Introduction to Spring Development

Kabul, Afghanistan
February 2011

This watershed rehabilitation and restoration training was prepared by the U.S. Department of Agriculture (USDA) team of Jon Fripp (Civil Engineer – USDA/NRCS), Melvin Westbrook (Director USDA-NRCS/IPD), Otto Gonzalez (International Agricultural Development Specialist - USDA Foreign Agricultural Service), Clark Fleege, (Nursery Manager, USDA Forest Service, and George Hernandez (Forester - USDA Forest Service), in consultation with Lief Christenson, (USA CJTF101 Water Resources Coordinator, Afghanistan). Contact Jon Fripp at jon.fripp@ftw.usda.gov or Otto Gonzalez at Otto.Gonzalez@fas.usda.gov for more information on this workshop.
Module Topics:
- Purpose of Spring Development
- Design and Construction Issues
- Examples

Figure 1. A typical spring box
Spring Developments Can Provide

- Water for agriculture irrigation
- Water for livestock
- Water for people

Spring Developments can be constructed in any zone but are typically installed in the collection zone.
To understand Spring Development, you need to understand soil attributes

- Gravel
- Clay
Gravel

Water can easily flow through gravel
Clay

Water cannot easily flow through clay
• Water can be contained in a gravel layer
• The clay may keep it from coming out very fast or at all
• If you dig out the clay, the water will not be trapped in the gravel
• It will come out
• But it will be uncontrolled
• If we use a spring box, we can control the water as it comes out of the gravel layer
• We can use it as a well
• We can put it in a pipe and send the water to another location
Locate a suitable area

Choose an area that should be wet.

You may need help from an engineer or someone experienced with spring box locations.
• Look for low point in slopes
• Look for green, water loving vegetation
• This type of project captures water lost to this vegetation and evaporation
Dig a little to see if it will provide water

Look at soils
Assess how fast water fills hole
If so, excavate a larger hole.

The hole should be larger than the size of the spring box.
• Do NOT dig to another gravel layer or you might drain the water away.
• Stop digging if you feel gravel
• If you do dig into another gravel, place 15 cm of clay on bottom and compress it down
Excavate a trench from the hole to a lower elevation.
A spring box is a hollow box or barrel with holes along one side. It can be a:

- Plastic Barrel
- Metal Barrel
- Concrete Pipe
- Plastic Box
- Stone
- etc
• Install a pipe 15 cm from the bottom of the spring box.
  Seal around the edge
Place the spring box in the hole and the pipe in the trench
• Place a clay plug or plastic sheet in the trench below the spring box.

Place a filter fabric around the spring box that covers the holes but still lets the water through.

Fill the hole around the spring box with gravel.

Place a lid on the spring box to keep dirty water and animals out.
This is a cross section of an installed spring box

Place Gravel Around Box in Hole

Filter

Gravel Layer

Natural Clay

The box allows for some storage and a place for some sediments to settle out
Seal and slope ground above box and lines to drain to prevent contamination
Installed Spring Boxes 2004
Still working ...

Photos 2006
Other approaches are often used. A box may not be needed if the water carries only a low level of sediments and if no storage is needed because the water flows at a rate sufficient to meet the peak demand. Or if the spring has a defined point (spring eye).
The End

Spring development by ACC