A Ten-Day
Advanced Watershed Assessment, Evaluation, Management and Rehabilitation Training Course For Afghan Forestry and Range Department of the Ministry of Agriculture Personnel

May 6 to 16, 2006

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TABLE OF CONTENTS

Executive Summary 3
Introduction/Background Information 3
Summary of Scope of Work 4
Deliverables 6
Objective 1*: To develop in relevant provincial ministry staff an understanding of what is a watershed, how it functions as an ecosystem, and how various human activities can have a positive or negative impact on soil, water, and plant resources in a watershed.* 6
Objective 2*: To develop in relevant ministry staff competence in identifying watersheds and sub-watersheds, and management problems within those watersheds.* 8
Objective 3: *To develop an awareness and knowledge of different measures to address watershed impairments and watershed management problems, and of ways to foster overall watershed rehabilitation. This will include the design and implementation of several "how to" management techniques.* 9
Objective 4: *To identify specific decisions ministry staff may need in their jobs to rehabilitate watersheds or to improve watershed management, and to determine how skills and knowledge covered in this training can be applied.* 20
Objective 5*: To introduce rangeland management as a science as well as identify rangeland plants, soil taxonomy and texturing and explain the soil/vegetation relationship to make informed decisions on grazing management recommendations.* 23
Conclusion 25
Contact Information.....27
Appendix A: Class Participants 27
Appendix B: Other Participants 28

Format Note: This report follows the format provided by Ms. Sarah Librea, Foreign Agricultural Service (Development Resources Specialist), USDA – FAS, Washington, DC. This format matches the requested format from other USDA TDY efforts and fits within the overall report of Afghanistan Reconstruction efforts being authored by Mr. Otto Gonzalez Afghanistan Reconstruction Team Leader USDA – FAS, Washington, DC. and Ms. Librea. Since this report includes the same content as is provided in a typical NRCS trip report, another report is not going to be developed unless a specific request to do so is made to the authors.

Executive Summary

The subject effort is part of a larger technical assistance mission to provide capacity-strengthening training to Afghan Government institutions. The purpose of this 10-day course is to provide technical support and training to provincial personnel and selected Kabul-based personnel from the Afghan Forestry and Range Department of the Ministry of Agriculture. This training addresses several interrelated watershed management and rehabilitation issues that have been identified as prevalent in Afghanistan. These broad issues are:

- Lack of vegetative cover (trees and grasses)
- Soil Erosion
- Water Quantity and Quality

As noted, these issues are interrelated. For example, a loss of vegetative cover can result in increased erosion which, in turn, can adversely affect water quality. Due to the interconnectedness of these important issues, it was decided by the team to present the information in the class in a watershed context.

Technical topics that were addressed in the course of this training include:

- Watershed issues and functions (including basic soil and water resources, hydrologic cycle; river basin and watershed delineations)
- Measures to reduce loss of vegetation and to reestablish vegetation in areas where it has been lost (including range management, grazing management, vegetation establishment in dry areas, seeding, riparian buffers, and irrigation)
- Measures to control and reduce soil erosion (including hillside ditches, check dams, soil bioengineering, riprap design, stream deflectors, windbreaks)
- Measures to increase available water potable water (including spring developments, cisterns and rain harvesters, filtration techniques, as well as discussion of the water savings and other advantages of using drip and micro sprinkler irrigation over the traditional flood irrigation).

Introduction/Background Information

The lands in Afghanistan have been degraded by poor agricultural practices, extensive deforestation and inadequate erosion control. Some management, rehabilitation and restoration techniques are now being implemented by dedicated and hard working Afghan nationals. However, additional capacity strengthening is needed in not only the actual design and construction of various practices but also in the planning and assessment needed to implement the practices in the correct location and to solve an identified and specific issue.

The basic theme that ran through the provided training was to present both interactions between and problems within parts of a characteristic watershed. The purpose, design, and construction of selected management and rehabilitation techniques were presented in the context of specific zones of a watershed and with their relationship to the identified issues of loss of vegetation, soil erosion and water quantity and quality. Interactive in-

class and field time was utilized in the instruction. The training included the following items:

- 34 PowerPoint Lecture Modules in English and Dari
- 3 Classroom Laboratory Flume Demonstrations
- 1 Classroom Movie
- 4 Classroom Survey Exercises
- 3 Classroom Calculation/Design Exercises
- 1 Classroom Construction Exercise
- Demonstration field exercises in
    - Seed drill use
    - Wind break construction
    - Irrigation (drip bucket, micro sprinkler, and conventional drip)
    - Slow sand water filter
    - Composting (conventional, pit and toilet)
    - Hillside ditch evaluation
    - Check dam evaluation
    - Soil pit evaluation
    - Range plant identification
    - Range production and composition transect
- 3 Field Trips with Students to Practice Skills
- 4 Classroom Student Group Presentations

Prior to subject trip, the United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS) team collected specialized tools, drafted lesson plans and PowerPoint lecture modules, and assembled a demonstration flume. An agenda was developed and coordinated between the NRCS team and Ms Librea and Mr. Otto Gonzalez. However, a significant portion of the training was developed and finalized by the USDA-NRCS team while in Afghanistan. During the week prior to the training, the USDA-NRCS team consulted with Afghan foresters and Afghan Conservation Corps (ACC) personnel on needs, capacity, and experience of the subject trainees in relation to the selected training areas. The USDA-NRCS and ACC personnel team visited and selected sites for field exercises as well as developed the demonstration project exercises. The materials required for the demonstration projects were identified and evaluated. Photographs were collected and compiled for use in the lectures. The USDA-NRCS team refined and developed PowerPoint based lecture modules and worked closely with a translator to convert the English into Dari.

Finally, it should be noted that the ACC and Afghan Ministry of Agriculture personnel provided excellent coordination for the necessary logistics, translation as well as food during the class. Without their efforts, the development and delivery of this training would have been exceedingly difficult.

Summary of Scope of Work

The scope of work for this effort included five objectives as summarized below:

1. To develop in relevant provincial ministry staff an understanding of what is a watershed, how it functions as an ecosystem, and how various human activities can have a positive or negative impact on soil, water, and plant resources in a watershed.
2. To develop in relevant ministry staff competence in identifying watersheds and sub-watersheds, and management problems within those watersheds.
3. To develop an awareness and knowledge of different measures to address watershed impairments and watershed management problems, and of ways to foster overall watershed rehabilitation. This will include the design and implementation of several "how to" management techniques.
4. To identify specific decisions ministry staff may need in their jobs to rehabilitate watersheds or to improve watershed management, and to determine how skills and knowledge covered in this training can be applied.
5. To introduce rangeland management as a science as well as identify rangeland plants, soil taxonomy and texturing and explain the soil/vegetation relationship to make informed decisions on grazing management recommendations.

The scope of work specified that the above objectives were to be achieved with a deliverable of a 10 day training class. This training was developed and provided by a United States Department of Agriculture – Natural Resources Conservation Service (USDA-NRCS) team of a civil engineer, a plant materials specialist, and a rangeland management specialist. Forty eight practitioners were selected by the Afghan Forestry and Range Department of the Ministry of Agriculture to receive this training. A combination of in-class lecture and calculations, demonstrations, and field exercises were used in this training. A photograph of the majority of the class participants is provided below in Figure 1.

Figure 1: Students and instructors at the conclusion of the first field trip.

Deliverables

The single deliverable of the subject scope of work is the aforementioned ten day training class. This 10-day workshop was delivered May 6 - 16, 2006. The scope of work describes five general objectives that were to be addressed through the training deliverable. The USDA-NRCS team did not view these objectives as either sequential or hierarchal. As the training agenda was developed and refined, a more iterative approach was taken to addressing these objectives. The specifics related to how these objectives were to be refined and addressed during the subject TDY trip was accomplished through close coordination and discussion between the USDA-NRCS team and Ms. Librea.

The primary delivery mechanism for the training was PowerPoint lecture modules, class and field demonstrations, and field exercises. Electronic copies of the lecture modules are provided under a separate cover. The demonstration flume and field equipment used in the class has been provided to the Afghan Forestry and Range Department of the Ministry of Agriculture, as instructed.

An overview of the instruction content and techniques that were used to address each of the objectives is provided below:

Objective 1*: To develop in relevant provincial ministry staff an understanding of what is a watershed, how it functions as an ecosystem, and how various human activities can have a positive or negative impact on soil, water, and plant resources in a watershed.*

Objective 1 was introduced and addressed with the first lecture module which is titled *Watershed Introduction*. This lecture included instruction in basic watershed delineation and identification of both large and small watersheds. Interactions with and between erosion and human activities in the watershed were addressed. This was accomplished with examples and discussion within this introduction module and throughout the class in subsequent modules. In this introduction module a basic understanding of watershed behavior was addressed, in part, with the use of the water cycle. This simple mental model describes the balance between precipitation, runoff, infiltration and evaporation.

To better understand the behavior of the watershed as a whole, a simple characterization of the watershed as three parts was presented in the second module titled *Watershed Zones*. These are:

1. the collection or catchment zone,
2. the transfer or transport zone, and
3. the deposition zone.

The identification of these zones was reinforced during the two field trips. Since each of these zones behaves very differently, a different approach to management and rehabilitation was presented. This three zone delineation was carried throughout the remainder of the class to provide the students with a context for various assessment, management and rehabilitation approaches and techniques. The interrelated nature of the issues (lack of vegetation, soil erosion, and water quantity and quality) was also expressed continually and as part of these zones. In addition, two transition lecture

modules titled *Transport Zone* and *Deposition Zone* were used to examine some of the zone behaviors in further depth and to better place the presented management and rehabilitation techniques in context. Finally, the lecture module *Zone Review*, summarized the issues presented and provided a summary of the application strategies for the management and rehabilitation techniques that were discussed.

This objective was also addressed with the training modules that were developed and presented in support of Objective 5. These include the *Grazing Management in Watershed Zones* and *Rangeland Management*. As indicated by the names, these modules addressed the detrimental affects that overgrazing can have on the vegetative cover of a watershed. The class was presented with the management practice of allowing animal to eat only half of a plant as a good grazing management strategy. This apparently new concept was repeatedly noted by the students throughout the class. A photograph of a simple means to make this evaluation is shown in Figure 2.

Figure 2: The “graze half – leave half” evaluation being demonstrated in the class.

These topics were reinforced during the first field trip where the students were led through an exercise of assessing existing vegetation in an overgrazed range area. A photograph of this exercise is shown below in Figure 3.

Figure 3: Vegetative composition and production evaluation conducted during first field trip.

Finally, this objective was addressed with the modules titled *Water Supply Introduction* and *Water Filtration*. Both of these modules included extensive discussions of how human activities can adversely affect water quality and quantity issues.

Objective 2*: To develop in relevant ministry staff competence in identifying watersheds and sub-watersheds, and management problems within those watersheds.*

Objective 2 was addressed with discussions of the differences between natural erosion and erosion caused by man's activities. The differences between impairments that can be addressed with management practices as opposed to those which must be addressed with rehabilitation techniques was also presented and discussed. Since each of the three aforementioned watershed zones exhibits specific behaviors and has unique interactions, the management issues were addressed by zone. Much of this was introduced in the module titled *Watershed Zones* however this important issue was continually reinforced throughout the class as part of small review lectures such as the ones titled *Transport Zone, Deposition Zone,* and *Zone Review*. This important concept was also reinforced during class exercises and as a transition to individual modules which addressed specific management practices and restoration techniques.

This objective was also addressed with a presentation of a lecture module that addressed the identification, evaluation, and selection of goals and objectives. This lecture is titled *Goals and Objectives.* This important point was reinforced during the third field exercise. This exercise required, in part, that the students to interview a head of shura (village headman) or landowner to determine their land use objective. This role was ably played by volunteers from the ACC and the Ministry of Agriculture. One of these mock interviews is shown in Figure 4.

Figure 4: ACC "head of shura" providing the class with management goals for field exercise site. After the broad goals were provided, the individual groups conducted more in depth interviews and discussions separately.

The class was divided into four groups to conduct this exercise. The general objectives and well as some specific issues were provided by the NRCS team. These stated objectives had to be evaluated by the students within the context of the location or watershed zone of the site as well as within the context of the existing condition of the site. The initial objectives were purposely chosen to be inappropriate – either not achievable, not specific or not measurable. The student groups were tasked with refining these objectives into good goals and developing management plans and rehabilitation strategies to address the refined goals. During the student group presentations, the USDA-NRCS team and ACC leaders queried the students as to possible management changes they would recommend in response to different goals as well as to what goals overall would be entirely unsuitable for a specific area. This exercise is also discussed in the overview of the techniques used to address Objective 4.

Objective 3: *To develop an awareness and knowledge of different measures to address watershed impairments and watershed management problems, and of ways to foster overall watershed rehabilitation. This will include the design and implementation of several "how to" management techniques.*

Objective 3 was addressed with a series of lecture modules and constituted the bulk of the training. These modules included skill sets, management practices, and rehabilitation techniques. As noted earlier, the primary delivery vehicle was PowerPoint lectures; however, demonstrations, analysis, presentations, class room exercises, and field exercises were also used.

The skill set modules were used to provide the students with basic tools to better understand subsequent lectures as well as to perform the data collection assessment required in the field trip exercises. The two skill set lectures are:

- *Basic Surveying* – land measurement, assessment and location
- *Reading and Understanding Plans*

Basic spatial recognition (section, plan, and profile) skills are very limited in many of the participants. While many of the participants are bright, the lack of an ability to read and understand plans limits their ability to quickly understand and implement new techniques. By presenting basic skills in the *Reading and Understanding Plans* lecture module, the participants were able to better understand the presentations and discussions within the workshop as well as implement techniques which were not presented in the workshop.

The ability to measure ground slope, distances and orient a location in a watershed on a map is critical for many of the assessment and design techniques that were presented in the class. These skills are lacking in many of the participants and, based upon responses to lectures provided by the USDA-NRCS team to the University of Kabul; do not appear to be a focus of current college education. UDSA-NRCS team presented field surveying techniques in the *Basic Surveying* lecture module. This module focused on the use and application of basic and inexpensive equipment. Compasses, line levels and hand levels were purchased in the US and provided to the students for their use during the class and for their future work. Each of these skills was reinforced during classroom exercises and in the field. Photographs of the classroom survey exercise are provided below in Figure 5. Figures 6 and 7 shows photographs of the students using the survey skills to take specific measurements as part of assessments conducted during the field exercises.

Figure 5: Classroom basic survey exercises. In this photograph, the students are practicing the use of string levels.

Figure 6: Students using the hand level to assess hillside slopes as part of the hillside ditch evaluation exercise during the first field trip. These skills were reinforced during the final field exercise.

Figure 7: Students being given additional field instruction on the use of compasses to approximate their location on a map. The USDA instructors had to work closely with the individual students during this portion of the exercise.

The management practices that were covered pursuant to this objective primarily centered on agriculture and grazing management. Two modules titled *Advantages of Vegetation* and *Planting in Dry Areas* focused specifically on this area. However subsequent modules as well as the field exercises made continual reference to management practices. The advantages of vegetation were illustrated with a short movie clip of a large laboratory flume experiment as well as the demonstration flume shown in Figure 8.

Figure 8: Demonstration Flume used to show performance of check dams. This demonstration flume was also used to demonstrate the advantages of vegetation and the performance of stream deflectors. After each demonstration, the students were invited to use break time and lunch time to work with the flume and the provided inserts.

The rehabilitation techniques modules covered a wide range of topics. They were presented as part of each zone with a detailed description of the advantages and drawbacks of each. The rehabilitation technique lectures include the following:

- *Terraces and Hillside Ditches*
- *Check Dams*
- *Gabion Construction*
- *Riparian Buffers*
- *Riprap Stone*
- *Soil Bioengineering*
- *Stream Deflectors*
- *Seedbed Preparation and Use of Seed Drill*
- *Introduction to Composting*
- *Composting Toilets*
- *Irrigation Overview*
- *Drip Bucket Irrigation*
- *Water Supply Introduction*
- *Spring Development*
- *Cisterns and Water Harvesters*
- *Wetland Overview*
- *Water Filtration*
- *Wind Breaks*

Photographs and examples from the 2004 class construction exercises were used to support the above lecture modules where available. There were several participants in

the 2006 training who had also attended both the 2004 and the 2005 training. These students were asked to describe and expand upon what they had learned for the benefit of the current class. The descriptions and presentation of the rehabilitation techniques were also used to expand upon the student's understanding of watershed behavior. For example, the *Check Dam* lecture module as well as the stream bank stabilization modules is placed in context with the use of an abbreviated version of the channel evolution model. Where possible, the presented techniques were reinforced during the field exercises. For example, the lecture module titled *Terraces and Hillside Ditches* was reinforced during later field exercises where the students were invited to assess existing terraces with the skills presented in the surveying lesson.

Basic calculations required for simplistic design were presented as part of some of the above lecture modules. Sample problems were then used to reinforce the calculations. The design situation and givens were presented via PowerPoint and hints were provided to lead the students through the analysis. Student volunteers were then asked to present their analysis for the class.

As noted above, an introductory overview of the purpose and construction of gabions was presented in the class. To reinforce the gabion construction and use lecture module, a locally manufactured gabion was assembled in the class room. Lacing wire and hog rings were brought from the US and used to demonstrate two different methods of fashioning for gabion assembly. While the gabion was not filled, several stones were brought into the class to facilitate a discussion of required stone size and recommended durability. This is shown in Figure 9. A photograph of the class room gabion construction exercise is provided in Figure 10. The conclusion of this module included a class exercise where the class was invited to assess and critique potential construction issues of various gabion projects that were shown in photographs.

Figure 9: Discussion of gabion stone size and durability

Figure 10: Classroom gabion exercise. Participants from the 2004 and 2005 training volunteered to assist with teaching this section. They also described some of their subsequent construction experiences to the class.

The second field trip involved class participation in the construction and practice of several of the techniques that were discussed in the lectures. These included windbreak planning and construction, seed drill use, compost construction (pit, above ground and toilet), drip bucket irrigation, micro sprinkler irrigation, drip irrigation, slow sand filter construction. The students were also able to participate in the evaluation of soils at a soil pit. In addition the trainees were taught how to identify, collect, preserve and label plant specimens. These soil and plant exercises also addressed the issues noted in Objective 5. The students were divided into groups which rotated through stations to conduct the exercises. This field experience was very well received by the students and gave them practical, hands-on experience with many of the techniques that were discussed. Photographs of these exercises are shown in Figures 11 through 21.

Figure 11: Windbreak planning and construction. An entire wind break was defined and several trees were planted as part of this exercise.

Figure 12: Seed drill use. The seed drill is of a traditional form that can be readily copied by a skilled metal worker or blacksmith.

Figure 13: Above ground compost bin. This pit was constructed for the class at the direction of the USDA-NRCS team. During the field exercise, it was partially filled with suitable materials by the students. The USDA instructor discussed the tasks associated with the creation of compost as well as the uses of compost. This not only reinforced the lectures but was also referred to many times by the students during the third field trip exercise.

Figure 14: Pit compost. This is a traditional means of composting material. This pit had not been used for many years. It was repaired at the direction of the USDA-NRCS team and used as the basis for class discussion during the field exercise. The USDA instructor discussed how excess rain runoff into the pit can slow the creation of compost.

Figure 15: Compost Toilet. The operation and maintenance of a compost toilet was discussed. The USDA instructor also stressed the potential dangers of using human fecal and urine on food crops.

Figure 16: Bucket Drip Irrigation. The supplies necessary to implement this simple but effective irrigation practice was provided to all of the students. The students agreed to install demonstration bucket drip irrigated vegetable gardens using the supplies in their home province.

Figure 17: Micro Sprinkler Irrigation. The students were able to install a small micro sprinkler system for irrigating seedlings in a greenhouse. Issues related to filtration of the water were discussed in the class.

Figure 18: Drip Irrigation. The students installed drip irrigation for the trees that were planted as part of the windbreak. While the nursery manager removed most of the system at the end of the class for security reasons, he stated that it will be replaced and used during the daylight hours.

Figure 19: Slow Sand Filter. The students were able to observe the construction and operation of a slow sand filter. This type of filter is used for drinking water.

Figure 20: Soil Pit Evaluation. The students used this pit as well as samples of different soils collected from other areas to familiarize themselves with the soil related issues discussed in the class.

Figure 21: Plant Identification. Various plant species that present in the nursery and at Qargha Dam were identified and discussed. Plant identification was also conducted during the other field trips.

Objective 4: *To identify specific decisions ministry staff may need in their jobs to rehabilitate watersheds or to improve watershed management, and to determine how skills and knowledge covered in this training can be applied.*

Objective 4 was addressed throughout the class. However, the following modules focused on this important area specifically:

- *Hoag Ranch*
- *Zone Review*
- *Afghan Visual Assessment*

The *Hoag Ranch* module presented the management and rehabilitation techniques used on a ranch in the United States which included property on the three described zones. This material was presented in the first person by one of the USDA-NRCS team members who owns and operates a ranch in Idaho. Historical photographs dating from the dust bowl were used to illustrate before conditions. The decisions made to select different management and rehabilitation techniques on this demonstration ranch were presented and discussed within the context of the material which was being presented in the class. Before and after pictures which illustrated many of the discussed techniques were shown. While the presented module included a collection of issues, problems, and solutions from several farms and ranches, all were from a climate similar to the Kabul area. This module stressed that many of the practices have a long track record, can be implemented with hand labor, and that effective soil and water conservation involves a long term and consistent commitment.

This lecture titled *Goals and Objectives*, discussed earlier, addressed this objective with providing guidance in the selection of suitable management and rehabilitation goals. This important aspect of knowing how and when to apply the learned skills was further

reinforced with the *Zone Review* lecture module. While this module primarily focused on a reminder of the functions of the different zones, it provided a discussion of the interrelated problems of lack of vegetative cover, soil erosion and water quantity and quality issues in the zones. It also served as a vehicle for class discussions related to the necessity of goals addressing an identified problem as well as being specific, measurable and reasonable.

The Afghan Visual Assessment Protocol (AVAP) was developed to provide ministry officials with a basis for assessing a watershed condition, establishing relative goals, and selecting appropriate management approach and rehabilitation techniques. The approach used in AVAP is loosely based on a simplification of the approach developed for the NRCS Stream Visual Assessment Protocol (SVAP). However, the content is expanded to include the entire watershed; not just streams and rivers. Two levels of assessment were developed. The first is a brief, one page assessment. The primarily purpose of this short form is to provide a framework for a qualitative documentation of goal selection, watershed assessment, and rehabilitation project selection. The second is a more detailed set of forms that leads the user through more quantitative data collection. This detailed assessment provides sufficient information to develop concept level designs for many of the rehabilitation techniques that were presented in the class. Both of these forms were introduced in the lecture module titled *Afghan Visual Assessment*. The use and application of the short form was reinforced during the third field trip and class presentations.

The class was divided into four groups for the last field trip. The groups approximated their location on a map using a compass and the procedures presented in the class. As described earlier in the discussion of Objective 2, the groups conducted mock interviews of a head of shura or landowner to aid in determining a land use objective. The groups then collected relevant physical and biologic data following procedures learned earlier in the class. The examined and critiqued the existing check dams on the site (Figure 22) as well as the hillside ditches. They also examined the vegetation and soils to assess grazing use and possible production. One of the groups explored a wider part of the watershed and, with the help of USDA instructors, identified an area that would be possibly suitable for the installation of a spring development (Figure 23).

Figure 22: Students critiquing and existing check dam. This check dam had been installed as part of the 2004 training.

Figure 23: One group identified this area as a potential site for a spring development. They used the information learned in the class in making this determination. In addition, one of the students who had attended the 2004 training where several sample spring boxes were installed shared what he learned with the rest of the group.

After this information was collected, the students returned to the classroom to prepare their presentations. Based upon the group's assessment of the area goals as well as their observations of the site, they developed a general plan for managing and treating the site area. Their presentations were written on large sheets of paper. Most of the groups had specific plans, sketches, and notes to document their proposal.

On the last day of the class, the groups were asked to make short presentations of their recommendations for the site. They were asked to support their assessments and

recommendations with collected information and analysis. Instructors, senior representatives from the ACC and the class asked questions. While this presentation can be somewhat intimidating to the students, it was gratifying to see that all of the participants approached it with enthusiasm. The presentation by one of these groups is shown in Figure 24.

Figure 24: Student presents the proposal of his group for a solution to a hypothetical set of goals. His group took the measurements and made the evaluation of the site using the techniques presented in the class.

The student groups accurately proposed many of the management practices and rehabilitation techniques that they learned during the class. When a student presenter omitted an important step in the required evaluation or data collection necessary to implement a practice, his fellow student were quick to note the oversight. This exchange showed the USDA instructors that most of class had understood the techniques that were presented in the course.

Objective 5*: To introduce rangeland management as a science as well as identify rangeland plants, soil taxonomy and texturing and explain the soil/vegetation relationship to make informed decisions on grazing management recommendations.*

Objective 5 was addressed with much of the presented material that addressed Objective 1. However, the following modules focused on this important area specifically:

- *Grazing Management in Watershed Zones*
- *Rangeland Management and Plants*
- *Rangeland Soils*
- *Rangeland Soil- Vegetation Relationships*

As indicated by the names of these modules, this portion of the presented material addressed the detrimental affects that overgrazing can have on the vegetative cover of a

watershed as well as techniques that can be applied to remedy these affects. These sections also provided valuable assessment and management guidance. This information was reinforced in all of the field trips. In the first field trip, the class was led through an exercise in the data collection techniques for evaluating carrying capacity of an example range. The preparation for this exercise in shown below in Figure 25.

Figure 25: The students were led through the required data collection efforts to determine the current carrying capacity of an example range. This photograph shows the transect being established.

The information that was collected and compiled. It was explained and provided to the students during the third and last field trip. They were instructed to use this information in their evaluation of the current land use and well as in their proposals. The students also proposed various management techniques and rehabilitation treatments to increase the production of their example watershed.

As noted earlier in the report, this Objective was also addressed during the filed exercise conducted during the second filed trip. Specifically, the exercises related to the soil pit and the vegetation identification provided valuable hands on experience in support of the

class room material. A photograph of the students evaluating sample soils is shown in Figure 26.

Figure 26. Student evaluating sample soils during the second field trip. During the last field trip, they were asked to make this evaluation without the direct guidance of the USDA instructor.

Conclusion

The presentation of the material primarily followed the identified interrelated watershed management and rehabilitation issues that have been identified as prevalent in Afghanistan. The management practices and rehabilitation practices have been put into context with the use of basic watershed zone delineation. As discussed earlier, this was done to give the students a better understanding of the watershed function and context for selecting appropriate management practices and rehabilitation treatments. A summary of the material developed for the class is provided below in Figure 27. This material is provided electronically under a separate cover.

Watershed Context

1. Watershed Introduction
2. Watershed Zones
3. Transport Zone Overview
4. Deposition Zone Overview

Skill Sets

1. Reading and Understanding Plans
2. Basic Surveying
3. Gabion Construction
4. Rangeland Soil – Vegetation Relationships

Lack Vegetative Cover - Management Practices and Treatment Techniques

1. Advantages of Vegetation
2. Grazing Management in Watershed Zones
3. Rangeland Management and Plants
4. Rangeland Soils
5. Planting in Dry Areas
6. Seedbed Preparation and Use of Seed Drill
7. Riparian Buffers
8. Introduction to Composting
9. Irrigation Overview
10. Drip Bucket Irrigation

Soil Erosion - Management Practices and Treatment Techniques

1. Terraces and Hillside Ditches
2. Check Dams
3. Riprap Design
4. Soil Bioengineering
5. Stream Deflectors
6. Wind Breaks

Water Quantity and Quality - Management Practices and Treatment Techniques

1. Water Supply Introduction
2. Spring Development
3. Cisterns and Water Harvesters
4. Composting Toilets
5. Wetland Overview
6. Water Filtration

Tools for Assessment and Management

1. Goals and Objectives
2. Hoag Ranch
3. Afghan Visual Assessment

Review

1. Review of field exercise
2. Zone Review
3. Final Test

Figure 27: PowerPoint Lecture Modules developed for the Advanced Watershed Assessment, Evaluation, Management and Rehabilitation Training Course for Afghan Forestry and Range Department of the Ministry of Agriculture Personnel.

Contact Information

For more information on the content and delivery of the subject training, contact the members of the USDA-NRCS May 2006 TDY team at the following:

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Appendix A: Class Participants
The following list was translated and provided by Sayeed Qasim Hussaini. It provides the official list of invitees.

Name	Address	Title
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Hadayatullah	Dikondi	Forest Officer
Akramudin	Helmand	Forest Officer
Md.Salim	Sari pul	Forest Officer
Abdullah	Farah	Forest Officer
Md. Alluh	Kandahar	Forest Officer
Md.Naeem	Maidan Wardak	Forest Officer
Md.Yousuf	Balkh	Forest Officer
Safar Md	Khost	Range Officer

Sahebudeen	Badakhshan	Forest Officer
Ab.Qadeer	Takhar	Forest Officer
Nasrullah	Logar	Forest Officer
Chaman Ali	Ghazni	Range Officer
Ashabudeen	Kunar	Range Officer
Fazalrahman	Jozjan	Forest Officer
Sd.jamal	Kunduz	Range Officer
Najebullah	Faryab	Forest Officer
Noor. Ad	Ghoor	Forest Officer
Dost.Md	Pakteka	Forest Officer
Ghulam Rabani	Zabul	Forest Officer
Ghulam Dastgeer	Herat	Forest Officer
Noor Md	Kapesa	Forest Officer
Md.Nabee	Orozgan	Forest Officer
Ayaodeen	Pakteya	Forest Officer
Ab.Sabor	Kabul	Forest Officer
Ab.Mateen	Nooristan	Range Officer
Md.Akbar	Nemroz	Forest Officer
Ghulam Rizaq	Baghlan	Range Officer
Ghlam Haidar	Borders	Mini. Officer
Burhanudeen	Borders	Mini. Officer
Fayaz. Ad	Borders	Mini. Officer
Md.Farooq	FRD	Technical staff
Ad.Wali	FRD	Technical staff
Mahmood jan	FRD	Technical staff
Shafiq .Ad	FRD	Technical staff
Zamary	FRD	Technical staff
Ab.Qayoom	FRD	Technical staff
S. Aziz	FRD	Technical staff
Arif	FRD	Technical staff
Zakeya	NEPA	Officer
Sona	NEPA	Officer
Md.Mosa	Bamyan	Forest Officer
Mohammady	Ssmanghan	Range Officer
Ghulam Rabani	Takhar	
Hamid alluh	Nangarhar	
H.Ayouf	Laghman	FRD Officer

Appendix B: Other Participants

The following list includes the USDA, UN and ACC personnel who participated in the development and delivery of the subject class.

1. Mohamad Ismail Nasri, Technical Officer, ACC
2. Mohammadullah, ACC, Training and Liaison Office
3. Sarah Librea, USDA Foreign Agricultural Service
4. Jon Fripp, USDA – NRCS
5. Dan Robinett, USDA - NRCS
6. Chris Hoag, USDA - NRCS