gullies.

28. In harvesting wheat as in this picture the contour lines are followed so that, if rains should occur, there will be less opportunity for erosion.

Erosion can also be prevented by planting trees to form forests.

29. This shows some land in West Virginia which was badly eroded.

30. The same place a few years later after many trees have been planted stopping the wearing away of the soil.

31. A good stand of trees in Illinois. These hold the water in the soil and the thick mat of decaying leaves on the forest floor acts like a sponge, holding the water.

32. A good growth of young pine in George on the way to become a forest.

33. A good stand of trees here in Pennsylvania. No erosion.

34. This is a hedge of small bushes which prevents erosion if planted on the contour line.

35. If sheep or cattle are allowed to graze in the forests in the

spring they often do much damage, as here, and erosion is apt to result.

36. During the last century much of our land became unfit for farming because of erosion, and people moved to better land farther and farther west. Here is an advertisement in 1860 urging the people to travel up the Mississippi to new rich farming lands of Minnesota. But now our country is pretty well settled, from coast to coast, so that we must be careful in our treatment of the soil. Only by such care can we continue to be a happy, prosperous nation.