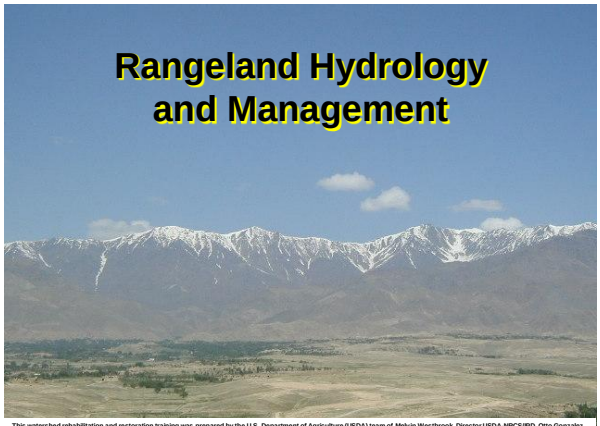
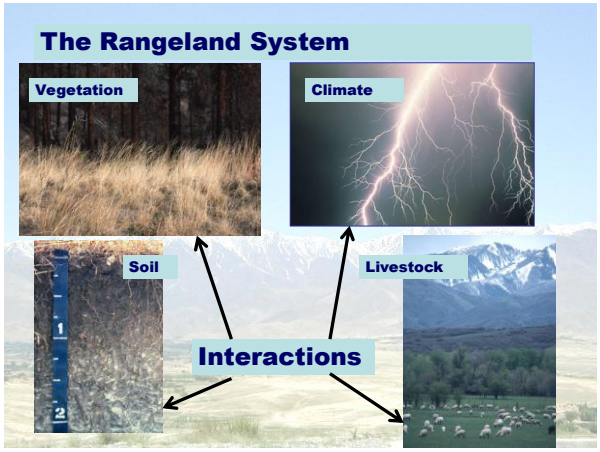


This watershed rehabilitation and restoration training was prepared by the U.S. Department of Agriculture (USDA) team of Melvin Westbrook, Director USDA-NRCS/IPD, Otto Gonzalez (Development Resources Specialist - USDA Foreign Agricultural Service,), George Hernandez (Forester - USDA Forest Service), Richard Weber (Civil Engineer - USDA Natural Resources Conservation Service), and Jon Fripp (Civil Engineer - USDA Natural Resources Conservation Service). Contact Jon Fripp at jon.fripp@ftw.usda.gov for information.

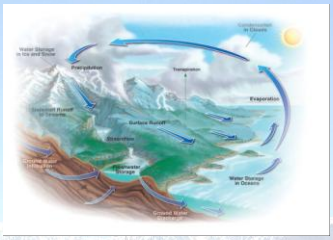


Range Management

Means Matching the Available Water (Climate) to-

- Herd Size
- Vegetative Potential
- Soil Potential

- All Rangeland receives enough water to support grazing, IF
  - Vegetation is healthy
  - Stream networks are stable
  - Grass, animals, and water distribution are in balance



Presentation originally prepared by Chris Hoag and Dan Robinette (2006)

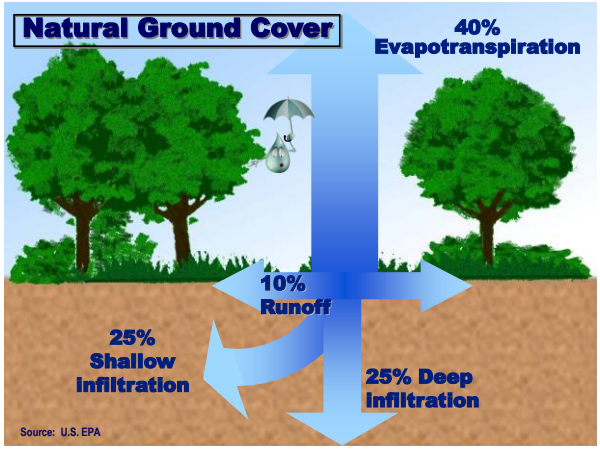
Water Moves Through a Rangeland System

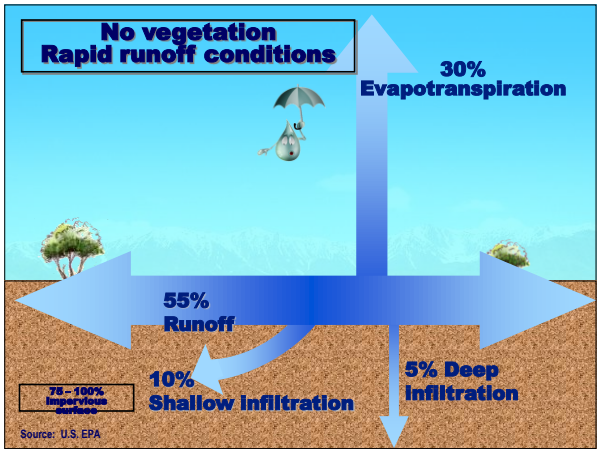
- Enters as Rain or Snow
- Is Captured by Soil/Grass
- Is Stored in Aquifers
- Moves Downhill as Streamflow

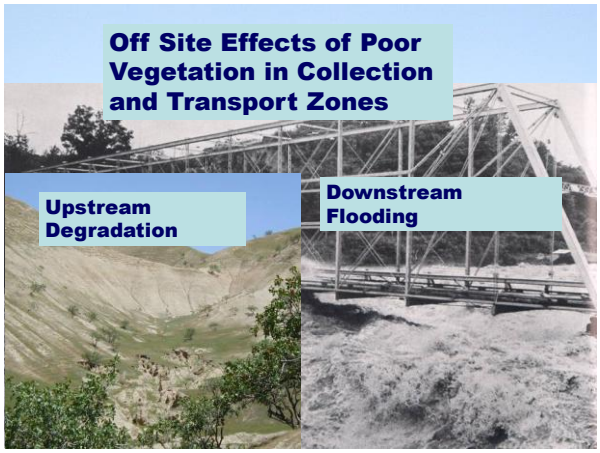
Water's Entry Into the System in the Collection Zone

Water has a Choice

- Run off the Surface
- Infiltrate Into the Soil

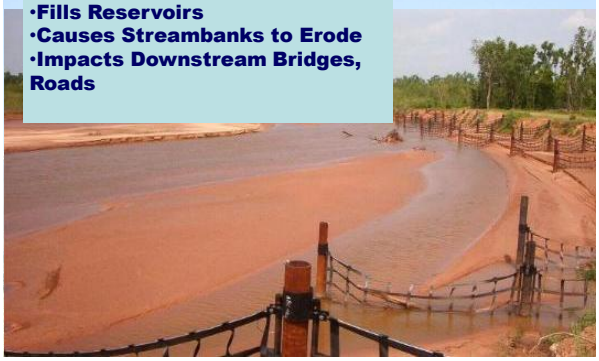

Natural Ground Cover
40%
Evapotranspiration
10%
Runoff
25%
Shallow
Infiltration
25% Deep
Infiltration
Source: U.S. EPA


No vegetation
Rapid runoff conditions
30%
Evapotranspiration
55%
Runoff
10%
Shallow Infiltration
5% Deep
Infiltration
75 – 100%
Impervious
surfaces
Source: U.S. EPA

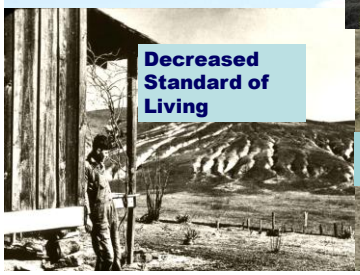

Off Site Effects of Poor
Vegetation in Collection
and Transport Zones
Upstream
Degradation
Downstream
Flooding

Sedimentation

- Fills Reservoirs
- Causes Streambanks to Erode
- Impacts Downstream Bridges, Roads



On Site Effects of Poor Vegetation in Collection and Transport Zones



Improving Infiltration

Improve

- Grass Cover
- Rooting Depth
- Decrease Soil Bulk Density

Effects

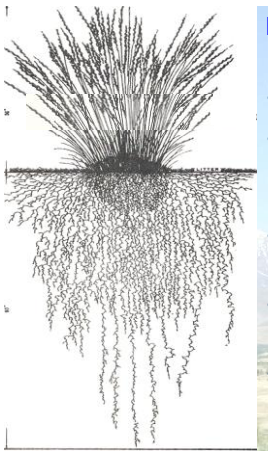
- Decrease Soil Erosion
- Decrease Downstream Peak Discharges
- Force Water Into Groundwater Storage
- GROW MORE GRASS!

INFILTRATION

Healthy Grass =
Healthy Soil =
Healthy Infiltration =
MORE MEAT
Reduced Flooding
Stronger Baseflows

Grazing – and Range Management

- Grazing and browsing are the process by which animals eat plants to acquire nutrients and energy
- Range management is the process by which people manage where, when and how often livestock graze.
- Over Half of Afghanistan is Rangeland
- Serious Problems Occur on These Rangelands Due to a Combination of Many Factors
  - Drought
  - Over grazing
  - Over harvesting of fuel
  - Soil erosion
  - Loss of productivity
  - Loss of biodiversity



Hillside Grass in good condition

- **Grass rebuilds the soil**
- **Plants produce seeds that produces a new generation of grass**
- **Provides erosion control for the hillside**
- **Minimizes loss of water by runoff**
- **Maximizes water absorption**

Over Grazing – Eating all of the Plant

- The plant does not have enough green leaves to feed itself
- The plant cannot produce enough leaves
- The plant cannot produce enough roots
- The plant cannot store food in its roots for winter and to survive drought
- Does not leave enough cover on the land to hold snow and rain and prevent soil erosion

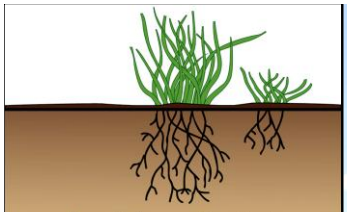
Proper Grazing – Eating Half the Plant

- The plant has enough green leaves to feed itself
- The plant can produce plenty of leaves
- The plant can produce plenty of roots
- The plant can store enough food in its roots for winter and to survive drought
- Will leave enough cover on the land to hold snow and rain and prevent soil erosion

Measuring Half the Plant

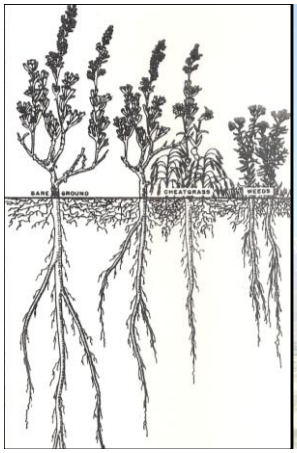
- The grazing height will be different for different grass species
- Grass plants can tolerate 50% grazing by weight, every year, and remain healthy

50% grazed Un-grazed



Percent leaf volume removed	Percent root growth stopped
10%	0%
20%	0%
30%	0%
40%	0%
50%	2-4%
60%	50%
70%	78%
80%	100%
90%	100%

- If 50% of the leaves are removed, only a small amount of the root growth is stopped.
- If 60% of the leaves are removed, as much as 50% of the root growth is stopped.



When weeds replace hillside grass:

- Weeds produce significantly less pounds of feed than grass
- Weeds do not have as much protein as a grass
  - This means skinny sheep
- Weeds are a high fire hazard
- Runoff increases
  - Rain or snowmelt only wets the soil surface
- Soil erosion is increased

When weeds replace hillside grass:

- Livestock do not like to eat weeds as much as grass
- Weed roots crowd out new grass plants
  - Recovery of the hillside grass takes much longer

To get the best production of hillside grass:

1. Delay initial grazing of the grass plants until June.
2. Keep early grazing periods short when the grasses are just starting to grow.
3. Eat half and leave half during each grazing period.

To get the best production of hillside grass:

- Allow 28-30 days between grazing periods
  - For leaf re-growth
  - Allows surplus plant food to be stored in the roots
- At the end of the grazing season,
  - Leave half of the growth to produce enough plant food to fill the roots before the plants go dormant
  - Leave enough residue on the plant to provide insulation from the cold winter temperatures

Training the herders

- Keep the vegetation on the slope
  - Control grazing
    - Move the herds as they graze the plants down
    - Keep them out of the riparian areas
  - Train the herders
    - Not to allow the sheep and goats to take all the vegetation
    - Recognize areas not to graze
    - Provide water for herds to use as they move
      - *Spring development*

Training the herders

- Keep the vegetation on the slope
  - Take only 50% of the plants each year
    - Leave some grass on the hillside
  - Rotate time of use
    - In each pasture
    - Each year
    - Early grazing should only happen 1 out of 3–4 years in each pasture

Training the herders

- How to measure 50% of the plants each year?

1. Find a sample grass plant that has not been grazed
2. Take all the seed heads and leaves in hand

Training the herders

- How to measure 50% of the plants each year?

3. Cut the grass bunch off at ground level
   - Include all the seed heads and leaves down to the ground
4. Hold all the cut parts of the plant in your hand

Training the herders

- How to measure 50% of the plants each year?
  5. Tie the bundle of seed heads and leaves together with a leaf or string
  6. Place the tie in about the middle of the bundle where you think half is

Training the herders

- How to measure 50% of the plants each year?
  7. Place the middle of the bundle on your outstretched finger
  8. Attempt to balance the bundle on your finger
  9. Move the bundle back and forth on your finger until it balances

Training the herders

- How to measure 50% of the plants each year?
  10. Once the bundle balances on your finger, this is approximately the center of the plant mass

Training the herders

- How to measure 50% of the plants each year?

12. Cut the bundle at the point of balance
13. The bundle base is about half of the whole plant

Training the herders

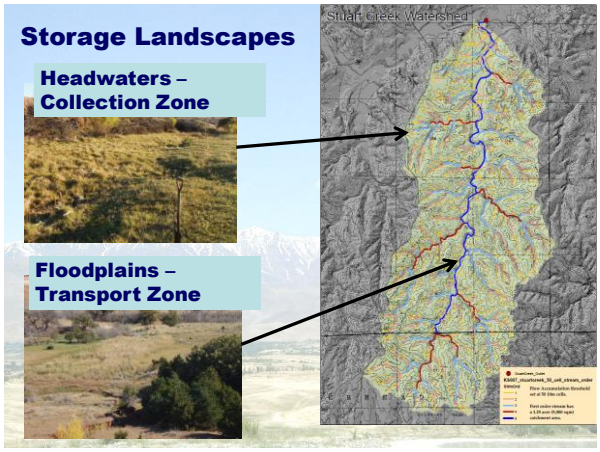
- How to measure 50% of the plants each year?

12. Measure the height of the cut base bundle
13. This is 50% of the grass plant that must be left

This is an easy way for the herder to determine the "eat half and leave half" in the field.

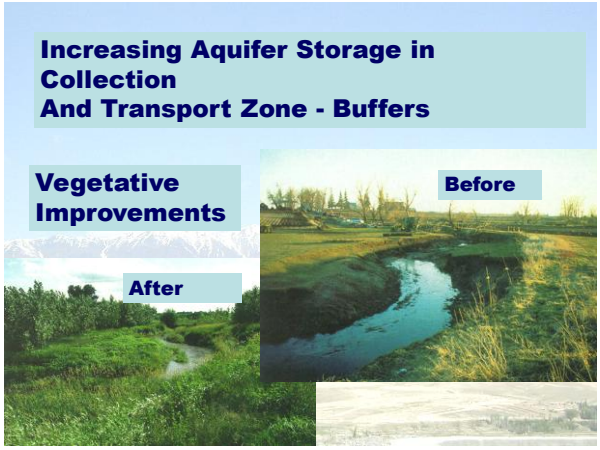
Aquifer Storage in Collection Zone

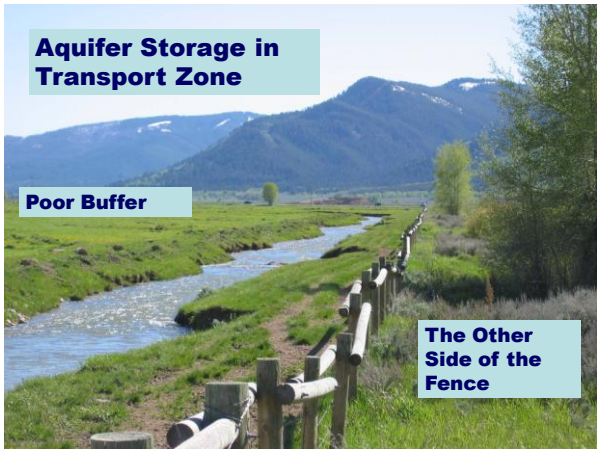
Occurs When Surface Runoff and/or Groundwater has –
- A place to be stored
- The OPPORTUNITY to go into storage


Storage Landscapes
Headwaters – Collection Zone
Floodplains – Transport Zone
Stuart Creek Watershed

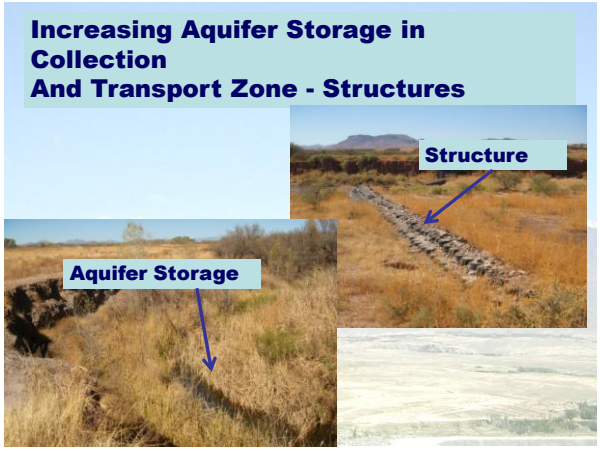

Degraded Headwaters
•Loss of Aquifer Storage
•Loss of Grass Production
•Sends Sediment Downstream

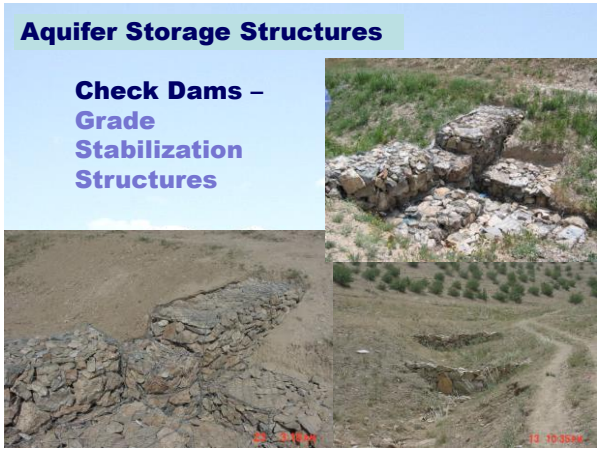

Healthy Headwaters
•Stores Groundwater
•Releases Water Downstream SLOWLY
•Produces GRASS

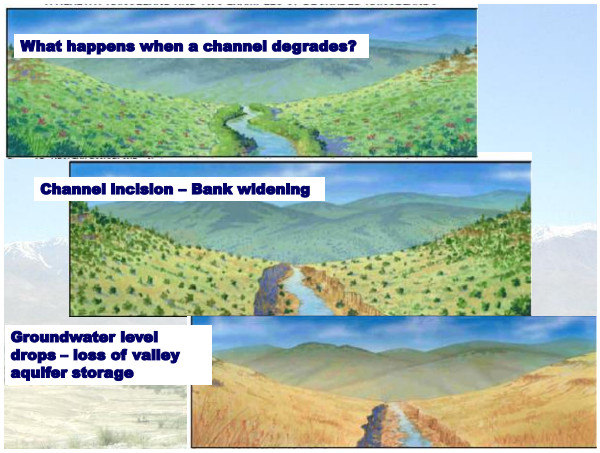

Increasing Aquifer Storage in Collection
And Transport Zone - Buffers
Vegetative Improvements
Before
After

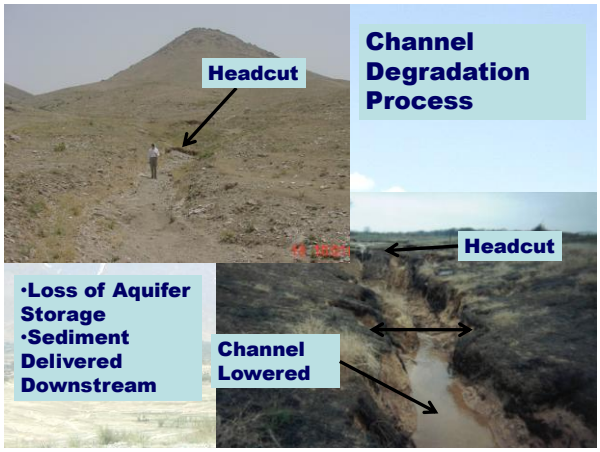

Aquifer Storage in Transport Zone
Poor Buffer
The Other Side of the Fence

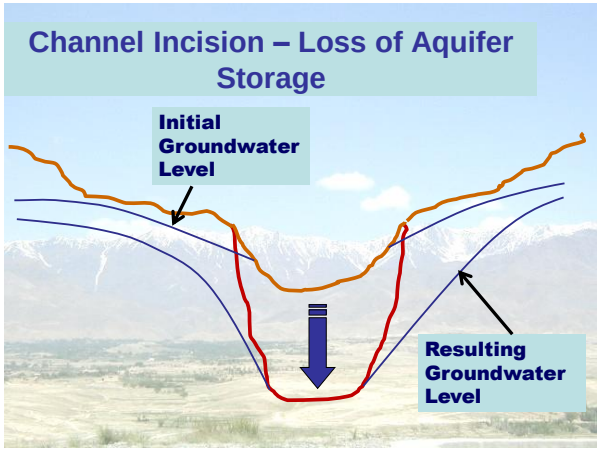

Healthy Buffer
Poor Buffer


Increasing Aquifer Storage in Collection
And Transport Zone - Structures
Structure
Aquifer Storage

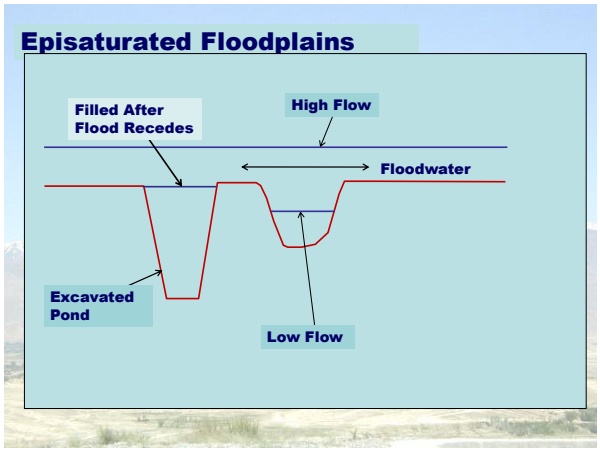

Aquifer Storage Structures
Check Dams –
Grade
Stabilization
Structures

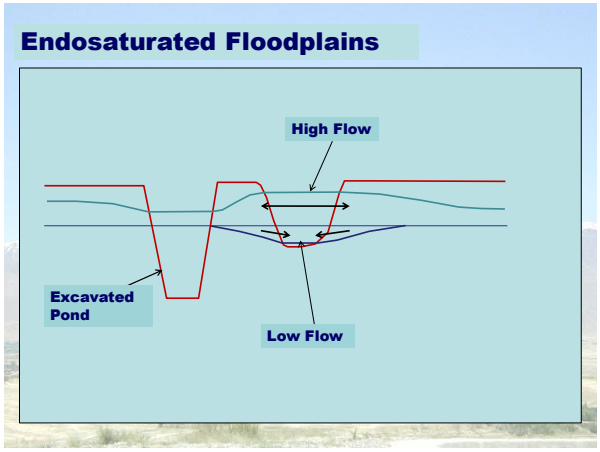

What happens when a channel degrades?
Channel incision – Bank widening
Groundwater level drops – loss of valley aquifer storage


Channel Degradation Process
Headcut
Headcut
•Loss of Aquifer Storage
•Sediment Delivered Downstream
Channel Lowered


Channel Incision – Loss of Aquifer Storage
Initial Groundwater Level
Resulting Groundwater Level


Floodplains in the Transition Zone
Endosaturated
Episaturated


Episaturated Floodplains
Filled After
Flood Recedes
High Flow
Floodwater
Excavated
Pond
Low Flow


Endosaturated Floodplains
High Flow
Excavated
Pond
Low Flow


Questions?