

Design and Evaluation of Watershed-Scale Water Harvesting Structures for Hallouf Watershed in Southern Tunisia

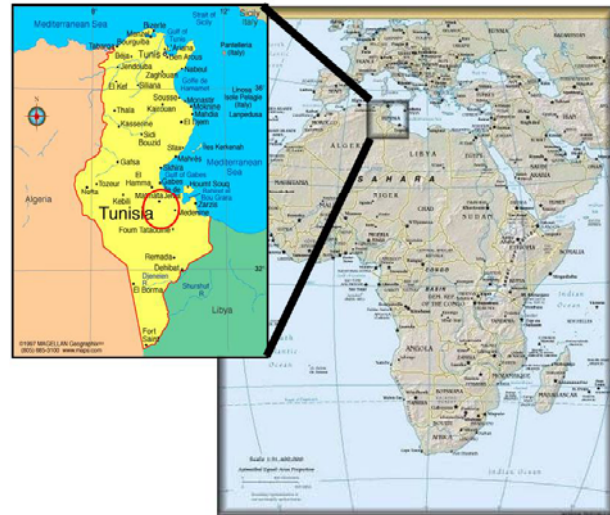
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Agricultural and Biological Engineering – Senior Capstone Design

Problem Statement: To improve the usage of available rainfall in the arid region of Tunisia through the installation of a storm water collection system known as gabion.

Objectives:

- ◆ Design a method for evaluating water harvesting structures, locally known as gabions
- ◆ Design models to represent the structures using WEPP®, HEC-1®, Arc-View GIS® and Excel®
- ◆ Analyze the effect of these structures on the hydrology and sedimentology of the watershed
- ◆ Compare the costs and benefits of the water harvesting structures on the local economy



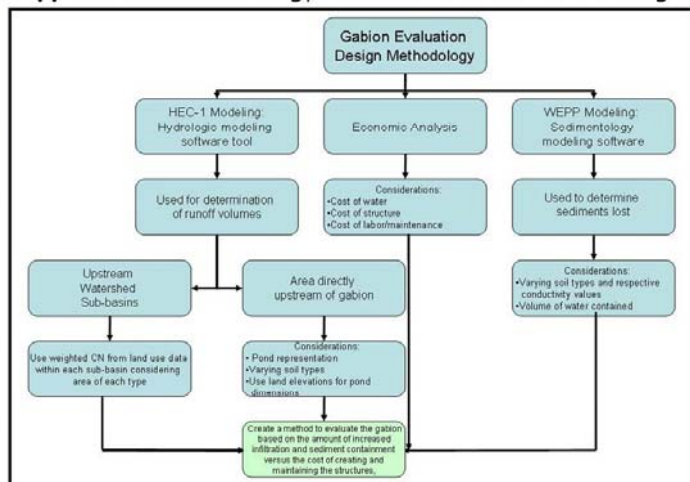
Background Information

- ◆ The Hallouf watershed is a sub-watershed of Oum Zessar, South Tunisia
- ◆ Average rainfall is less than 150 mm per year.



Existing Gabion in Tunisia

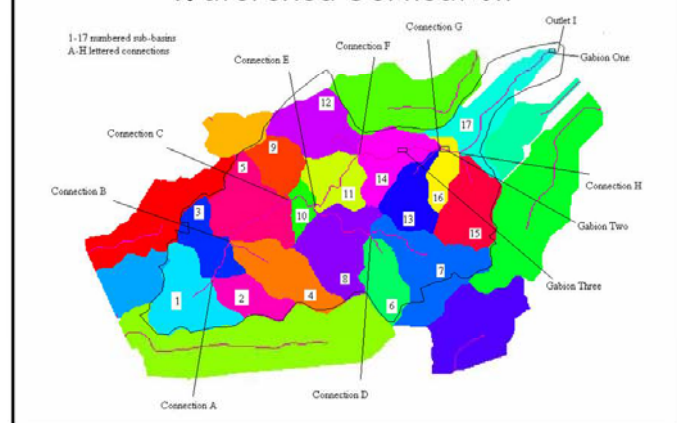
Approach: Methodology for Gabion Evaluation Design



GIS Data Acquisition & Modeling

- ◆ Graphical image of the distributions of soil classifications and land-use types over the entire Hallouf watershed
- ◆ Graphical image of the stream profile and topographical map of entire Hallouf watershed
- ◆ Detailed delineation of Hallouf watershed
 - ◆ Created 17 sub-basins within watershed to associate land-use properties, slope, etc., with more accuracy
 - ◆ Determined GIS delineation functions based on:
 - ◆ Land topography
 - ◆ Water flow direction & accumulation
 - ◆ Stream definition and segmentation

Watershed Delineation



Delineation of Hallouf Watershed using Arc-View GIS®