United States Department of Agriculture
Natural Resources Conservation Service

USDA NRCS

A Discussion of Soil and Water Conservation on Alluvial Fans, Hill Torrents, and other Water Courses in the North Western Frontier, Pakistan

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75 Years A Legacy of Conservation
Helping People Help the Land
USDA-NRCS

A brief note about the USDA-NRCS

- The USDA-Natural Resources Conservation Service is an agency of the US Department of Agriculture.
- The USDA-NRCS works with private landowners (70% of the US)
  - The USDI—US Department of the Interior works on public lands in the US.

OUTLINE

- USDA, Historical perspectives in conservation
- USDA today: conservation experience, tools, programs
- NW Frontier of Pakistan, development of Action Plan and Demonstration Projects

USDA, Historical Background

- USDA-NRCS, Born from Disaster: Dust Bowl, 1930s
- People demanded that the government respond
- USDA-Soil Conservation Service formed in 1935

USDA, Historical Background Civilian Conservation Corps (CCC)

- Stream restoration, during construction
- Hand tools used to shape the bank
- Rock rip rap dumped and then placed by hand

USDA, Historical Background Civilian Conservation Corps (CCC)

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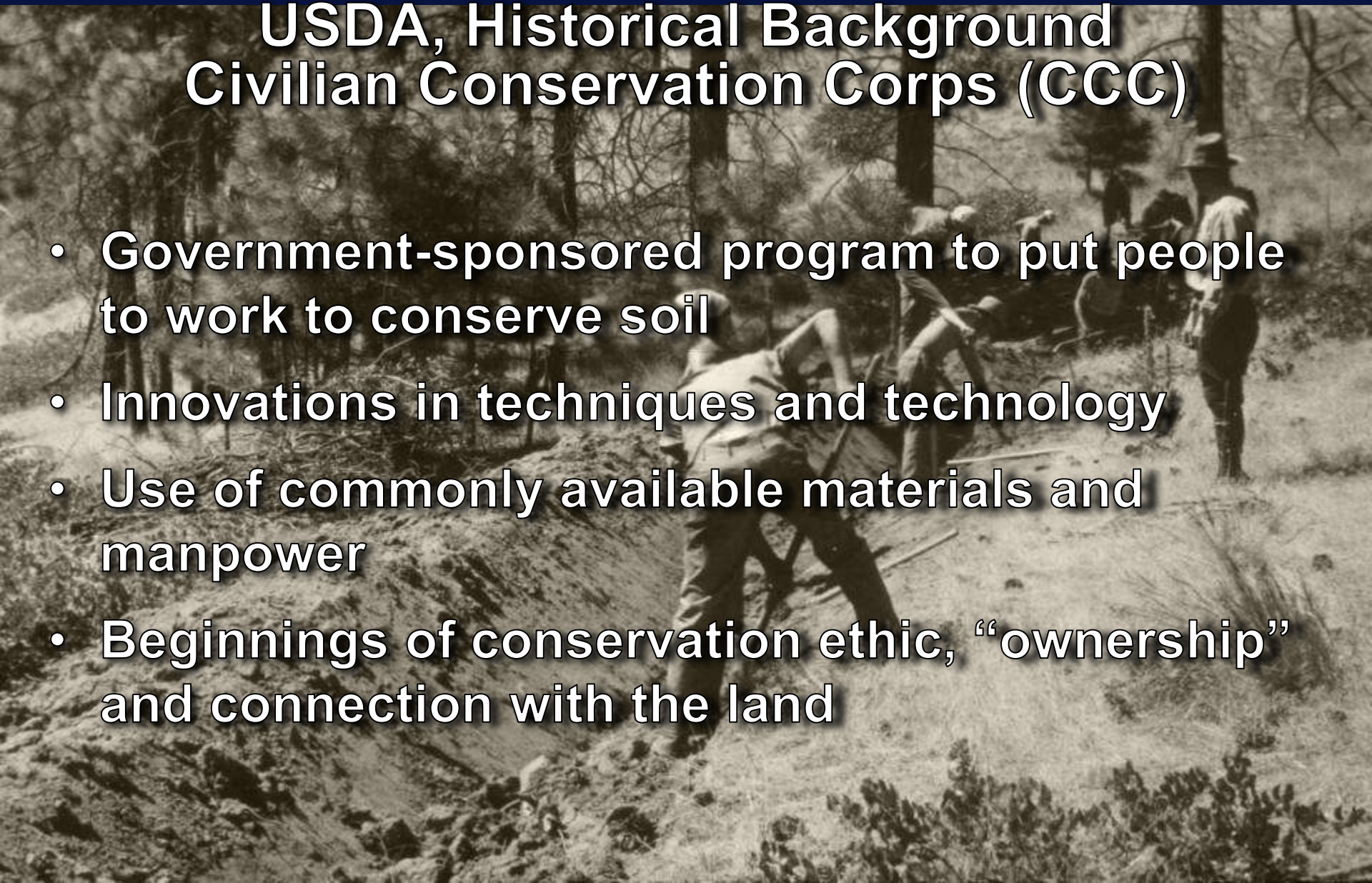


- Government-sponsored program to put people to work to conserve soil
- Innovations in techniques and technology
- Use of commonly available materials and manpower
- Beginnings of conservation ethic, “ownership” and connection with the land

USDA Capabilities

- USDA experience and expertise in the USA and in other countries
- Planning, designing, and implementing conservation practices and systems
- Voluntary programs
  - Cost sharing
- Technology and tools
  - Handbooks
  - National practice standards
- Training, workshops

Alternative Treatments

- Water management and conservation
  - Irrigation water management
  - Cropping systems that emphasize infiltration and moisture-holding capacity
  - Water supply
- Erosion protection
  - Land management
  - Stream courses
- Flood water management
  - Hill torrent effects on structures and required designs

Example of Integrated Watershed Approach

- Conservation cropping practices
- Structural practices
  - Terraces
  - Flood water retarding dams
- Complementary designs
  - Conservation cropping systems reduce runoff and increase infiltration
  - Terraces reduce runoff and increase infiltration
  - Flood water retarding structures are designed to hold the runoff water

Location: Iowa, Central US

Water Management
Irrigation

- Small scale
- Low tech

- Large scale, high tech.

Erosion Protection: Land Management

- Planned grazing, rotational grazing
- Support water supplies


Location: Central US


Location: Western US

Erosion Protection: Land Management

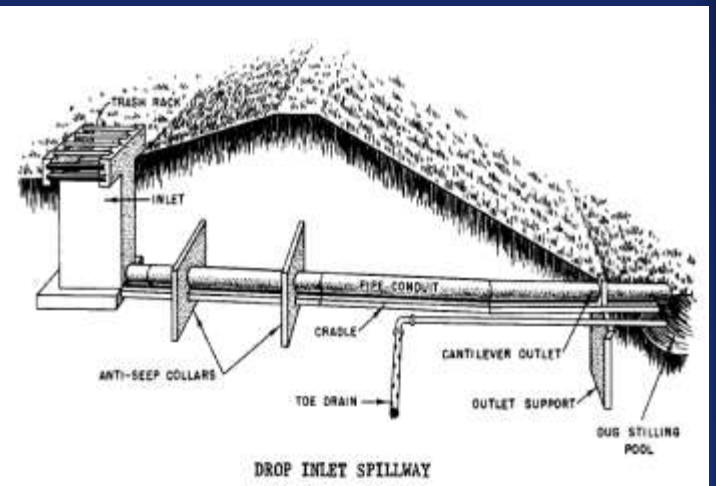
- Reforestation and forest management

Location: US


Location: Afghanistan

Erosion Protection: Land Management

- Structural practice: Water and sediment control basins
- Terraces
- In series



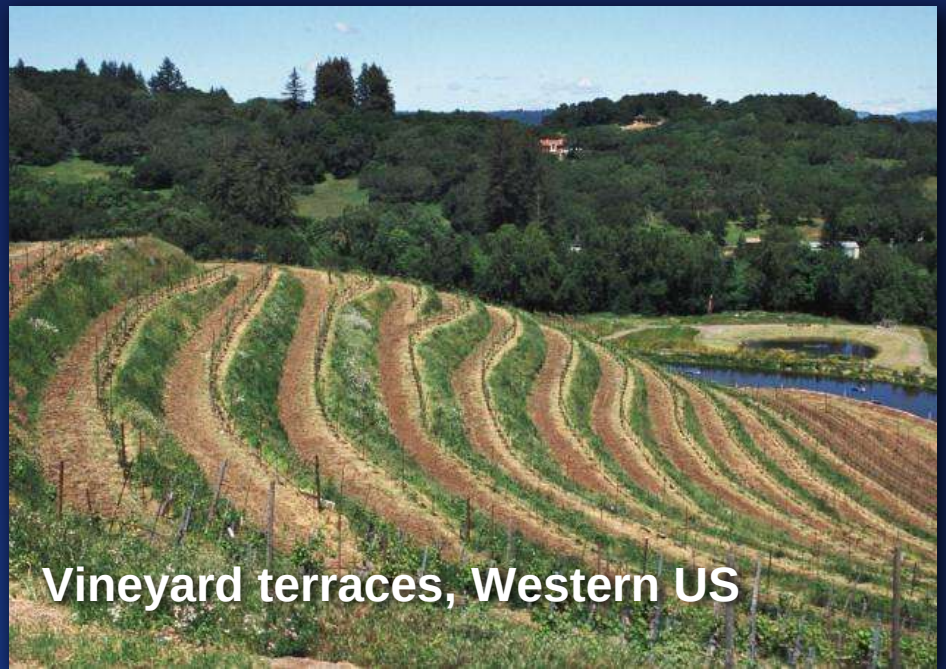
DROP INLET SPILLWAY


Location: Western US

Erosion Protection: Land Management

- Structural practice: Hillside Ditch
  - A diversion
- Structural practice: Terraces

Location: Western US



Vineyard terraces, Western US

Erosion Protection: Land Management

- Structural practice: Check dams

Straw bales. Western US

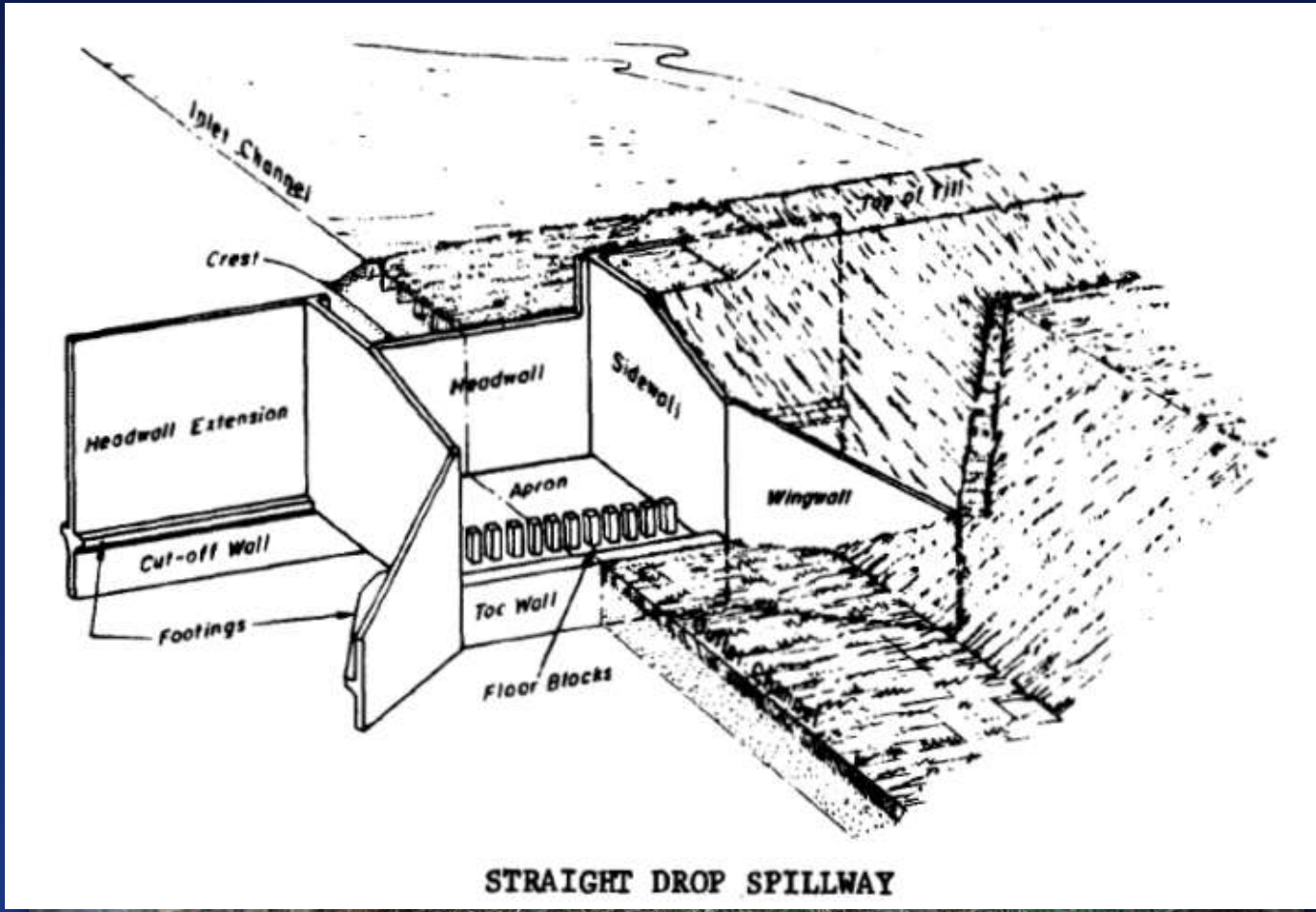
Rock with vegetation. Afghanistan

Rock gabion structure. Afghanistan

Check dams in series: Afghanistan

Erosion Protection: Land Management

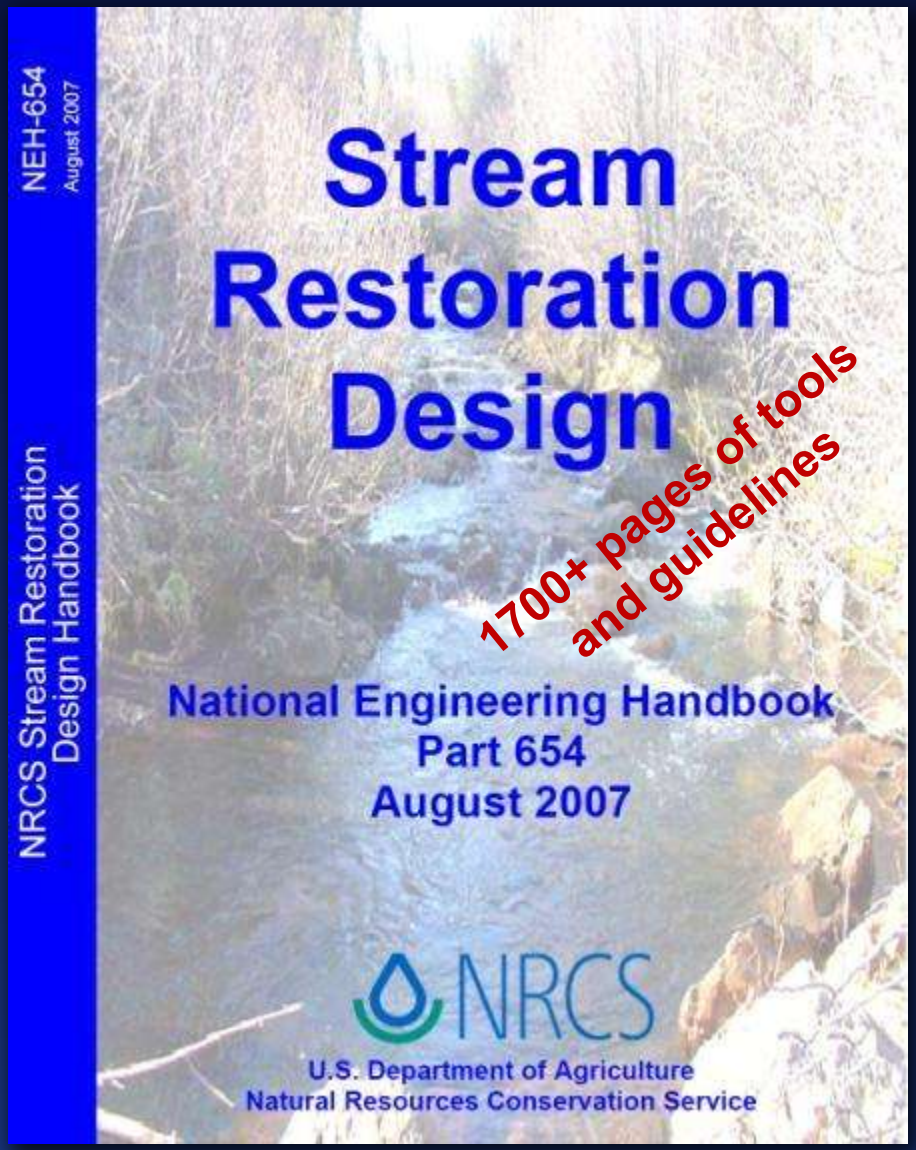
- Structural practice: Grade control structure



Erosion Protection: Land Management

- Structural practice: Rock gabion check dams

Location: Afghanistan



http://directives.sc.egov.usda.gov/

Floodwater management

- Floodwater storage and retarding with dams
  - Designed with capability for hill torrents or large runoff events to pass over, through, or around dams
- Flood warning and flood damage reduction
  - Systems incorporate rain gages, stream gages, and expert hydrologists to analyze information and to issue alerts or warnings
  - Construction to prevent damage to property

Floodwater management

- Floodwater storage and retarding with dams
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Floodwater management

- Floodwater storage and retarding with dams
  - About 11,000 small floodwater retarding dams built in the US through USDA-NRCS assistance.

Floodwater management

- Flood warning and flood damage reduction
  - Systems incorporate rain gages, stream gages, and expert hydrologists to analyze information and to issue alerts or warnings, to get people out of harm's way
  - Construction to prevent damage to property

Location: Louisiana, post-Hurricane Katrina

"Watershed" Concept

- Structures planned to complement conservation land treatment practices
  - Dams, grade control structures, etc.
- National programs for administration
- Cost-sharing
- Local sponsors "own," maintain, and operate
- Continuous process
  - Age, wear and tear
  - Changed safety standards
  - Land ownership changes

Technology Transfer

- Workshops
- Direct Assistance

Locations: Afghanistan

NW Frontier, Demonstration Sites Alternative Treatments

- Contour bunds and barriers
- Check dams
- Percolation Pond, Dams
- Hillside ditches, terracing, and stream bank stabilization
- Sediment traps to create new soil.
- Reforestation, revegetation

Demonstration Areas: How to proceed?

Recipe for Bread

- Flour
- Oil or butter
- Water or milk
- Salt
- Optional ingredients
  - Eggs
  - Honey
  - Nuts
- Person to make the dough
- Person to bake the bread

Recipe for Conservation

- Fertile soil
- Good seed
- Nutrients
- Water
- Sunlight
- Person to manage the soil
  - Nutrients, amendments
- Person to plan the crop
  - What, how, where to plant
  - Conservation cropping system

Demonstration Areas: How to proceed?

- Local leadership is key
- Basic soil and water resource information
- Problem identification and ranking
- Formulating realistic objectives
- Evaluating alternative treatments
  - Which have best chance of success?
  - Combinations of structural and land management
- Proper design—"fitting" solutions to landscape
- Proper construction—oversight
- Maintenance and adaptive management

NW Frontier, Demonstration Sites, Limitations and Alternatives

- Soil Quality?
  - Can it grow anything with appropriate water?
  - Does it need to be modified, physically or chemically?
  - Erosion controls, grade controls, diversions?
- Water supply, source for irrigation water
  - Groundwater? Feasible to pump? Chemistry?
  - Impoundments? Temporary, permanent? Multi-use?
  - Diversions?
- Floodwaters, torrents
  - Suitable detention sites? Watershed size?
  - Flood damage protection, warning systems?

NW Frontier Action Plan

- Build and learn from demonstration area performance and experience
- Employ a complementary combination of structural and management approaches
  - To reach realistic goals
  - On a watershed basis
- Communicate success stories
  - Provide guidance and training in successful techniques
- Local leadership is key

USDA Experience and Tools

- Planning on a watershed basis
- Delivery system with local leadership
- Designing systems comprised of structures and land management support practices
  - To reach specific goals
- Experience outside the US
- Tools, guidelines, handbooks

Questions?

Location: Pakistan, Earth