U.S. Agricultural Technology & Benefits for Uzbek Farmers

More than 50 years ago in the United States, farmers relied on furrow and flood irrigation systems, much like those used in Uzbekistan today. Beginning in the 1970s, farmers steadily transition sprinkler irrigation systems to increase crop yields. In the past few decades, farmers have continued to transition to more high-efficiency irrigation and management systems, including drip irrigation technology, to conserve water and combat environmental degradation, both of which are concerns in Uzbekistan.

For much of the 20th century, the United States built infrastructure such as dams, pipelines, and other mechanisms to move water from the source area to arid areas of the country for agriculture and other needs. This system proved to be unsustainable, and now vital rivers are at risk of drying. The U.S. is now transforming its approach to integrate planned, centralized systems of water management with small-scale, localized facilities. This latter path focuses on the finished product -the end result of the water use - not the water use itself. This path emphasizes producing the final good with the most efficient use of water, thereby decreasing total water usage.

Efficient water use and efficient irrigation methods can benefit Uzbek farmers and citizens by increasing crop yields while using less water, ensuring that vital water resources remain for future generations.

I. Introduction
   a. Introduction to Uzbek farming systems and problems (refer to previous paper)
      i. Inefficient water use (Aral Sea and its sub-catchments: Amu Darya and Syr Darya), soil salinization, loss of agriculture land due to salinization, poor water quality (World Bank)

II. Background
   a. Use of furrow and flood in the U.S. prior to the 1970s
      i. Contour furrowing, ripping, and pitting have been used since the 1930s in the U.S. (Branson)
      ii. Mechanical technology used to implement these irrigation systems include: plows, listers, disc plows, rippers, motor patrols, road graders, trenchers, furrowers (Branson)
   b. Agriculture problems in U.S.
      i. Furrow and similar systems not always helpful in arid climates, like Arizona. Soil type is important factor in determining if furrowing will be helpful (Branson)
         1. Uzbekistan has arid climate (World Bank), and therefore can learn from U.S. irrigation adaptations in its arid regions, like Arizona)

III. Transition to new irrigation system technologies
   a. 1978 – sprinkler irrigation accounted for 35% of irrigation in American West
   b. Trickle, subsurface, sprinkler irrigation lead to higher yields than do furrow systems (Al-Jamal)
   c. drip irrigation, low-energy precision sprinklers, better information as to when and where to irrigate can save water (Gleick)
   d. Microsprinklers – 95% efficiency compared to flood irrigation at 60% or less efficiency

IV. Water management and delivery systems
   a. U.S.
      i. Previously – dams, pipelines, aqueducts, centralized facilities (Gleick)
         1. Large storing facilities are expensive and often fail to accurately project future needs (Gleick)
      ii. Current/future – small-scale, localized facilities complement large, centralized facilities (Gleick)
         1. Improve water productivity rather than seek new water sources (Gleick)
         2. Satisfy demands for agricultural goods using less water when water is used more efficiently (Gleick)
   b. Uzbekistan
      i. Over use, inefficient use of water from Aral Sea – unsustainable, causing water salinization, water logging, environmental disaster if continues. There is already a water

deficit in Uzbekistan. Rural communities especially vulnerable. (World Bank)

1. Better water management, delivery, and irrigation systems will address these problems

V. Conclusion

Sources:

http://siteresources.worldbank.org/ECAEXT/Resources/258598-1277305872360/7190152-1303416376314/uzbekistancountrynote.pdf

- ⇨ World Bank policy recommendations: "*Optimization of land use and crop selection by matching crops and irrigation to suitable land types, Reconstruction and maintenance of economically viable irrigation delivery and drainage infrastructure to improve system water use efficiency, Introduction of new irrigation techniques and improvement of existing techniques to enhance water-use efficiency, Development of water resource monitoring, including improvement of the water recording system and quality management*"

Contour Furrowing, Pitting, and Ripping on Rangelands of the Western United States, Branson et al.

Comparison of sprinkler, trickle and furrow irrigation efficiencies for onion production, Al-Jamal, et al
http://elmu.umm.ac.id/file.php/1/jurnal/A/Agricultural%20Water%20Management/Vol46.Issue3.2001/1576.pdf

Global Freshwater Resources: Soft-Path Solutions for the 21st Century, Gleick

Enhancing Water Use Efficiency in Irrigated Agriculture, Howell

Dynamic Adjustment of Irrigation Technology/Water Management in Western U.S. Agriculture: Toward a Sustainable Future, Schaible et al.