K-STATE Research and Extension
Biological and Agricultural Engineering

Reclaiming Flooded Land with Tillage

When the flood water recedes, a landowner may be surprised or even shocked at the damage left behind. Damage may range from erosion in some locations to sand and debris deposits in other areas.

Bringing flooded land back to pre-existing production levels depends largely on the type and degree of damage. Before tilling agricultural land, check with the Natural Resources Conservation Service (NRCS) to determine whether the land is classified as highly erodible (HEL). The conservation compliance plan for your land may require residue cover. Failure to maintain proper residue levels for erosion control could result in a loss of USDA program benefits, including Conservation Reserve Program (CRP) and/or disaster aid payments.

Photo by Keith McCall, USDA Natural Resources Conservation Service.

A field following a flood.

On upland soils, severe erosion such as gullies, rills, and terrace breaks may have occurred. Contact your NRCS/ Conservation District office before tilling or making repairs because cost share may be available. In stream valleys high in the watershed where slopes are steeper, scouring in the floodplain is common. If these soils have eroded, reclamation may require some or extensive earth moving.

In river valleys, sand deposits are common. When sand deposits are thin, reclaiming land with tillage equipment or an on-farm earthmover is usually possible and practical. However, if the layer is deeper and more widely spread across the field, you may need deep plowing or even removal of deposits. Economic considerations of reclaiming land are addressed in K-State Research and Extension Publication: *Should You Repair Flood-Damaged Land*, MF-1153.

Incorporating sand deposits into underlying soil may make the soil more susceptible to future wind and water erosion than the original soil would have been. A cover crop, strips of tall vegetation, or a wind break helps protect soil from wind erosion during the winter and early spring.

The information on the back page is provided as guidance for field operations needed to reclaim land with sand deposits.

Photo by Charlie Rahm, USDA Natural Resources Conservation Service.

Soil scientists evaluate flood-deposited sand.

Contractors use deep plows to help restore productivity to a field of deep sand.

Suggested Plowing Depth to Incorporate Flood-Deposited Sand

Texture of soil layer beneath the sand	Thickness of sand deposit (inches)						
	2	4	6	12	18	24	30
Clay, Silty Clay, Sandy Clay	4	8	12	25	37	50	62
Clay Loam, Sandy Clay Loam, Fine Sandy Loam	4	7	11	22	33	44	55
Loam, Silty Clay Loam, Very Fine Sandy Loam	3	6	9	18	28	37	46
Silt Loam	3	6	8	17	25	33	42
Sandy Loam	6	12	19	37	56	74	–

Note: When the underlying soil is a sand or loamy sand texture, tillage will not improve the water holding capacity.

Sand Deposits

Depending on the duration, velocity, and extent of flooding, millions of tons of sand can be deposited in floodplains. During the 1993 floods that affected nine Midwestern states, sand deposits ranged from a few inches to more than 8 feet deep. Water-sorted sand deposits typically have low water-holding capacity with low organic matter and nutrients. These deposits can greatly impact soil productivity.

When the farm is affected by sand deposits, producers need to assess conditions of each field (or areas of a field) separately. The depth of sand deposits, total area affected, and texture of underlying soil layers are critical factors. Soil surveys, along with knowledge of the farm, are useful in assessing pre-flood soil conditions. Contact your local NRCS office for assistance in obtaining a soil map for your property, or view soil survey information online using the NRCS Web Soil Survey at *http://websoilsurvey.nrcs.usda.gov/app*.

Shallow Deposits

For deposits of less than 4 to 6 inches, a chisel with twisted points or a moldboard plow can be used for incorporation. A moldboard plow should adequately incorporate deposits in one pass, while the chisel may require multiple passes. Tillage depth for either implement should be 10 to 12 inches. When deposits are deeper than 4 inches, but only cover a limited area of the field, the sand should be spread over an area large enough that the depth does not exceed 4 inches. The sand is then incorporated into the underlying soil.

Deep Deposits

If a large area or the entire field is covered with more than 4 to 6 inches of sand, normal farm-tillage tools generally will not do the job. The deposits can either be removed, or a large inverting/incorporating plow (operating much deeper — 2 to 5 feet) can be used. If the sand deposits are uneven, spreading them prior to tillage typically reduces the necessary tillage depth and cost. The table above shows suggested plowing depths based on depth of sand and the underlying soil texture.

The power required for deep tillage is related to tillage depth and speed and can be extremely high. Plowing 5 feet deep at 3 mph requires approximately 400 horsepower for steel-tracked tractors, while plowing 2 feet deep requires about 150 horsepower.

Agricultural tractors are not recommended for deep plowing because they have difficulty generating traction on deposits and they are usually not designed for slow speed lugging. These tractors typically operate at higher speeds (4-6 mph). Construction machines are a better choice because they are designed to operate under high loads at low speeds. Operating agricultural tractors at low speeds and with high drafts can lead to drive-train failure.

Summary

Flooded land can be reclaimed and put back into production, but the cost to do this can become quite expensive. Evaluate each field or area independently and consider all options before making any decisions. Check with your NRCS/ Conservation District and Farm Service Agency offices for information concerning compliance with farm programs and availability of cost share. Carefully evaluate the cost before committing to restoration.

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