

EFFECT OF SILT ON NATURAL VEGETATION AND DRAINAGE IN THE FLOOD PLAIN OF DEEP FORK OF THE NORTH CANADIAN RIVER, LINCOLN COUNTY, OKLAHOMA

HORACE J. HARPER and LONNIE E. ROSE

Oklahoma A. and M. College, Stillwater

A drainage ditch excavated in the valley of Deep Fork of the North Canadian River from the central part of Oklahoma County to the east side of Lincoln County to increase the rate of flow and capacity of the channel was completed in 1923. Increasing the velocity of water in the stream channel has permitted flood water to flow more rapidly. As a result of this condition, large quantities of sand, silt, and clay carried into the valley by the erosion of soil from the upland and from the stream banks have been deposited on the Deep Fork flood plain in the western part of Creek County. Log jams have blocked the channel in this area and alluvium has been deposited to a depth of 10 or 12 feet. Shallower deposits extend eastward for several miles. A report of soil and vegetative conditions in this area was made by Harper (1938) and by Featherly (1941).

The gradient of the Deep Fork valley is very low. Data obtained from U. S. Geological Survey maps show that the slope of the flood plain is approximately 2.5 feet per mile in the central part of Creek County, 2.9 feet per mile southwest of Chandler and 3.4 feet per mile southeast of Chandler.

A deep silt deposit across a stream valley acts very much like a dam. It decreases the velocity of the water above the point of silt accumulation and additional quantities of alluvium are deposited from flood water. This condition has occurred to such an extent that at the present time the eastern part of the drainage ditch in Lincoln County has been filled or partly filled for several miles and sediments have accumulated to a depth of several feet on several sections of land. A planimeter measurement of the bottom land shows that approximately 2800 acres in Creek County and 4200 acres in Lincoln County have been covered with deep deposits of recent alluvium.

Measurements taken at different locations in the Deep Fork drainage channel, beginning southwest of Chandler and extending eastward to the Lincoln-Creek county line, are given in Table I. These measurements show that the stream channel is much shallower east of Sparks than in the central and western parts of Lincoln County. When the drainage ditch was dug the earth was piled on each side of the channel forming levees frequently more than 20 feet high. The width of the channel has been increased in many places by stream bank erosion and the levees have been washed away; consequently a very small rise will flood the adjacent land.

Much of the recent alluvium in Lincoln County has been deposited during the past five or six years. Soil samples collected from the SW $\frac{1}{4}$ Sec. 16, T. 14N, R6E in 1939 were obtained among healthy pecan trees. At the present time the combined effect of silt accumulation and a rise in the water table has destroyed these trees. The channel of Deep Fork west of the Sac and Fox Agency had not been filled appreciably in 1939. At the present time the water is only a few feet below the floor of the bridge.

The flood hazard on many farms has increased not only in the Deep Fork valley but also along the tributaries flowing into this area. A con-

siderable area of farm land has been abandoned because of poor surface drainage and frequent overflow.

TABLE I

Effect of silting on the depth of the Deep Fork Drainage Ditch in the eastern part of Lincoln County, Oklahoma.

No.	Location	Depth in feet below adjacent flood plain
1	NW¼ Sec. 24, T. 14N, R3E	8.00
2	NW¼ Sec. 33, T. 14N, R4E	10.89
3	NW¼ Sec. 34, T. 14N, R4E	9.45
4	NW¼ Sec. 35, T. 14N, R4E	6.81
5	SE¼ Sec. 36, T. 14N, R4E	3.87
6	SW¼ Sec. 5, T. 13N., R5E	9.48
7	NE¼ Sec. 10, T. 13N, R5E	9.48
8	NW¼ Sec. 5, T. 13N, R6E	6.80
9	NW¼ Sec. 28, T. 14N, R6E	3.20
10	SW¼ Sec. 15, T. 14N, R6E	2.99
11	NE¼ Sec. 15, T. 14N, R6E	3.55 ^a
12	SW¼ Sec. 11, T. 14N, R6E	1.96 ^a

^a Heavy silting in this area on each side of stream channel. Levee destroyed and water level about 2 feet above original soil in valley.

The important problem is to determine how far silting will continue up the channel of Deep Fork and render a large acreage of cultivated land unsuitable for cultivation because of increased flood hazard. Theoretically, a fill of 8 or 10 feet in Creek County and a fall of 2.5 feet per mile in the stream valley should not increase the rate of silting or flood hazard more than 8 or 10 miles upstream.

If erosion of upland has been the important source of these sediments, the quantity of alluvium should decrease since the acreage of cultivated land in Lincoln County was reduced from 273,904 acres in 1924 to 211,240 acres in 1939. Normally the steeper slopes which erode most rapidly are the first to be abandoned.

It would appear that crops which can be planted after floods are likely to occur would be the best for this particular area. It is difficult to grow corn or cotton on land which is subject to flood damage in May or June. About the only crops which can be planted in late June are sorghum for forage or grain or a summer legume, such as cowpeas or mung beans. Annual weeds are the dominant type of vegetation on areas not covered by trees; consequently uncultivated areas have little value for pasture. Where power machinery is available a seed bed can be prepared in a short period of time when soil conditions are favorable for tillage. This is an important factor in the utilization of the clay soils in this area. One sample of alluvium collected about 200 feet north of the drainage ditch in the SW¼ Sec. 11, T. 14N, R6E contained 67 percent of clay and 2.2 percent of organic matter. This is not an uncommon condition in the ponded areas in this valley.

Pecan production was the chief source of income on many farms in this part of Deep Fork valley before the drainage project was started. Deep deposits of alluvium and a subsequent rise in the water table killed thousands of pecan, walnut, oak, and elm trees. The present forest cover, composed principally of willow, ash, and cottonwood, has very little economic value except for firewood.

If a drainage channel could be dug through the silted area and kept open, this land would not be affected as much by overflow as formerly. Although all the drainage district bonds have been paid, some of the land

owners affected are not interested in a second drainage project unless soil erosion from the upland can be controlled and an adequate outlet for drainage water can be provided. As the silt accumulations tend to approach a static condition in the eastern part of this area planting desirable species of post timber or pecans may be the best land use under present conditions.

LITERATURE CITED

- Featherly, H. I. 1941. Silting and forest succession on Deep Fork in southwestern Creek County, Oklahoma. Proc. Okla. Acad. Sc. 21:63-64.
- Harper, H. J. 1938. Effect of silting on tree development in the flood plain of Deep Fork of the North Canadian River in Creek County. Proc. Okla. Acad. Sc. 18:46-49.
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