

A long-lived success under Recent Stress (Nile Floodplain)

- Agriculture in the Nile River floodplain because it provide irrigation with no canals and little soil eroded
- Fine textured and fertile sediments from erosion in Ethiopia were deposited in the Egyptian floodplain
- The Aswan High Dam built in 1970 has
 - > Removed fertile sediments
 - > Increased erosion
 - > Increased fertilizer use and water quality degradation

The American Dust Bowl

- Settlement of the high plains was encourage after the civil war
- A wet period encouraged this settlement and cultivation of the area.
- Another wet period occurred in the 1920
- This corresponded to a dramatic increase in wheat prices and mechanization of farming

The Plow that Broke the Plains

- <http://www.youtube.com/watch?v=fQCwhjWNcH8>
- Very good about black Friday and Hugh Bennett
 - > <http://www.youtube.com/watch?v=psVsc74DLIE>

Black Sunday Article

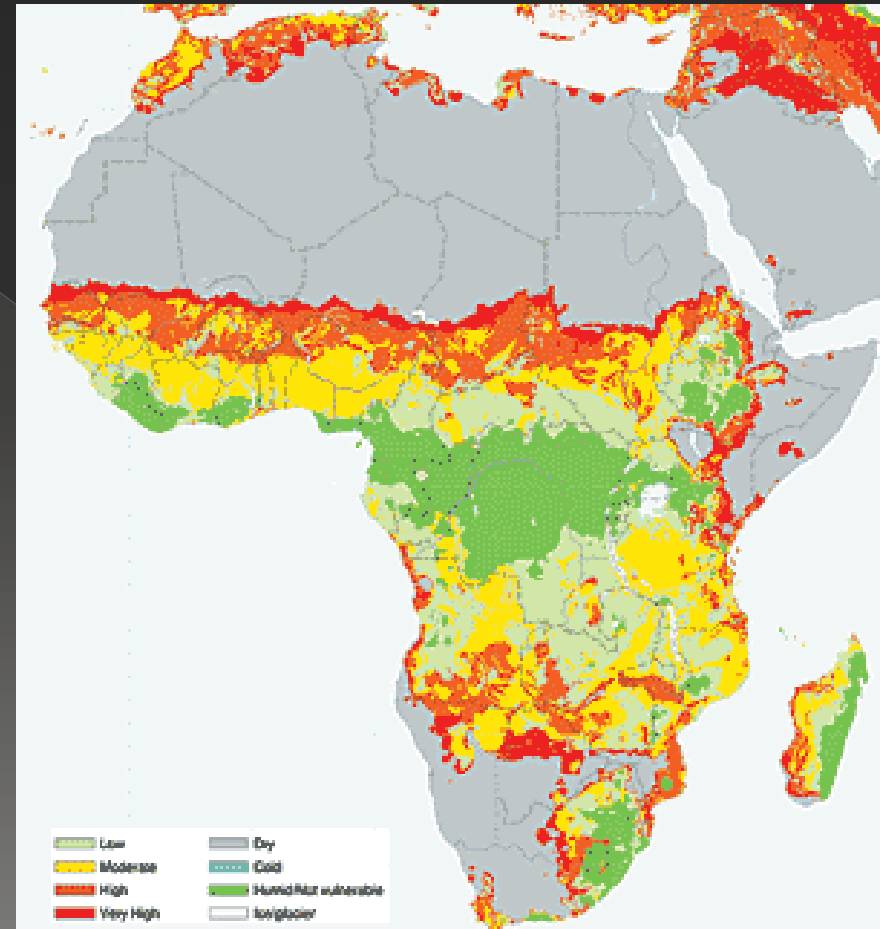
- A dust storm occurred which carried soil from the high plains to Washington DC.
- It arrived during a congressional hearing where Hugh Bennett was requesting for the formation of the Soil Conservation Service.
- The SCS was created before the end of the year.
- <http://www.srh.noaa.gov/oun/?n=blacksunday>

Graham-Hoeme

- <http://www.asabe.org/awards-landmarks/asabe-historic-landmarks/graham-hoeme-chisel-plow-38.aspx>

There are Numerous examples of Current Soil Degradation

- ◉ Turkmenistan
- ◉ Gobi desert in China
- ◉ Sub-Saharan Africa



Desertification, Gobi Desert in China

- ◉ Dust Cloud
- ◉ Estimates predict that around 950 square miles of land become desertified on a yearly basis (Reference)

Desert Expansion in Gobi



West Texas Dust Storm 10/17/11

- <http://www.youtube.com/watch?v=fDgsrbri-8k&feature=related>
- <http://www.youtube.com/watch?v=CZ8XZ3L2Fe8&feature=fvsr>
- <http://www.youtube.com/watch?v=fDgsrbri-8k&feature=related>

Water erosion: On-Site Problems (Section 1.5.1)

- ◉ Loss of topsoil
- ◉ Nutrient depletion
- ◉ Loss of organic Matter
- ◉ Direct crop damage
 - > Burial
 - > Scouring





This gravel was likely below the surface after the last tillage event
Erosion removed at least 0.25 inches or **37 tons** of soil per acre



Burial by sediment is another localized form of damage



Scouring will remove the crop and soil!!!

Off-Site Problems

- ◉ Nutrient and pesticide pollution
- ◉ Sedimentation of water bodies
- ◉ Alteration of landscape characteristics



Types of Soil Erosion

- ◉ Spash
- ◉ Interrill erosion
- ◉ Rill Erosion
- ◉ Gully
 - > Ephemeral and permanent

Splash erosion

- Displacement of soil particles resulting from the impact of a raindrop
- Provides most of the detachment energy for water erosion
- Sand on solid surface
- In sand

Interrill erosion

- Transport of sediment between rills
- When combined with splash erosion it is referred to as Sheet erosion
- Sheet erosion is the most common type of erosion despite being difficult to see.
 - > Makes up about 70% of total erosion

Rill Erosion

- Erosion that occurs in small channels formed by concentrated flow.
- Channels can be removed by tillage
- Rills generally occur between crop rows or along tillage marks



Rill Erosion

- ◉ Second most common form of water erosion
- ◉ Erosion occurs at a fast rate in channel but total erosion is small compared to sheet because the surface area is small
- ◉ Frequency is also lower than sheet erosion

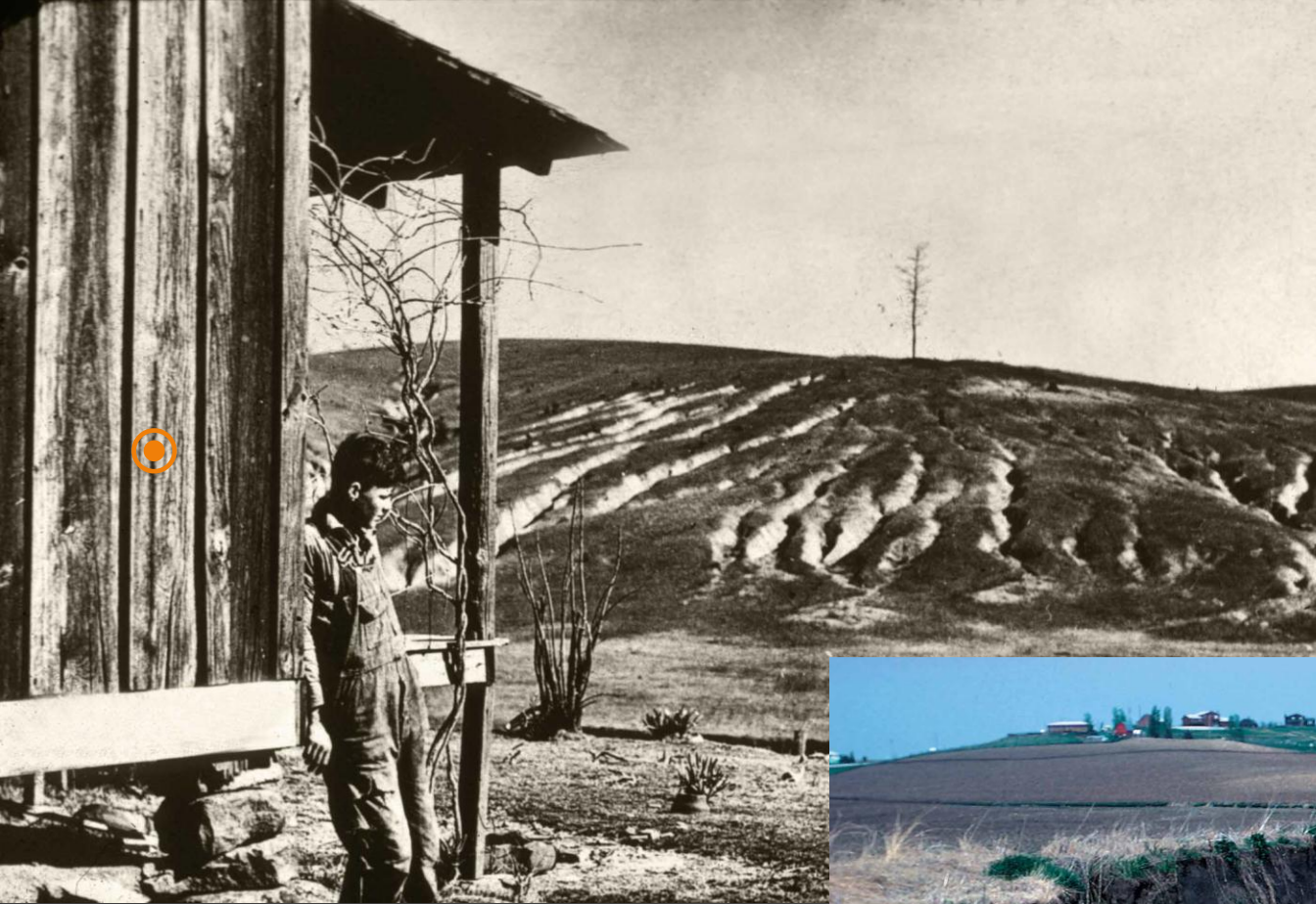
Ephemeral Gully Erosion

- A rill channel that occurs in the same location in the field after each erosion event.
- Will cut through tillage and planting rows due to landscape position
- Can be removed by normal tillage



Permanent Gully

- ◉ Can not be removed by normal tillage
- ◉ Can result in the removal of the whole soil profile in localized area
- ◉ Least common form of water erosion but the most dramatic.
- ◉ Very uncommon in U.S. cropland because of terraces and grassed waterways.



Stream Bank Erosion

- Collapse of banks along streams, creeks and rivers
- Intensive cultivation, grazing, and traffic along streams and the lack of riparian zones accelerate this process
- Can also result from artificial changes in stream channel



Erosional Processes

- Detachment
- Transport
- Deposition

Detachment

- Raindrops provide most of the energy for detachment.
- A single raindrop won't do much to detach particles from a stable soil aggregate
 - > It is more difficult to detach clay particles because they generally form more stable aggregates.

Detachment

- ◉ Detachment is accelerated in wet soils because aggregates can become dispersed
- ◉ In addition to splash erosion, scouring is a form of detachment caused by runoff.
- ◉ Although dramatic scouring represents a small fraction of erosion
 - > Can be responsible for much of the off-site damage because of high velocity water flow (Stream bank erosion)

Transport

- Interrill, rill, and gully erosion
- Again interrill is the most common
- Small particles are transported more easily
 - > Clay and organic matter are preferentially removed
- Coarser particles are left behind, potentially changing the texture of the surface soil
- Nutrient laden clay and organic matter particles are removed.



Sheet erosion will leave the sand and gravel behind.
Effectively changing the texture of the soil surface

Deposition

- Deposition can cause damage to drainage ditches, reservoirs, and down slope crops
- Can create highly productive soils

