

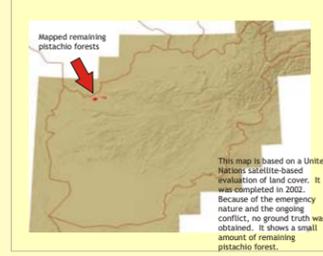


Reforestation, Irrigation, and Crop Improvement In Afghanistan: Defining the Problem

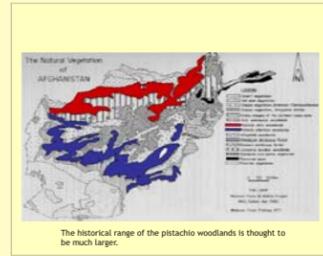


Our investigation began in 2005 with an attempt to rehabilitate mountainous pistachio woodlands in northern Afghanistan. These projects were funded by a number of sponsoring U.S. agencies, with the help of the Afghanistan Forestry and Range Department, the Afghan Conservation Corps, the United Nations, and other cooperating organizations.

Please see the publications:
Shovitz, H. F., 2005. *Continuing Pistachio Woodland Rehabilitation in Afghanistan: Pistachio Woodlands TDY 2 Report*. November 20, 2005. Prepared for USAID/Afghanistan, Office of Agriculture & Rural Development.
Gosula, L. and H. F. Shovitz, 2005. *Initiating Pistachio Woodland Rehabilitation in Afghanistan: Pistachio Woodlands TDY 1 Report*. June 22, 2005. Prepared for USAID/Afghanistan, Office of Agriculture & Rural Development.
For more information.



This map is based on a United Nations satellite-based evaluation of land cover. It was completed in 2002. Because of the emergency nature and the ongoing conflict, no ground truth was obtained. It shows a small amount of remaining pistachio forest.



The historical range of the pistachio woodlands is thought to be much larger.



In fact, for pistachio woodlands, our own evaluation of its quality showed significant spatial and classification problems.



Hence we developed a generalized map of present pistachio locations. This map was good enough to help us decide there are enough remaining woodlands to justify further work. However, it was not enough to plan projects.

So we decided to do a project plan for part of the Samangan Province. We obtained high-resolution satellite imagery and mapped actual pistachio distribution and density. However, no satellite-based assessment is worth much unless ground-truthed.



These methods are:

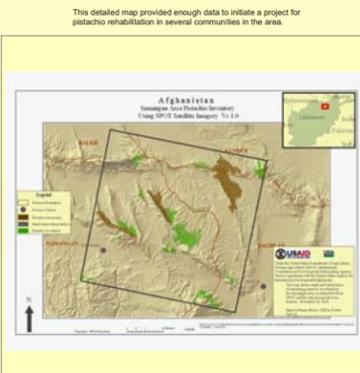
- Low level flights using GPS-based cameras
- Field trips using knowledgeable Afghan scientists with GPS-based cameras and notes.
- High-resolution imagery interpretation co-located with LANDSAT imagery
- Field trips and experience using Provincial Reconstruction Team (PRT) personnel
- Maximizing the use of climate, water, and geologic/soil information from existing assessments.



High-resolution imagery for the Samangan area



Ground-truthing flights for the Samangan project.



This detailed map provided enough data to initiate a project for pistachio rehabilitation in several communities in the area.



With this more detailed information, a plan was developed in late 2005 emphasizing local involvement in the areas identified by the map.



The project was accomplished with local contacts and the Afghan Conservation Corps (ACC).

A case study in 2007 confirmed success of this plan, which is due, in part to an accurate inventory of resource potential.

USAID AFGHANISTAN CASE STUDY Pistachio Woodlands Rehabilitation

Pistachio woodlands in northern Afghanistan have been severely degraded by decades of conflict. This case study describes the success of a project to rehabilitate these woodlands, focusing on the role of local involvement and the use of remote sensing technology.

The project was initiated in 2005 and completed in 2007. It was funded by USAID and implemented by the Provincial Reconstruction Team (PRT) in Samangan Province. The project's goal was to improve the livelihoods of the local population by restoring the pistachio woodlands, which are a vital source of food and income.

The project was successful in several ways. First, it improved the local population's access to pistachio woodlands. Second, it improved the local population's knowledge of forest management practices. Third, it improved the local population's ability to monitor and manage their own woodlands.

The project was a model of successful development assistance. It was based on a thorough understanding of the local context and the needs of the local population. It was also based on a strong partnership between the PRT and the local community.

But this project only looked at pistachio forests. In a small part of the country. A much bigger problem is apparent, based on local opinion and some general comparisons.



We think there is a significant deforestation and range degradation in Afghanistan. We know there is a problem.

These two data sources are incompatible and unverifiable. And there are no others. All were destroyed in the wars. These two maps are all that can be found to justify our concern. But they are not enough to plan any kind of projects or even to prioritize where to look.

Though we know degradation of forest and rangeland is still occurring, we don't know how much and where. See below for a project that is attempting to address the problem.

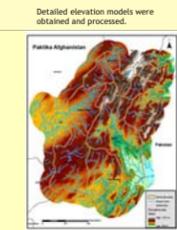
A new project has been initiated by the Provincial Reconstruction Team and the Army Corps of Engineers in Paktika Province. It's objective is to evaluate potential water resource projects that will benefit the people of that region. Project planning may include hydropower potential, flood control, erosion control, irrigation dams, canals, drains, and sanitary concerns. Project completion is anticipated in March 2008.



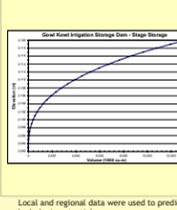
Some 12 projects areas have been proposed so far.



Here are examples of the kinds of dams that may be proposed: small irrigation and flood control dams and check dams to reduce flooding and erosion.



Detailed elevation models were obtained and processed.

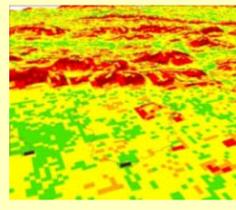


Local and regional data were used to predict hydrologic potential.

However, siltation and flooding is an enormous problem in these areas. Reservoirs can become completely non-functional in a few years. Therefore an additional sub-project was developed to help assess watershed conditions and make recommendations for reduction of erosion and sedimentation.



The watershed restoration part of this project makes use of imagery and experience on the ground, using exactly the same ground-truth methods used above. Here is an example of 3D interpretation of a watershed with a proposed dam site. Note the identified sediment sources stand out in this view, and can be quantified using the slope classification below.



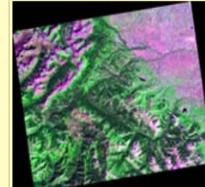
A similar sediment-contributing area on the ground



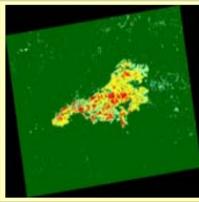
Recommendations for watershed restoration will be included on a local basis. Determining the land use in the area is dependent on local PRT personnel.

There is a larger problem. Deforestation in upper reaches is contributing to sediment loads and floods. To evaluate watershed condition and potential we need an estimate of deforestation.

The U. S. Forest Service has developed a satellite-based system for determining vegetation change after forest wildfires. It is based on modeling of a set of spectral band combinations that differentiate vegetation from rock and soil. When two imagery dates are compared, an absolute change in vegetation status can be calculated.



This result shows the probable vegetation change from a wildfire. The color red indicates total vegetation removal, yellow and green, a partial removal.



Here are two satellite images purchased for this project. The U. S. Forest Service model will be applied to these two images, and ground-truthed using the methods described above.



When this is completed, we will have an answer to "How much" and "Where" and can begin to build recommendations to reduce erosion and sedimentation when combining this with the site recommendations. This will begin the process of watershed-level rehabilitation, which is critical to the long-term success of our irrigation projects, as well as long-term success in Afghanistan's reconstruction.

These applications of remote sensing are non-traditional. They have a higher potential for error than many studies made under less-trying circumstances. But they have one advantage for the country of Afghanistan. They are consistent, repeatable, and ground-truthed. They can help us define the problem.

Indeed, the most valuable part of any problem-solving process is to accurately answer the question "What is the problem?" These methods can help us do so.

Cooperating Agencies: U. S. Department of Agriculture Foreign Agricultural Service, U. S. Agency for International Development, U. S. Army Corps of Engineers, the U. S. Forest Service, the United Nations, the Afghan Conservation Corps, and the U. S. Army

Logos for USDA, USAID, UN, ACC, and U.S. Army.

Map by Henry F. Shovitz, PhD, U. S. Forest Service, Gallatin National Forest, Feb. 3, 2008