RESEARCH PROGRAM ON Water, Land and Ecosystems

CGIAR

Evidences

Study #3959

Contributing Projects:

- P511 - Water and irrigation in Central Asia

Part I: Public communications

Type: OICR: Outcome Impact Case Report

Status: Completed

Year: 2020

Title: WLE/IWMI research findings on water and energy use in lift irrigated areas have impacted water policies in Uzbekistan, potentially applicable to over two million hectares

Short outcome/impact statement:
WLE/IWMI research findings demonstrated that substantial water and energy savings could be achieved by adopting more efficient irrigation technologies in the lift irrigated areas of Uzbekistan. Researchers engaged with decision makers and recommended that the government shift subsidies from energy to water saving technologies. This recommendation has been adopted in a state program on water saving technologies covering 450,000 hectares in 2021.

Outcome story for communications use:
Research shifts policy from energy subsidy to water savings in Uzbekistan's irrigated heartland

In Uzbekistan, most agricultural land is irrigated with water pumped from two rivers, the Amu Darya and Syr Darya. This pumping consumes 20% of the country's power, and to keep power affordable for farmers and other users, the government sinks USD 450 million into energy subsidies every year. Research by the International Water Management Institute (IWMI) and CGIAR Research Program on Water, Land and Ecosystems (WLE) has demonstrated an alternative, and led the government to redirect some subsidies towards more efficient irrigation that saves water and energy.

The researchers determined the performance of different irrigation methods under the conditions of the Aral Sea Basin, and found that current practices are energy-inefficient and create return flow, waterlogging and salinity problems. Drip irrigation, however, achieved a 30% saving in water–and therefore pumping energy–while improving yields.

The analysis was a robust application of the water-energy-food nexus concept, showing how on-farm choices could lead to multiple benefits. Research in Karshi Steppe indicated that optimized irrigation could save half a trillion liters of water, spare 259 gigawatt-hours of electricity, and cut 122,000 tons of carbon dioxide emissions.

IWMI shared these results at a workshop with Uzbekistan's presidential administration and Ministries of Water Resources and Economy. The researchers' recommendations – that the government shift subsidies towards water saving technologies, while seeking to build institutions and create incentives for water and energy savings – were taken to heart.

The government quickly adopted a new strategy to expand drip irrigation: they would cover up to half the costs of setting up systems, and farmers who did so would be exempt from land taxes for five years. The initial target was to roll out water saving technologies on more than 250,000 hectares of land between 2019 and 2022, and this was soon upped to an even more ambitious 450,000 hectares.

The embrace of the research was helped by the widespread collaboration that went into it. This included the United States Agency for International Development, National Academy of Sciences and Department of Agriculture, and Uzbekistan's Uzgip Institute, Amu-Kashkadarya Basin Irrigation System Authority and Information Analytical Center.

The program launched with a presidential resolution in 2020, receiving national television attention. As farmers respond and try out drip irrigation, the shift in subsidies should enable better livelihoods, less competition for resources, and a healthier balance in the water-energy-food nexus.

Links to any communications materials relating to this outcome: <Not Defined>

Part II: CGIAR system level reporting

Link to Common Results Reporting Indicator of Policies : Yes

Policies contribution:

- 676 - Uzbekistan Presidential Resolutions #5742 and #4919 shift subsidies from energy to water saving in lift irrigation schemes (https://tinyurl.com/2e35wewa)

Stage of maturity of change reported: Stage 2

Links to the Strategic Results Framework:

Sub-IDOs:

- Agricultural systems diversified and intensified in ways that protect soils and water

Is this OICR linked to some SRF 2022/2030 target?: Too early to say

Description of activity / study: <Not Defined>

Geographic scope:

- National

Country(ies):

- Uzbekistan

Comments: <Not Defined>

Key Contributors:

Contributing CRPs/Platforms:

- WLE - Water, Land and Ecosystems

Contributing Flagships:

- F2: Land and Water Solutions for Sustainable Intensification (LWS)
- F4: Managing Resource Variability, Risks and Competing Uses for Increased Resilience (VCR)

Contributing Regional programs: <Not Defined>

Contributing external partners:

- Ministry of Water Resources of Uzbekistan
- USDA - U.S. Department of Agriculture

CGIAR innovation(s) or findings that have resulted in this outcome or impact:

No

Innovations: <Not Defined>

Elaboration of Outcome/Impact Statement:
In Uzbekistan, more than half of 4.3 million hectares (ha) of agricultural land is under pump irrigation. The water is lifted from two major rivers, the Amu Darya and Syr Darya. Water pumps consume 20% of the energy generated in Uzbekistan, and USD 450 million is spent annually for energy subsidies. Water losses due to inefficient irrigation practices cause excessive energy consumption, which limits electricity transmission to other sectors (1). Additionally, these practices create problems of return flow, waterlogging and salinity (2).

A research project implemented by WLE/IWMI assessed drip irrigation performance and documented 30% irrigation water savings and improved crop yields compared to the normal practice (3). The project emphasized involvement of women including in special training programs and offering opportunities for women scientists.

The results, demonstrating the multiple 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 a workshop organized by IWMI (4, 9). The researchers recommended that the government should shift subsidies from energy to water saving technologies in lift irrigated areas. The need to introduce institutions and policies to create incentives for water and energy saving was also emphasized during the workshop.

Consequently, the government adopted a strategy to expand drip irrigation areas by up to 253,381 ha between 2019 and 2022 (7, 10). It is currently implementing the program, which will cover up to 50% of drip irrigation costs to farmers and exempt them from land tax for five years. WLE/IWMI's key recommendations helped government officials in Uzbekistan 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 (8). The program was publicized via mass media, including on national TV channels in the Uzbek and Russian languages, widely acknowledging IWMI's contribution.

This work was implemented in collaboration with the United States Agency for International Development, US National Academy of Sciences, US Department of Agriculture – Agricultural Research Service and Uzbek Hydro Project Design Institute, as well as the Amu-Kashkadarya Basin Irrigation System Authority and Information Analytical Center, both under the Ministry of Water Resources of Uzbekistan.

References cited:

Evidence: journal articles, reports, emails, media coverage etc.:
1. Lautze, J.; Uhlenbrook, S.; Bharati, L. 2020. Is it crunch time for the Water-Energy-Food (WEF) Nexus? 3 recommendations to move the needle. Springer Nature Sustainability Community, December 3, 2020. https://bit.ly/3qmsx4j
2. Djumaboev, K.; Yuldashev, T.; Holmatov, B.; Gafurov, Z. 2019. Assessing water use, energy use, and carbon emissions in lift irrigated areas: A case study from Karshi Steppe in Uzbekistan. Irrigation and Drainage 68(3): 409-419. https://doi.org/10.1002/ird.2321
3. Djumaboev, K.; Manthrithilake, H.; Ayars, J.; Yuldashev, T.; Akramov, B.; Karshiev, R.; Eshmuratov, D. 2019. Growing cotton in Karshi Steppe, Uzbekistan: Water productivity differences with three different methods of irrigation. In: Proceedings of 9th International Micro Irrigation Conference (9IMIC), Aurangabad, India, 16-18 January 2019. Bangalore, India: Ivy League. Pp. 391-397. https://hdl.handle.net/10568/101253
4. Djumaboev, K.; Yuldashev, T.; Akramov, B.; Gafurov, Z.; Anarbekov, O. 2018. Policy dialogue workshop report, September 4, 2018. Tashkent, Uzbekistan. Confidential. https://cgiar.sharepoint.com/:b:/s/WLE/EXkD5tmex6tBqmzhn13kGJMBdx335CkBVJ68mPJwq-cJtg?e=MvhqjE
5. Djumaboev, K.; Yuldashev, T.; Akramov, B.; Gafurov, Z.; Anarbekov, O. 2018. Mitigating the competition for water in Amudarya River Basin, Central Asia by improving water use efficiency. USAID PEER Cycle 4 project final report. Tashkent, Uzbekistan. Confidential. https://cgiar.sharepoint.com/:b:/s/WLE/EbvL7dHQcX1AhKS37Jx95gMBN7T8Jw712QJsIhthISEf5w?e=W2c6oZ
6. Djumaboev, K.; Hamidov, A.; Anarbekov, O.; Gafurov, Z.; Tussupova, K. 2017. Impact of institutional change on irrigation management: A case study from southern Uzbekistan. Water 9(6): 419. https://doi.org/10.3390/w9060419
7. Lex.uz. 2019. Presidential resolution #5742 on rational use of water and land resources in agriculture, dated June 17, 2019 [in Uzbek]. Tashkent, Uzbekistan. https://lex.uz/uz/docs/4378526
8. Lex.uz. 2020. Presidential resolution #4919 on implementing of water saving technologies in agriculture, dated December 11, 2020 [in Uzbek]. Tashkent, Uzbekistan. https://lex.uz/docs/5157168
9. Gafurov, Z.; Eltazarov, S.; Akramov, B.; Djumaboev, K.; Anarbekov, O.; Solieva, U. 2018. Geodatabase and diagnostic atlas: Kashkadarya Province, Uzbekistan. Colombo, Sri Lanka: IWMI. https://doi.org/10.5337/2018.217
10. Lex.uz. 2020. Presidential resolution #6024 on approval of Water Sector Development Concept of the Republic of Uzbekistan for the period 2020-2030, dated July 10, 2020 [in Russian]. Tashkent, Uzbekistan. https://lex.uz/docs/4892946

Promotional products: blogs, outreach materials (cannot be used as evidence but useful for promotion):

- IWMI's contribution to the presidential resolution was highlighted on national television (in Uzbek): https://drive.google.com/file/d/1O6jE5GYdugy--eMzHbz_efxTfMJDXB_3/view
- PEER Cycle 4 project outcome story was published in IWMI's Annual Report for 2019: http://2019.annual-report.iwmi.org/reducing-water-competition-in-central-asia/
- Kakhramon Djumaboev was invited by the Caspian Policy Center to take part in a webinar on water management in Central Asia: https://www.caspianpolicy.org/press-release-caspian-policy-center-releases-report-and-holds-discussion-on-water-management-in-central-asia/

Quantification: <Not Defined>

Gender, Youth, Capacity Development and Climate Change:
Gender relevance: 1 - Significant
Main achievements with specific **Gender** relevance: Gender disaggregated data was collected for the study areas from 2015 to 2018. The project team contributed to a two-day training seminar, "Improving the skills and knowledge of Uzbek women farmers in the practice of agribusiness and the exchange of experience", organized by the Central Asian and Southern Caucasus Association of Agricultural Research Institutions jointly with Tashkent State Agrarian University, World Vegetable Center, IWMI and the US Embassy in Tashkent. In addition, the project team equally supported female and male scientists during the project implementation period (5).
Youth relevance: 1 - Significant
Main achievements with specific **Youth** relevance: Summer schools were organized for young professionals on the water-energy-food (WEF) nexus and water saving technologies. The main objective of the summer school was to improve the knowledge of young professionals on the WEF nexus and water saving technologies. The specific objective was to apply interdisciplinary approaches for advancing scientific knowledge in the areas of water, energy and food in Central Asia. The summer school was attended by around 50 graduate students and young professionals. It provided them with advanced research methods for conducting sustainability assessment of the WEF nexus, integrating the notions of ecosystem services, resource use efficiency, long-term soil quality maintenance, human health and economic viability using empirical examples from Central Asia and Afghanistan. The course reflected on the environmental, social and economic features of important agricultural land and water use systems and the possibilities for broader diffusion. Moreover, the project team supported 2 bachelor's degree students, 4 master's degree students and 5 Ph.D. students between 2015 and 2018. Furthermore, the project leader offered courses on the WEF nexus for graduate students of Humboldt University of Berlin, Nazarbaev University, Tashkent Institute of Irrigation and Agricultural Mechanization Engineers and Tashkent Westminster International University (5).
CapDev relevance: 1 - Significant
Main achievements with specific **CapDev** relevance: The project organized 82 events including seminars, workshops, summer schools, international conferences and policy dialogue workshops. On the WEF nexus and water saving technologies, these included 2,571 male and 743 female representatives of key line ministries, academic institutes, research institutes, donor communities, development agencies, NGOs, parliament, water users' associations, rural communities and farmers (5).
Climate Change relevance: 1 - Significant
Describe main achievements with specific **Climate Change** relevance: Geographic information system (GIS)-based geodatabases and mapping tools were developed for the project study area in Uzbekistan. The main objectives of the geodatabase development were to convert raw data into graphics and maps (using GIS and remote sensing/earth observation mapping tools) for visual interpretation and to create geodatabases of the study areas to act as a guide and a decision-support tool. The geodatabases consist of various input data (hydrological, climatological, infrastructure, water use, land use, basin characteristics, etc.). Climate data from geodatabases were widely used by water management organizations and irrigation research institutes to calculate crop water requirements for different crops under climate change scenarios (5, 9).

Other cross-cutting dimensions: Yes

Other cross-cutting dimensions description: The Aral Sea Basin is home for different ethnic groups, including Kazakh, Kyrgyz, Tadjik, Turkmen and Uzbek people. Agriculture plays an important role and more than 50% of the population lives in rural areas. There is growing competition for water and energy use in the Basin. Our project applied the water-energy-food nexus concept in the lift irrigated areas of the Aral Sea Basin. The results indicated that water and energy savings as well as greenhouse gas emission reductions could be achieved by improving on-farm water management practices. If governments shift subsidies from energy to water saving technologies in lift irrigated areas, it will improve water and energy use efficiency in the region and improve the overall livelihoods of people in the lift irrigated area (2, 5, 6).

Our analysis indicated that water and energy savings as well as greenhouse gas emission reductions can be achieved in the Karshi Steppe in Uzbekistan with an optimal irrigation schedule (simulated using CROPWAT 8). Some 575 million cubic meters of water and 259 gigawatt-hours of electricity can be saved. Emissions can be reduced by the equivalent of almost 122,000 tons of carbon dioxide (2).

Outcome Impact Case Report link: Study #3959

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