Rangeland Watershed Management Program in Nangarhar Province

Technical Report

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# Abbreviations and Terms

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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AWATT</td>
<td>Afghanistan Water, Agriculture and Technology Transfer</td>
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<tr>
<td>Canal</td>
<td>In this and all AWATT documents, the word “canal” refers to either a secondary or tertiary canal. ¹</td>
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<tr>
<td>CSU</td>
<td>Colorado State University</td>
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<tr>
<td>jerib</td>
<td>Unit of land area approx. 0.2 hectare</td>
</tr>
<tr>
<td>Karez</td>
<td>Usually unlined sloping tunnels in the hills that access aquifers</td>
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<tr>
<td>FRM</td>
<td>Farm Resource Management</td>
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<tr>
<td>MAIL</td>
<td>Ministry of Agriculture, Irrigation and Livestock</td>
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<tr>
<td>MEW</td>
<td>Ministry of Energy and Water</td>
</tr>
<tr>
<td>NMSU</td>
<td>New Mexico State University</td>
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<tr>
<td>NVDA</td>
<td>Nangarhar Valley Development Authority</td>
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<td>RWM</td>
<td>Rangeland Watershed Management</td>
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<tr>
<td>SIUC</td>
<td>Southern Illinois University Carbondale</td>
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<tr>
<td>UIUC</td>
<td>University of Illinois at Urbana-Champaign</td>
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<tr>
<td>US</td>
<td>United States</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>USDA</td>
<td>United States Department of Agriculture</td>
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</table>

¹ This distinction is important because the new Afghan Water Law passed this year (2010) gives responsibility for primary canals (diverted directly from the rivers) to the Ministry of Energy and Water (MEW), and for secondary canals (diverted from the primary canals to villages) and tertiary canals (diverted from the secondary canals for distribution to the farms) to be the responsibility of MAIL, specifically the newly established MAIL Department of Irrigation (DI). Similarly, the term “watercourse” is used interchangeably with the word “canal” in AWATT documents.
Rangeland Watershed Management Program in Kashmond Kala Village at Dare Noor District in Nangarhar Province

EXECUTIVE SUMMARY

In January of 2011, AWATT began working with the Nangarhar Director of Agriculture, Irrigation, and Livestock (DAIL) and other stakeholders to establish a Rangeland Watershed Management (RWM) pilot project on 40 hectares of selected rangeland in the Dare Noor district. The program was designed as a small-scale localized project that could serve as a model for other RWM projects in Nangarhar province and throughout Afghanistan. The intent is to continue to leverage this project to develop a set of RWM best practices that can be used to design and manage RWM projects in other rangeland areas. The key to success for the Dare Noor project thus far has been the education, cooperation, and support of the local villagers. In coordination with the DAIL, AWATT is training these villagers to adopt sustainable and efficient farm resource management and RWM practices that protect and rehabilitate both the upper and lower watersheds.

INTRODUCTION

The last three decades of war in Afghanistan have resulted in the rampant depletion and destruction of the country's natural resources. Practices such as overgrazing, uncontrolled firewood collection, timber smuggling, and encroachment have resulted in soil erosion, destruction of rangeland watersheds, plant cover deterioration, deadly landslides, frequent flash-flooding, groundwater pollution, and low biomass production in the eastern and northern regions of the country.

Rangelands represent an important natural resource in Afghanistan and are vital to the sustenance of rural communities. Several million pastoralists and livestock herders in the arid and semi-arid regions in Afghanistan face a lack of employment opportunities and do not have access to farmland. These constraints result in a heavy reliance on animal based economies that derive most of their income and sustenance from rangeland livestock grazing. As a result, Afghan rangelands are being stressed as animal numbers expand to meet a growing human population demand. At the same time, both humans and animals are dependent upon a shrinking resource base. The current trend is unsustainable and is causing a cycle of poverty that, if left unchecked will continue in a downward spiral.
Because Afghan farmers have responded to the insecurity and instability of warfare by adopting survivalist agricultural practices such as overgrazing, the deterioration of basic rangeland resources remains one of the most serious problems facing the country. The destructive cycle was initiated some time ago but has intensified over the last 30 years. Overgrazing restricts livestock nutritive intake, exacerbates erosion, increases parasite problems in farm animals, and ultimately causes chronic and cumulative desertification of rangeland watershed areas.

Rangeland shrub and forest cover has suffered a significant negative impact from fuel wood collection. Rural families lack a reliable and sustainable alternate source of energy for cooking and heat other than the natural rangeland vegetative cover. Firewood traders organize large scale shrub uprooting and collection in remote areas for resale in the growing urban markets.

Shrubby vegetation serves a critical role in rangeland rehabilitation and restoration. The uprooting of rangeland shrubs, notably Artemisia, for fuel, denudes hillsides and removes natural barriers that slow and absorb water flow. The resulting rapid flow of water down the hillsides results in the loss of topsoil, massive erosion, downstream siltation and flash flooding. The deterioration of vegetative cover is a major problem for efficient water resource management.

**AWATT Rangeland Watershed Management Program**

**Program Description**

The RWM program will roll out a model development project in the watershed area of the village of Kashmond Kala in the Dare Noor district of Nangarhar Province. The initial efforts and focus of the RWM program will be to establish a successful and replicable model integrated watershed rehabilitation project that can serve as a demonstration program for expanded implementation of the RWM program.

RWM is an integrated rangeland watershed model program, fully owned by the DAIL and designed to rehabilitate upper and lower watersheds through local community involvement. As part of this process, local villagers are involved in the development, implementation and sustainment process. RWM seeks to control water flow, improve vegetation cover, manage grazing, and implement the DAIL’s Farm Resource Management (FRM) program in the connected lower watershed.

The project in Dare Noor consists of three major activities: construction of a series of check dams to slow and help capture rainwater, direct seeding of new rangeland grasses and shrubs in the riparian areas to control erosion, and education and training of the local villagers to encourage them to adopt sustainable and efficient farm resource and watershed management practices. The project also includes establishment of community based hoop houses to produce shrub seedlings and classes for women on poultry farming and bee keeping.

As part of the education process, RWM seeks to improve, manage and rehabilitate the lower watershed though implementation of the Farm Resource Management (FRM) program. FRM is a
lower watershed rehabilitation program designed to improve on-farm animal husbandry practices, water management practices, irrigation practices, and soil conditions through scientifically accepted forage and fodder crop rotation practices.

As a first step, local villagers constructed check dams and terraces throughout the upper watershed as part of the RWM pilot project in the Dare Noor district. These watershed infrastructures and the reintroduction of trees, shrubs and grasses will conserve water, improve and diversify plant cover and improve groundwater replenishment in the area.

In the lower watershed, AWATT’s Farm Resource Management program was introduced to establish sustainable agricultural practices that included rehabilitation of farmland and discouraged unfettered grazing of the upper watershed catchment areas. Greenhouses and nurseries were established to provide a local source of trees, shrubs and grasses to revegetate the denuded hillsides with plantings on terraces built throughout the upper watershed catchments.

Alternate livelihood training and support is provided to villagers and farmers in the affected watershed to diversify the economic base for the area and incentivize farmers and villagers to participate in and maintain the RWM program. Village females were provided training and initial startup equipment in small “backyard” poultry and beekeeping to provide an additional economic base to decrease the need for large animal flocks as a source of family income. Over time, reduced reliance on farm animals will allow the healing process to take place in the upper watershed.

**Program Focus**

The RWM program in the Dare Noor district focused on the following components:

- Reseeding rangeland with trees, shrubs and grasses;
- Local seedling production and transplanting;
- Watershed rehabilitation;
- Testing of introduced range plants in replicable trials;
- Applying rangeland management principles on the selected site;
- Involvement and participation of the local community in all processes of the RWM program;
- Introduction of the FRM program in the lower watershed.

**Program Objectives**

The RWM program objectives are:

- Improve the overall condition of the rangeland;
- Increase levels of available water for irrigated farming;
- Improve water quality;
- Reduce sediment in irrigation water and streams;
- Reduce erosion by slowing water run-off;
- Reduce flash flooding and minimize the risk of eroded and washed-out farm land;
- Provide a sustainable high quality source for forage to reduce rangeland grazing;
- Increase vegetation cover;
- Improve livelihoods of village farmers;
- Increase food security.

**Expected Outcomes**

The RWM pilot program is an ambitious project that seeks to provide large scale watershed rehabilitation throughout the eastern provinces of Afghanistan through the implementation of small scale locally supported watershed rehabilitation projects. As local micro-watersheds are rehabilitated, the participants of the RWM program can expect the following outcomes will be observed:

- Vegetation cover in the riparian areas will increase;
- Flooding, uncontrolled runoff and landslides will significantly decrease;
- Water erosion will be constrained through the construction of terraces and check dams;
- Rangeland plant communities will be diversified which will contribute to the continued propagation of rangeland vegetation;
- Rangeland plant, water and soil interaction will improve and result in increased vegetation and raising of the local water table over a significant period of time;
- Local employment opportunities and incomes will increase;
- Water quantity and quality will improve;
- Sedimentation and flash floods in the lower watershed will decrease;
- Available water for drinking, irrigation and livestock production will increase;
- Agricultural production and household incomes will rise.

**Model Program Site**

Forty hectares of rangeland were selected in Kashmond Kala village in the Dare Noor district of Nangarhar Province in January 2011. The site has two distinct components: the upper watershed, including associated rangeland watershed and riparian areas; and the lower watershed consisting of village farms and houses.
The Rangeland Watershed Management Pilot Project Area in Kashmond Khala Village, Dare Noor District, Nangarhar Province, Afghanistan

Program Partners

- Nangarhar DAIL
- AWATT
- Nangarhar ADT
- USAID/Nangarhar
- Nangarhar PRT
- US Army Corps of Engineers
- Nangarhar Provincial Council
- Dare Noor District Development Authority
- Kashmond Kala villagers

Beneficiaries

The RWM program will employ a significant number of local laborers in the program area. The success of the RWM program depends upon the local community being fully invested in the program. The anticipated improved agricultural productivity and economic benefits will increase the possibility of sustained behavioral change by the local villagers.

Farm resource management activities and efforts such as soil fertility, on-farm water management, efficient and sustainable crop rotation, introduction of Egyptian clover forage
legume, integrated crop/livestock systems, farm economic incentives, and community participation are incorporated in the RWM program as interfacing management techniques in the lower watershed farming system. Integration of the lower watershed improvement programs provides the foundation to encourage community participation in upper watershed rehabilitation efforts. Watershed rehabilitation activities in both the upper and lower watersheds will significantly contribute to the overall watershed reclamation.

The cash-for-work portion of the program targets, but is not limited to, unemployed non-land owning laborers. The hoop house nurseries have been sown with fourwing saltbush and forage Kochia Prostrate. Technical training on seedling production of range plants in hoop houses has been provided by AWATT to participating rural women and young farmers to provide additional training in agriculture and agri-business programs and techniques to encourage continued diversification of the local agriculture economy.

**Introduction of Exotic Range Plants**

Five range plants were introduced to Afghanistan by Dr. Hamdy Oushy, Rangeland Watershed Management Program Leader, from the State of New Mexico, USA to be evaluated in replicable trials as part of the pilot rangeland rehabilitation site. The three perennial grasses and two shrubs selected for evaluation were selected from rangeland shrubs and grasses common in New Mexico and recognized as hardy in a climate similar to that present in the Kashmond Kala Village area. The shrubs selected were: Fourwing saltbush (*Atriplex canescens*) and Forage Kochia Prostrate. The rangeland grasses selected were: Crested wheat grass, Russian wheat grass and Siberian wild rye.

**Hoop House Shrub Nursery**

The RWM project built three hoop houses for seedling production at the project site in Kashmond Kala village in February 2011. One hoop house is 6 meters by 30 meters and the second is 6 meters by 25 meters. *Atriplex canescens* and forage Kochia prostrate were seeded in these two hoop houses.
A third 6 meter by 20 meter hoop house was built to facilitate the adaptation of seedlings to the local environment. Funds for the construction of the hoop houses were provided by AWATT. The program also provided fertilizer, a water tank, sprinkler with hose and other technical tools sufficient to produce seedlings of *Atriplex canescens* and *Kochia prostrate*.

![Seedling production of Atriplex canescens and Forage Kochia Prostrate](image1)

Village farmers participated in hoop house nursery activities where they were trained in nursery-raising practices that can be adapted to the production of other seedlings.

![Three hoop houses for seedling production were established at Kashmond Kala village in Dare Noor District](image2)
Applied Rangeland Research Trials

Two replicable trials were conducted on the range site at Kashmond Kala village in CRBD with six replications. The two trials (1) evaluated the survivability and productivity of the three perennial grasses and forage Kochia and (2) evaluated different mixtures of forage Kochia prostrate with each of the three perennial grasses.

Seed Production Program

The four introduced range plants; Crested wheat grass, Russian wheat grass, Siberian wild ray, and forage Kochia prostrate were planted in four large plots for seed multiplication. The local community had contributed these four large plots to the project, free of charge, as a sign of commitment and ownership to the project’s activities. This will allow the Nangarhar DAIL Natural Resource Department to sustain and replicate the program in the other districts of Nangarhar Province.
Range plant seed multiplication sites at Kashmond Khala village in Dare Noor District, Nangarhar Province

**Community Participation & Capacity Building Approach**

**Community Participation**

Kashmond Kala village was selected as the first community to participate in the RWM model program by the Nangarhar DAIL and his natural resource staff. Kashmond Kala village is located in the central portion of Dare Noor province and consists of six separate tribes. The project was initiated through a shura hosted by the Nangarhar DAIL with the residents of the village. The Nangarhar DAIL also led a meeting between village leaders, elders and representatives of the Dare Noor District Development Council. The meetings introduced local community members and leaders to the RWM project objectives and activities.

*The District Council of Dare Noor District meets with the project, the project team members at the project site in Kashmond Kala*
The local community leaders approved the project work plan; Dr. Hamdy Oushy explains the work plan to the project team.

The participation of the local community on the rehabilitation process of range and watershed is essential. After they received training, the village residents implemented all RWM field activities on the 40 hectares covered by the project. Project supervision was provided by the AWATT field representatives. In addition to training for project workers, an educational and training program was delivered to local villagers, elders, Shura Council members and farmers about the rangeland rehabilitation program on the designated upper watershed area.

**Cemented check dam construction**

Six cemented check dams have been built on the upper watershed. Their dimensions ranged between; long: 18-12 m; width: 1-1.5 m; height: 1.5-2.0 m with the mouth on the top middle. They were constructed by using local materials such as rocks and sand; in addition to 100 bags of cement.

*Local laborers’ on-the-job training to layout and construct cemented check dams at Kashmond Kala village in Dare Noor District, Nangarhar Province*
Layout of the check dam sites in the upper watershed area at Kashmond Kala village in Dare Noor District, Nangarhar Province

Sand, cement and water were transferred to the upper range watershed using donkeys to construct check dams at Kashmond Kala village

Cemented check dams under construction at Kashmond Kala village in Dare Noor District, Nangarhar Province
Cemented check dams under construction at Kashmond Kala village in Dare Noor District, Nangarhar Province

Final check dams No. 1 and 3 at Kashmond Kala village in Dare Noor District, Nangarhar Province

Final check dams No. 4 and 6 at Kashmond Kala village in Dare Noor District, Nangarhar Province

**Terraces establishment**

1030 half circle terraces have been established in 40 hectares of rangeland at Kashmond Kala as shown on the photos below.
DAIL-Natural Resource Department staff and local villagers’ on-the-job training in rangeland rehabilitation using terraces establishment

Typical half circle terrace that was replicated over 40 hectares 1030 times for reseeding of Kochia Prostrate and three perennial grasses

**Range plants direct seeding**

Direct seeding of the three exotic perennial grasses; Crested wheat grass, Russian wheat grass and Siberian wild ray as well as forage Kochia Prostrate have been taken place in 1030 terraces at Kashmond Kala village in Dare-Noor District, Nangarhar Province.
Young Afghan agricultural engineers were carrying out rangeland rehabilitation through direct seeding in half circle terraces

Crested wheat grass and forage Kochia prostrate have been well established in terraces due to direct seeding

Capacity Building

The Nangarhar DAIL Natural Resource Management Director, Hamidullah Nazir, and his team were involved with project field work from the initiation of the project. Eng. M. Hussein Safi, the Nangarhar DAIL, frequently visited the project site to emphasize the Provincial government’s support and involvement in the project. Two DAIL extension workers from the Dare Noor District agriculture extension office were trained on project completion and management to ensure the sustainability and replicability of the project. An additional AWATT employee was hired and trained to provide overall supervision of the project.

Working in cooperation with the Nangarhar DAIL, the Nangarhar ADT facilitated the development of a capacity building program to train local villagers. The ADT capacity building program focused on providing training in alternative small scale agri-businesses such as backyard poultry production and beekeeping. Both programs provide additional income and employment opportunities for village females. In addition, the establishment of local bee hives facilitated the pollination of established rangeland grasses and shrubs to ensure their continued propagation.
As part of the incentive program to encourage village farmers to control grazing in the watersheds riparian areas, Nangarhar ADT has committed to seek funding to provide support to the FRM program by providing initial supplies of barley and other livestock inputs. After evaluation, the capacity building efforts of the Nangarhar ADT may serve as a model to train members of the Nangarhar DAIL staff and other western province DAIL staffs in providing local small scale agri-business development training programs.

Local community members and DAIL Natural Resources staff were trained in:

- Rangeland plant seed multiplication and seedling production;
- Hoop house operation and management;
- Direct seeding of range plants in terraces;
- Construction and establishment of half circle terraces;
- Construction of cemented check dams;
- Rangeland grazing management.

In addition, two training programs with 25 local rural women participating in each program, have been presented at the RWM project site at Kashmond Kala Village in Dare Noor District, Nangarhar Province: Poultry program and Beekeeping program.

25 local rural women participate in the Poultry training program at Kashmond Kala Village in Dare Noor District, Nangarhar Province
The ADT Training Program provided each of the 25 local rural women who participated in the Poultry Training Program with adolescent chickens and roosters as well as feeding and watering equipment.

25 local rural women participated in the Beekeeping Training Program at Kashmond Kala Village in Dare Noor District, Nangarhar Province.

The ADT Program provided each of the 25 local rural women who participated in the Beekeeping Training Program with some beekeeping equipment and a bee hive.
FRM and RWM Programs

The Farm Resource Management (FRM) program will formally start up in October 2011 in the lower watershed farming area of Kashmond Kala village which is connected to the pilot upper rangeland watershed rehabilitation area. FRM is a program of the Nangarhar DAIL that is designed by AWATT to break the cycle of rice/wheat, improve soil fertility, control weeds and diseases, improve on-farm animal husbandry practices, improve on-farm water management practices, improve soil conditions through scientifically accepted forage legume and fodder crop rotation practices, and begin rehabilitation of the lower watershed.

Project Owner and Work Team

The Nangarhar DAIL is the owner of the RWM project. The DAIL's Dare Noor Agriculture Extension Agents and Natural Resource Department provides direct technical and administrative support to the residents of Kashmond Kala village to ensure the sustainability of the RWM program.

The residents and farmers of Kashmond Kala village are the direct beneficiaries of the RWM and FRM programs. The village residents are responsible for the construction and maintenance of the program projects with the assistance of the DAIL's professional staff.

The RWM project is jointly supported by the USAID, the USDA, the Nangarhar ADT and the Nangarhar PRT.

The USAID Field Program Manager for Nangarhar Province, USAID-Office of Agriculture, is responsible for the supervision of all USAID activities related to the RWM program.

Dr. Hamdy Oushy, the AWATT FRM & Rangeland Program Leader, is responsible for the technical supervision of both the RWM and FRM program.

The Nangarhar ADT is a key partner in the RWM project through its support of capacity building in the FRM program and direct mentoring of the DAIL’s district agriculture extension agents in the key terrain areas of Nangarhar Province.

USDA provides technical advice and support for the RWM and FRM program.

The Nangarhar PRT provides technical mapping and hydrology support through its engineering section and the US Army Corps of Engineers.

Conclusion

The RWM program relies on community support and involvement to be successful. Community involvement and support can only be achieved with programs that are fully owned and supported by the Provincial DAIL and the District government. Involvement of the Provincial DAIL and District government will increase the legitimacy of the government of Afghanistan with local villagers and demonstrate the government’s ability to provide development programs that are successful and meet the needs of the people.
USAID, AWATT and coalition forces must provide support to the Provincial DAIL until the government of Afghanistan is capable of assuming full support for the program. However, the program must be seen as government-led with support from the USAID, AWATT and the coalition forces, and not the other way around. This ensures that the government is seen as providing basic services to its people which will help to counter the insurgency.

The RWM program partners believe that the success of the Kashmond Kala Village watershed rehabilitation program can serve as a model for the widespread expansion of manageable small scale watershed rehabilitation projects throughout Afghanistan that will begin providing benefits to the farmers and people of Afghanistan in the near term. However, getting local villagers invested in the program is the key to success.
ACKNOWLEDGEMENTS

I would like to acknowledge the contributions, collaboration, and support of the US Government Team in Nangarhar province, ADT, USAID, USDA, PRT and DAIL/Nangarhar in the development of the integrated model of RWM and FRM in selected upper and lower watershed area in Kashmond Kala Village in Dare Noor, Nangarhar Province in Afghanistan.

In addition to US Army Corps of Engineers who contribute the valuable data and maps for the watershed areas in Dare Noor District and in Nangarhar Province. Also, I would like to acknowledge the sincere efforts of the Nangarhar Provincial Council and Dare Noor District Development Authority to organize the local community to support our effort to rehabilitate the rangeland watershed pilot site at Kashmond Kala Village.

Moreover, I would like to acknowledge the great support of New Mexico State University, AWATT team in Nangarhar Province, Dr. Jim Libbin, Dr. Derek Bailey and Dr. Sam Fernald for their sincere support to establish this pilot project and provide the model for MAIL to rehabilitate other rangeland watershed areas in Afghanistan.

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- Hamdy Oushy