The Flood of March, 1913, Along the Ohio River and Its Tributaries in Southeastern Indiana.

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Upon investigation it was found that the floods of the tributaries of the Ohio River in southeastern Indiana, resulting from the unusual rainfall of March 23-27, 1913, were not so remarkable as those of the streams of central Indiana and Ohio.

Two reasons may be given for this. The first is that the precipitation in the basins of the tributaries of the Ohio in southeastern Indiana during the above period did not exceed seven or seven and a half inches, except in very small areas. In the basin of the tributaries of the east and west forks of White River the rainfall in places reached nine or more inches during the same period. The second reason is, that while the precipitation was excessive, yet the heaviest showers of two or three inches, coming within a period of a few hours, were sufficiently separated in time to permit the "immediate runoff" to pass into the larger streams and on to the Ohio River. This was done the more readily inasmuch as the gradients of the tributaries of the Ohio in this region are very high. In these streams a period of a few hours only is needed to carry off an excess of water that in the more level parts of central and northern Indiana would require almost as many days.

Two or three excessive rainfalls of this period added greatly to the destructive erosion of the steep hillsides, where unprotected by forest growth or other vegetation. The soil of these slopes, loosened by the winter's frost and in too many cases entirely without protection, was swept away by the hundreds and thousands of tons. Along with the finer materials much gravel and small stones were deposited over the valuable bottom lands along the larger streams, adding greatly to this destructive work which has taken place during every great flood since the forests were removed from the hills.

The flood of the Ohio River during early April, resulting from the rains of March, was not the greatest known, being exceeded by that of

1884. That of March, 1913, however, was noted especially in two respects, viz: the remarkable rapidity of its rise, and the very great quantity of sediment carried.

From ten days to two weeks are usually required for the Ohio River to reach a flood stage such as that of March, 1913, but in that case such was the rapidity of the rise, that flood stage was reached in four or five days. Because of the unusually rapid rise there was a destruction of movable property much greater than ordinarily occurs.

Slide Covering Madison and Hanover Pike.

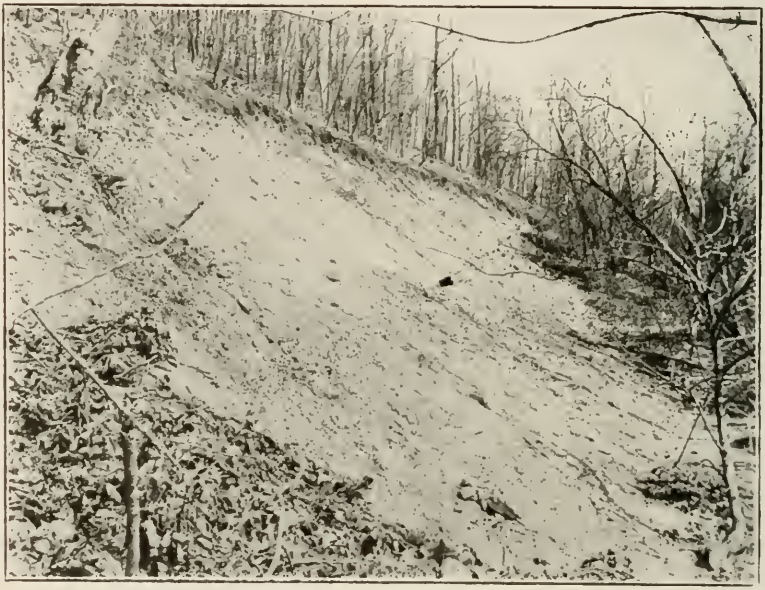
The deposits left on the bottom lands of the Ohio by the floods of last March were by far the greatest known. In many places the silt or mud was laid down to the depth of six, eight, and even twelve inches. The immediate effect of this deposit was the complete destruction of all wheat and alfalfa growing in the bottoms below high water mark, where covered with flood waters for several days. In many of the Ohio bottoms alfalfa is one of the most valuable crops and its destruction was a serious loss to the farmers. Where the soil could be broken and cultivated all the bottom

lands, whether previously sown to wheat or alfalfa, were plowed and planted in corn. Where the deposits were eight to twelve inches, however, and in some cases even of less depth, it was found to be impossible to get the soil in condition for a crop in 1913, a winter's freezing and thawing being necessary to produce the proper texture in the soil for the cultivation and production of a crop. The materials, soil and silt, left by the 1913 flood, like all those of more recent years, are found to be not nearly so fertile as were the deposits of the past, when much of the basin of the Ohio was still largely forested.

Landslide on Steep Hillside Upon Which Tobacco Had Been Grown. This Picture Shows a Great Mass of Soil, etc., Heaped Up Below the Break.

The most important results of the very unusual precipitation of last March, on the steep slopes of the Ohio and its tributaries in southeastern Indiana, from a geological standpoint and probably from an economic also, was the very great number and size of the landslides. Those occurring as a result of the rains of last March were tenfold more numerous than those following any heavy rains of the past. Every few hundred yards along the slopes facing the Ohio and its larger tributaries, these slides occurred.

In some places great cracks extending for several hundreds of feet were formed in the earth, and the soil moved a few feet only. In other places hundreds of tons of soil broke away to the depth of from three to five or six feet, and moved to more gentle slopes below, leaving a great tangle of soil, roots, branches and trunks of small trees in huge mounds. Valuable tobacco or other lands were rendered unfit for cultivation, or roadways were so completely covered that the use of dynamite alone could remove the material and open the roads for traffic.



Slide Covering One-half Acre on a Slope Covered with Growth of Small Trees.

In other cases the slides began well up the slopes and continued to the bottom of the valley, carrying hundreds of tons of rocks, soil, and vegetable debris. The slides were fully as frequent on the forested slopes where the larger trees had been removed, and only shrubs and small trees remained, as on the hillsides covered with blue grass. In a few cases it was noticed that a black walnut or a white oak, although not more than a foot in diameter, was able to hold the soil even in the midst of a comparatively large landslide. The large tap roots of these trees extended far

below the materials loosened, and hence held their positions and the soil embraced by them.

Very much more extensive than the slides themselves was the creep of the hillside soils. The effect of the creep was the removal of thousands of tons of soil on a single slope to the distance of a few inches or a foot or so down the slope.

The one great lesson taught by the excessive rainfall of March, 1913, so far as the steep slopes of southeastern Indiana are concerned, is that

Extensive Slide on a Steep Slope Covered with Blue Grass Sod.

the only adequate protection against disastrous soil loss is in the reforestation of such localities with the larger varieties of trees. The planting of such trees as the black walnut and the white oak and others with very large tap roots is especially desirable.