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Improving Water and Energy Use Efficiency in the Lift Irrigated Areas of Uzbekistan

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Innovative water solutions for sustainable development

Food · Climate · Growth

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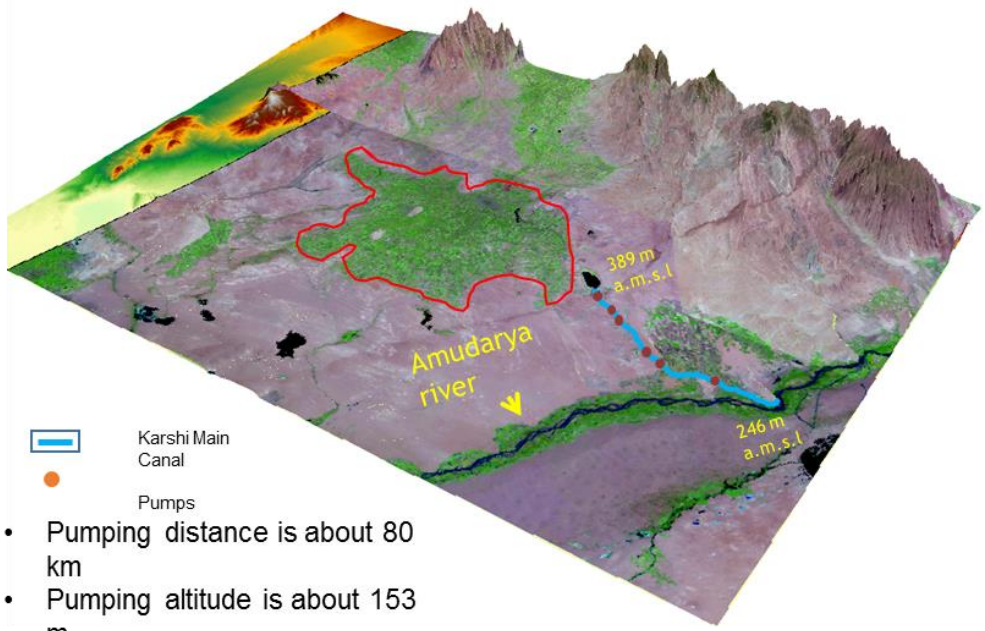
CGIAR

Irrigated Agriculture in Uzbekistan

- ✓ Irrigated agriculture contributing 30% to overall GDP, employs 27% of the rural population, and generates 25% of all export revenues (World Bank, 2020)
- ✓ ~97% of crop production is cultivated in the irrigated areas;
- ✓ 4.3 million ha of irrigated area; more than 50% of this area under the lift irrigation;
- ✓ Lift irrigated area consumes ~20% of total available energy of the country.
  - annually 7.5-8.5 bln. kWh of energy used for pump operation;
- ✓ The Government of Uzbekistan annually subsidizes around US$ 450 mln. for energy resources in the lift irrigated areas.

Major challenges in the Irrigated Agriculture of Uzbekistan

- ✓ Population growth along with emerging climate change has resulted in rising demand for **water**, **energy**, and **food** production;
- ✓ According to climate scenarios, Amu Darya river flow might be reduced 15% by 2050;
- ✓ Farmers use conventional irrigation practices that lead to excess drainage water runoff;
- ✓ Inefficient irrigation practices have led to water losses and caused excessive consumption of energy by outdated pumps;



- Pumping distance is about 80 km
- Pumping altitude is about 153 m
- Irrigated area is about 335,000 ha

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Return flow back to water bodies from lift irrigation scheme

Source: Avezmuradov,2018

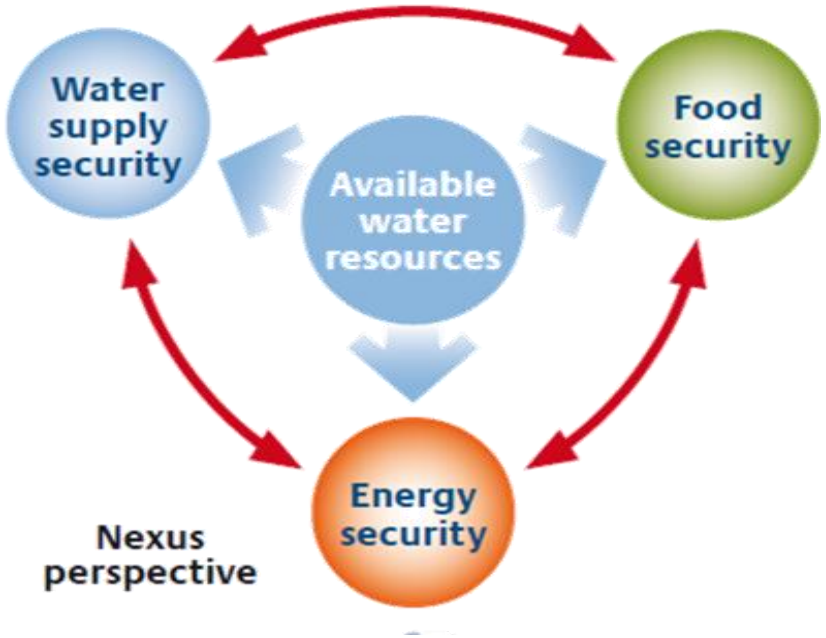
Operationalization of WEF nexus in the lift irrigated agriculture

- The Water–Energy–Food (WEF) nexus is a framework for analysing the dynamic interactions between water, energy and food systems and developing strategies for sustainable development (Liu et al. 2017);

- At the heart of the nexus approach is a strong understanding of the interdependencies among these three systems and how to ensure water, energy and food security for a growing population;

- WEF nexus helps to identify and manage trade-offs and to build synergies, allowing for more integrated and cost-effective planning and decision making;

- There is limited application of WEF nexus application in the development projects and quantitative assessment of WEF nexus benefits;



Project objective

The main aim of this project was to improve water and energy use efficiency in lift irrigated areas through the lenses of WEF nexus (USAID funded, 2015-2018, partners: Ministries, BWMO, WUAs and farmers)

Specific objectives:

- ✓ Create a spatial data base for estimating the sub-basin water and energy use efficiency using a combination of archival data collection, field data collection, and RS/GIS methods;

- ✓ Document best practices of farmers on water and land management implemented in in the region;

- ✓ Assess the potential impact of improvements in the water use efficiency and energy use intensity through development of different scenarios;

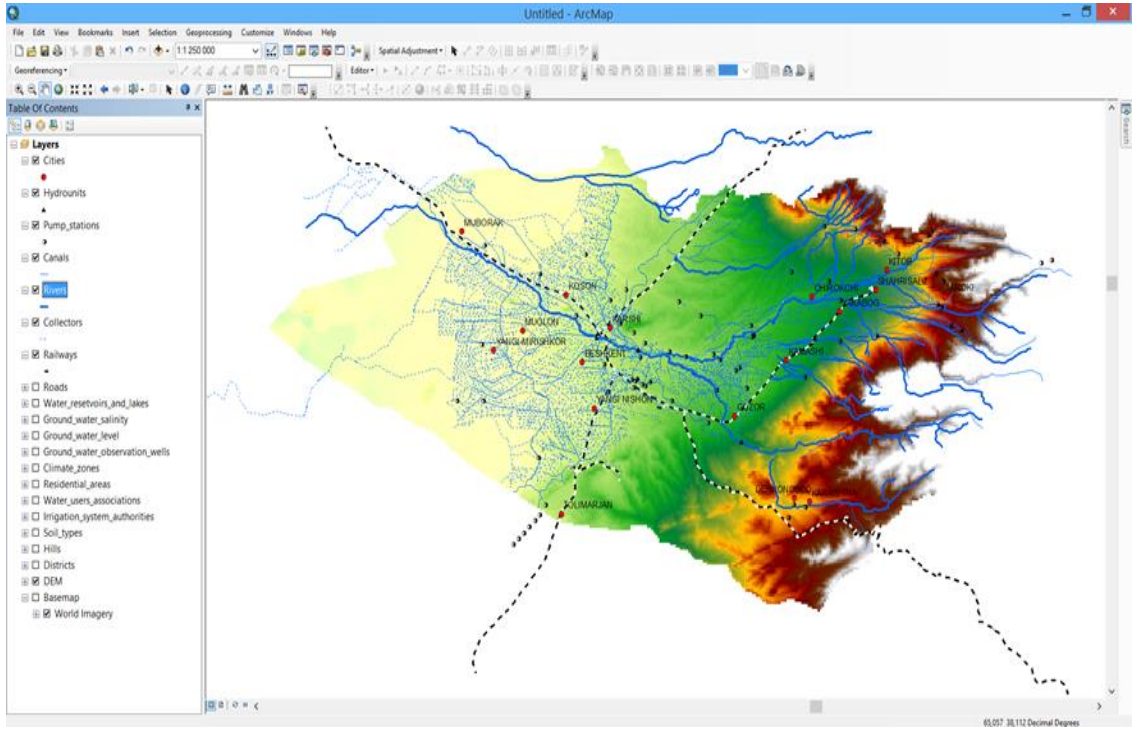
- ✓ Prepare key recommendations for policy makers to improve existing water management strategies in the lift irrigated areas of Central Asia including Uzbekistan.

Geodatabase for Kashkadarya region

Geodatabase is a collection of geographic datasets of various types held in a common file system.

Content:
- Agricultural administration
- Ground water
- Water resources
- Climate
- Soil
- Land cover/use
- Vegetation
- Crop classification

Methods:
- Analogue data
- Satellite image analyses
- Climate model
- Field trips



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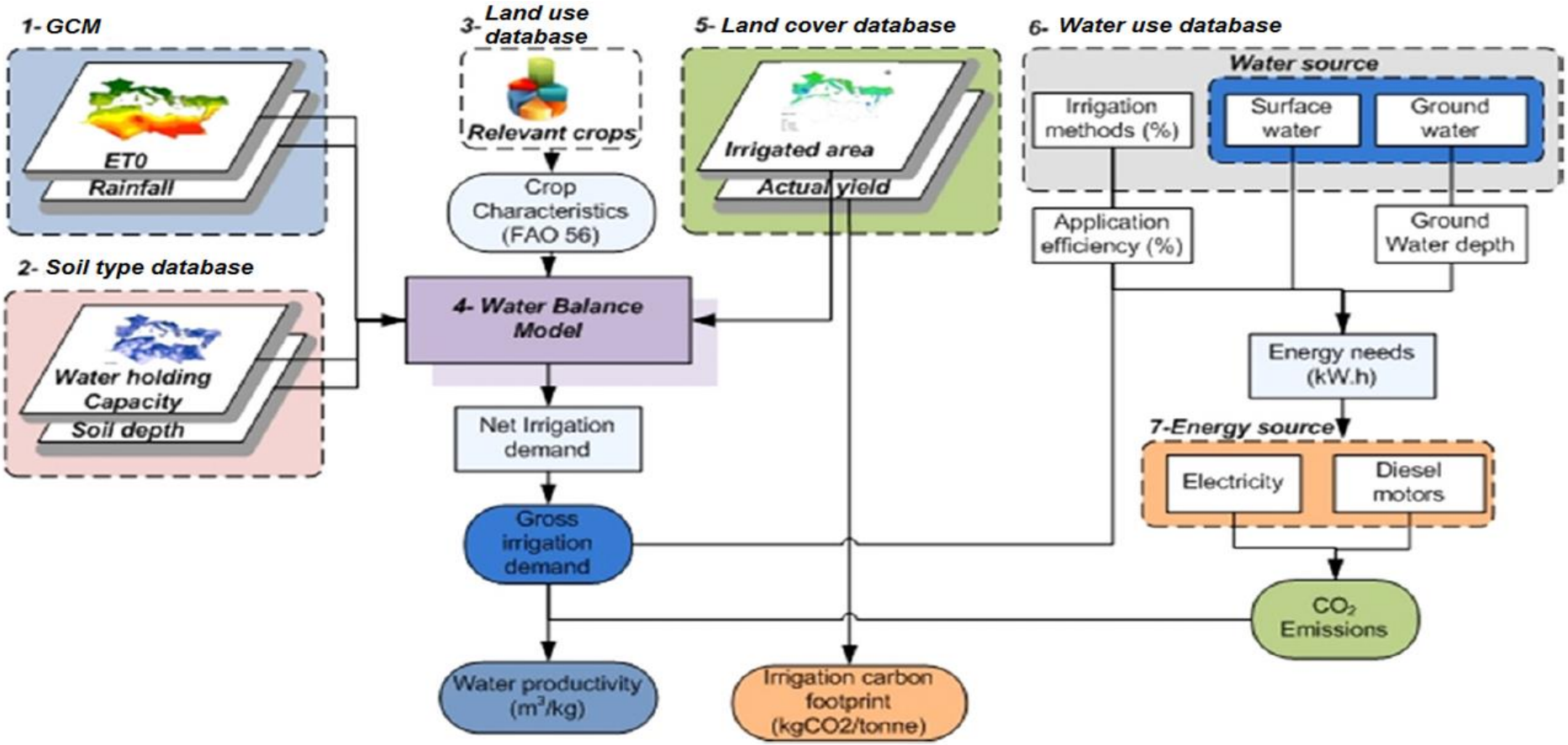
Documented water saving technologies

Project methodology

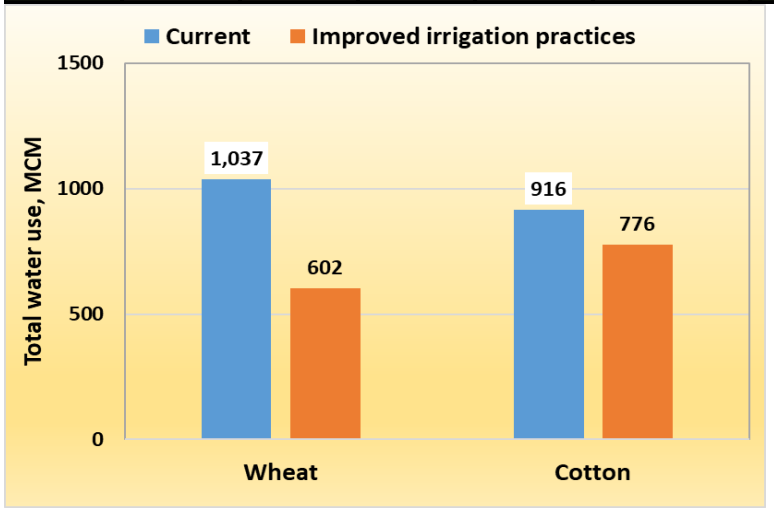


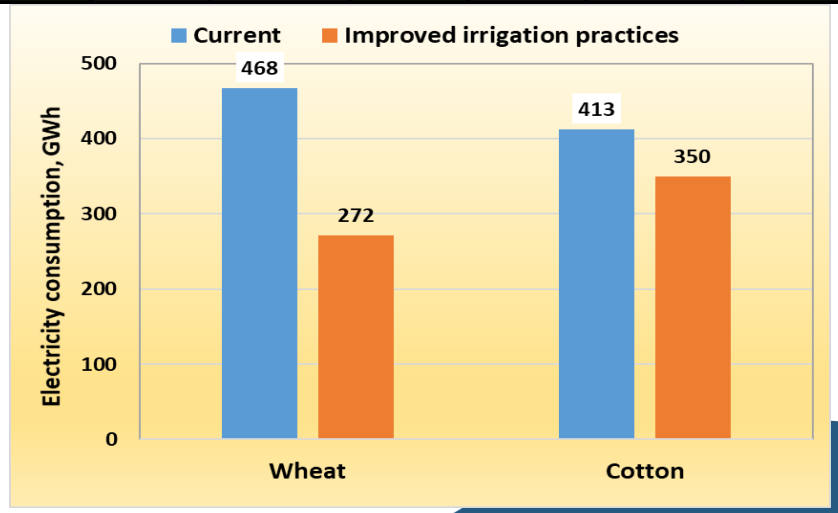
Adapted from DACCACHE et al., 2014

Research results in Karshi steppe

Total water use, water and energy consumption saving under current and improved irrigation practices (Karshi)

Crop	Total pumped area, ha	Irrigation application, mm		Total water use, MCM		Total water saving, MCM	Electricity consumption, GWh		Total energy saving, GWh	GHG emissions, Kton		CO_2 reduction, Kton of GHGs
		Current	Improved irrigation practices	Current	Improved irrigation practices		Current	Improved irrigation practices		Current	Improved irrigation practices	
Wheat	102600	1011	587	1037	602	**435**	468	272	**196**	219	127	**92**
Cotton	119681	765	648	916	776	**140**	413	350	**63**	194	164	**30**
Total	222281	N/A	N/A	1953	1378	**575**	880	621	**259**	413	291	**122**





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Conclusions and policy recommendations

- ✓ Current government policies on energy subsidy in the lift irrigated areas do not support water and energy savings. Therefore if the government shifts subsidies from energy to water-saving technologies, it will improve water and energy use efficiency;

- ✓ Project findings indicated that improving on-farm water management leads to save 30% of water, 30% of energy consumption, reduce CO2 emission by 30%. In addition, increase water productivity, reduce return flow and protect the environment;

- ✓ There is a need to introduce institutions and policies to create incentives for water and energy saving, which is currently under implementation.

Policy Uptake

- The results demonstrating multi-benefits of promoting new irrigation technologies in lift irrigated areas were communicated to stakeholders from the presidential administration and the Ministries of Water Resources and Economy in Uzbekistan

- The government has adopted a strategy to expand drip irrigation areas by up to 253,381 ha during 2019-2022, which will cover up to 50% of drip irrigation costs to farmers and exempt them from land tax for five years.

- Our key recommendations helped government officials in Uzbekistan to expand the program target on water saving technologies to 450,000 ha in 2021. This program came into effect on December 11, 2020 through a Presidential resolution

Project publications

- Djumaboev K, Hamidov A, Anarbekov O, Gafurov Z and Tussupova K. (2017). Impact of Institutional Change on Irrigation Management: A Case Study from Southern Uzbekistan. Water 2017, 9(6), 419, doi: 10.3390/w9060419 http://www.mdpi.com/2073-4441/9/6/419

- Kakhramon Djumaboev, Ahmad Hamidov and Oyture Anarbekov 2017.Collective Action in the Irrigation Sector of Uzbekistan: A case Study of Water Consumers Associations (WCAs) in the Karshi Steppe of Uzbekistan. http://centralasia.iwmi.cgiar.org/regional-content/central_asia/pdf/collective_action_in_the_irrigation_sector_of_uzbekistan.pdf

- Kakhramon Djumaboev, Tulkun Yuldashev, Bunyod Holmatov and Zafar Gafurov (2018). Assessing Water Use, Energy Use, and Carbon Emissions in Lift Irrigated Areas: A case Study from Karshi Steppe in Uzbekistan. Paper accepted for publication. Irrigation and drainage journal of International Commission on Irrigation and Drainage. https://onlinelibrary.wiley.com/journal/15310361

- Gafurov, Z., Eltazarov, S., Akramov, B., Djumaboev, K., and Anarbekov, O. 2018. *Geodatabase and Diagnostic Atlas: Kashkadarya Province, Uzbekistan*. Colombo, Sri Lanka: International Water Management Institute (IWMI). http://centralasia.iwmi.cgiar.org/regional-content/central_asia/pdf/geodatabase_and_diagnostic_atlas-kashkadarya_province-uzbekistan.pdf

- Gafurov, Z., Eltazarov, S., Akramov, B., Djumaboev, K., and Anarbekov, O. 2018. *Information tool for Zafarabad district, Sogd province (Tajikistan)*. Colombo, Sri Lanka: International Water Management Institute (IWMI). http://centralasia.iwmi.cgiar.org/regional-content/central_asia/pdf/information_tool_for_zafarabad_district_sogd_province_tajikistan.pdf

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Thank you

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