



International Water  
Management Institute



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Deutsche Gesellschaft  
für Internationale  
Zusammenarbeit (GIZ) GmbH

**CGIAR F2R-CWANA**



# Challenges of on-farm irrigation in emerging cluster system in Uzbekistan

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IWMI-CA Office**

**CAWAMNET Workshop - Central Asian Water Conflict and  
Migration Network**

**Session III: “Water users’ adaptation strategies to water scarcity”  
Tashkent, Uzbekistan 27-28 April, 2023**

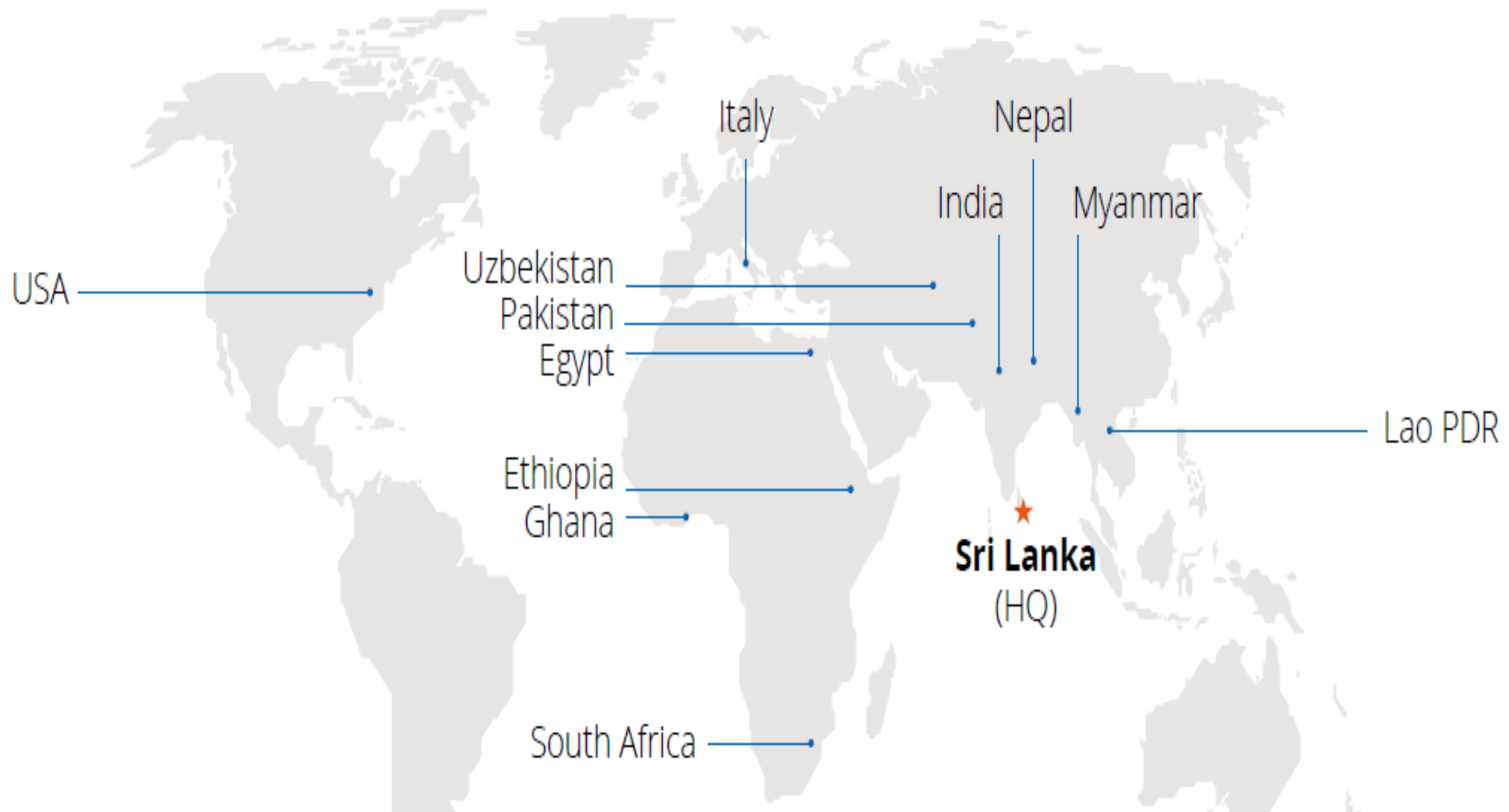
# IWMI – International Water Management Institute

**Vision:** reflected in its Strategy 2019-2023, is 'a water-secure world'.

**Mission:** to provide water solutions  
for sustainable, climate-resilient development

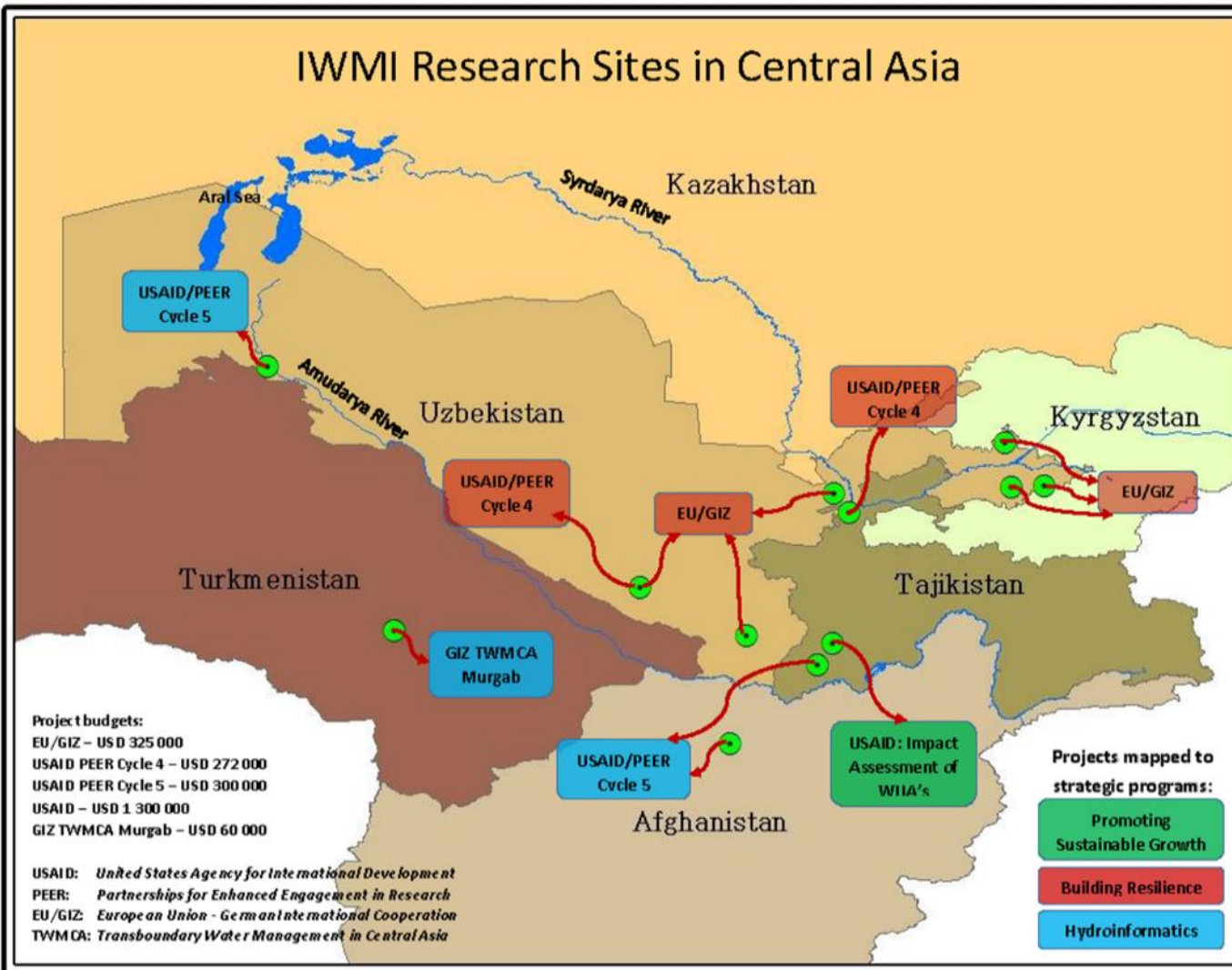
## IWMI Offices

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# IWMI – operates since 2001 in CA

## IWMI Research Sites in Central Asia

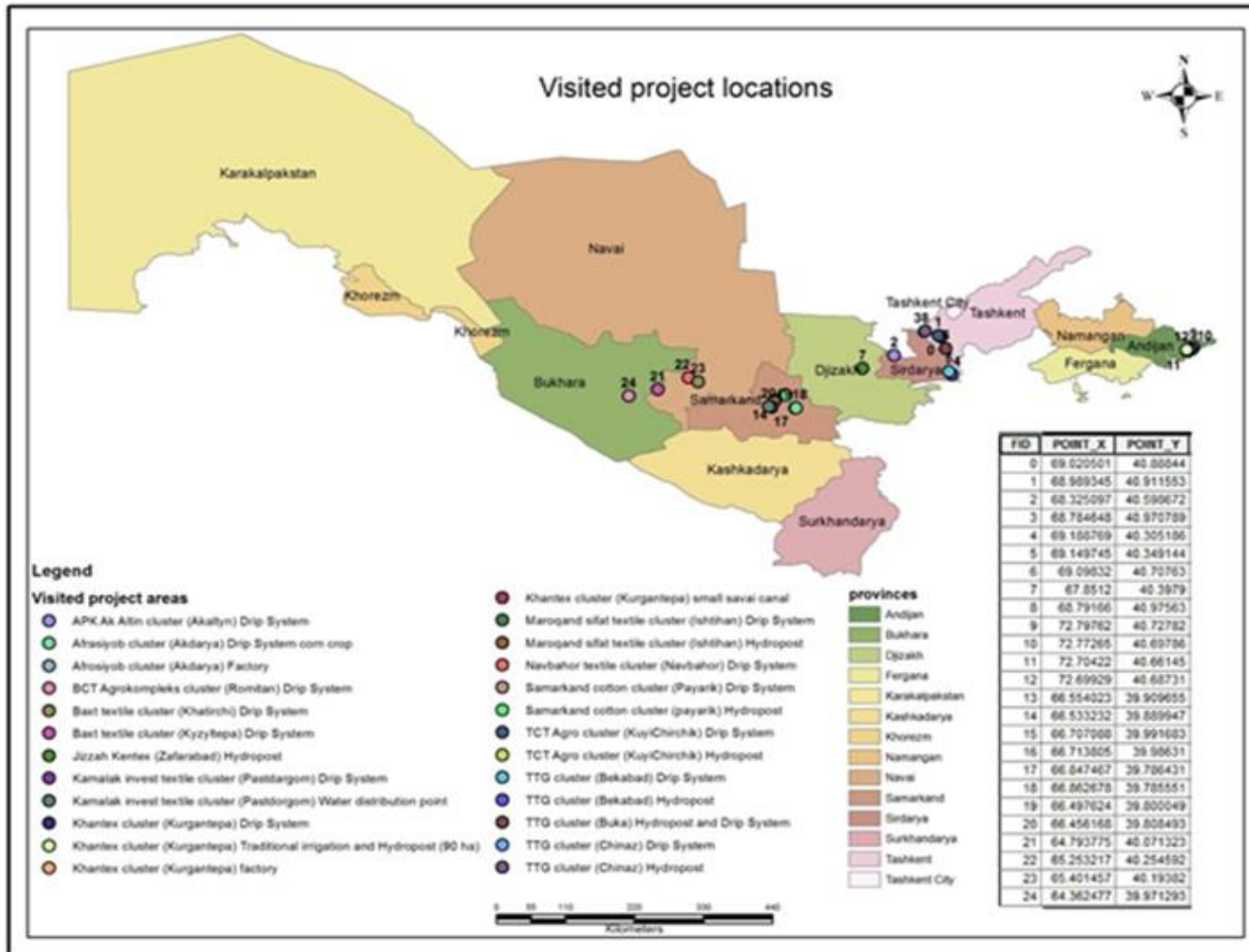


## Strategy 2019-2023

- WATER SAVING TECHNOLOGIES
- WATER ACCOUNTING FROM FARM TO BASIN
- CLIMATE CHANGE ADAPTATION
- DROUGHT RESILIENCE
- CIRCULAR ECONOMY
- ECONOMIC IMPACT ASSESSMENT

DIGITAL INNOVATION  
INSTITUTIONAL STRENGTHENING  
TRANSBOUNDARY COOPERATION

# Implementation of water efficient technologies in the cotton production sector in Uzbekistan

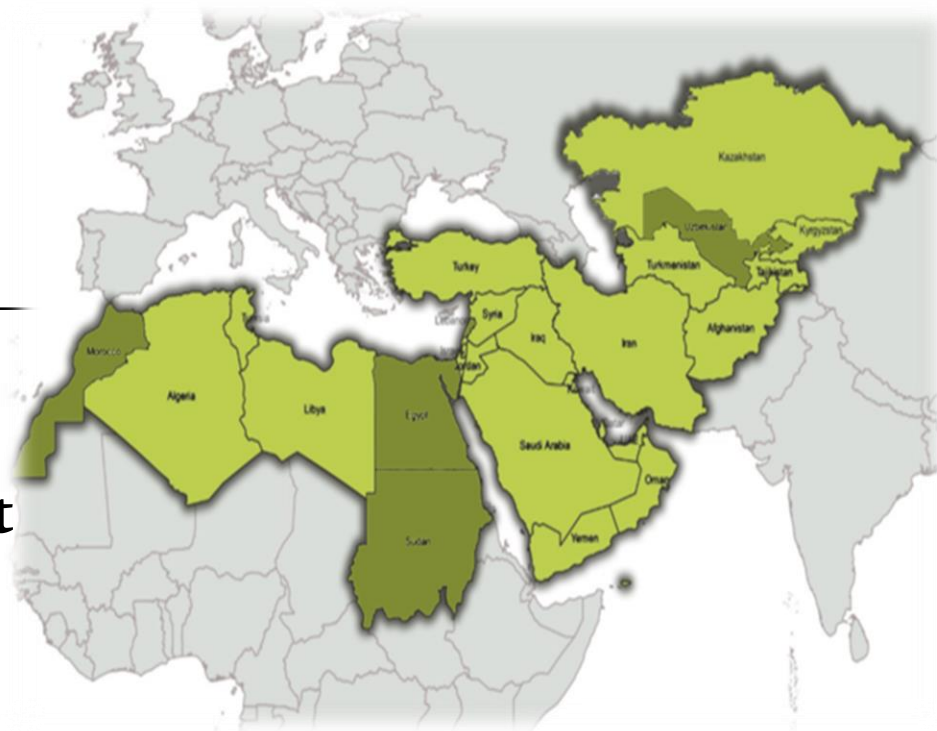


- Project sites: **7 Provinces**
- Number of clusters: **14 in 7 Provinces**
- Water saving technologies: **drip irrigation.**
- **Capacity building**

# From Fragility to Resilience in Central and West Asia and North Africa (F2R-CWANA)

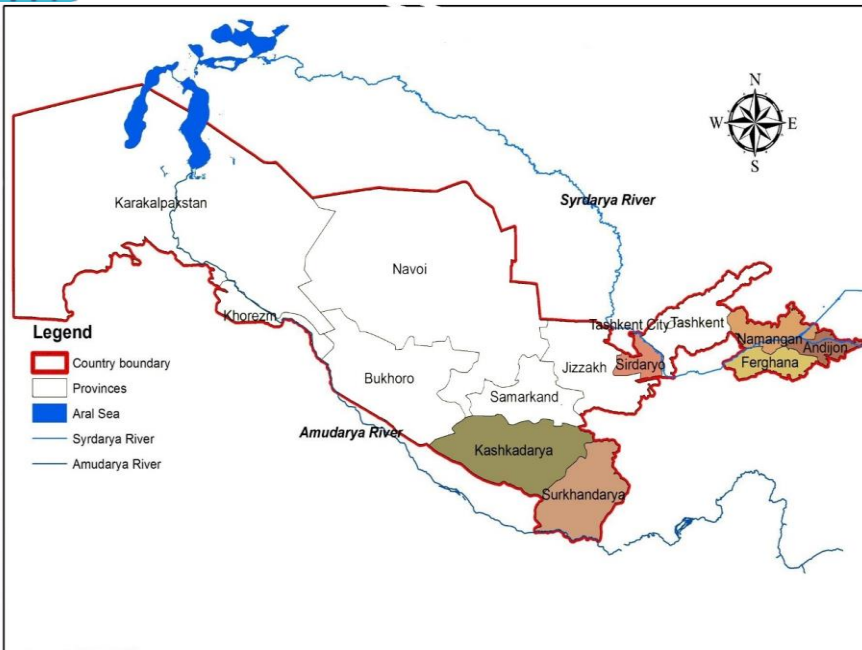
**WP 4: Integrated food, land, water and energy systems for climate resilient landscapes**

**WP 5: Scaling innovation and digital tools for climate resilient food value chains**



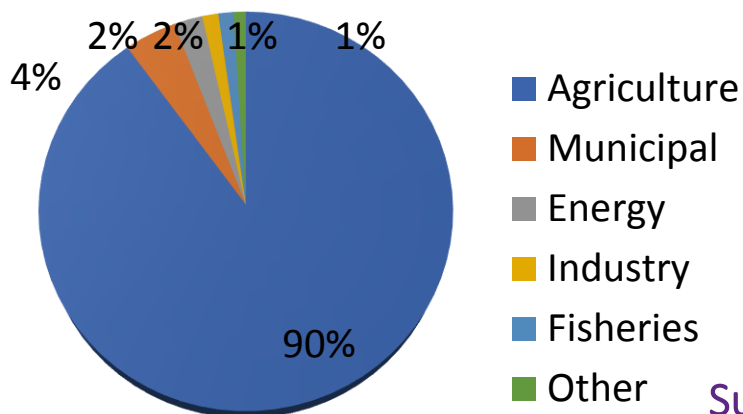
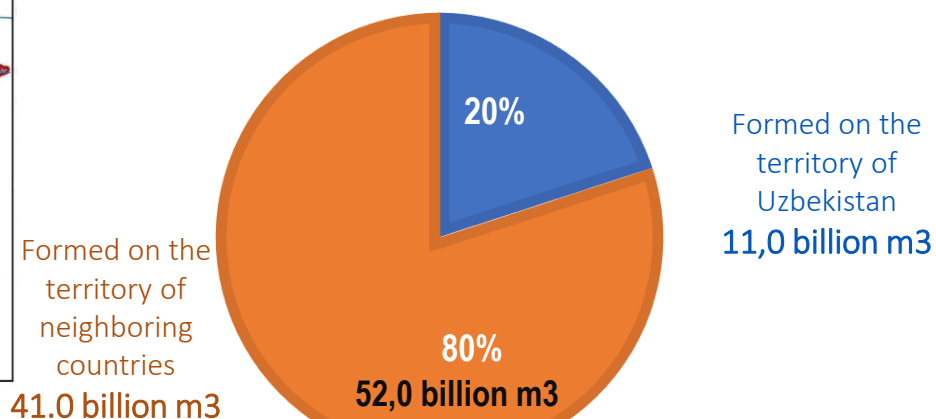


# Water Resources in Uzbekistan



The territory is 44,892.4 '000 ha  
 Ag-e land is 57.0%  
 Irrigated land is 9.6%

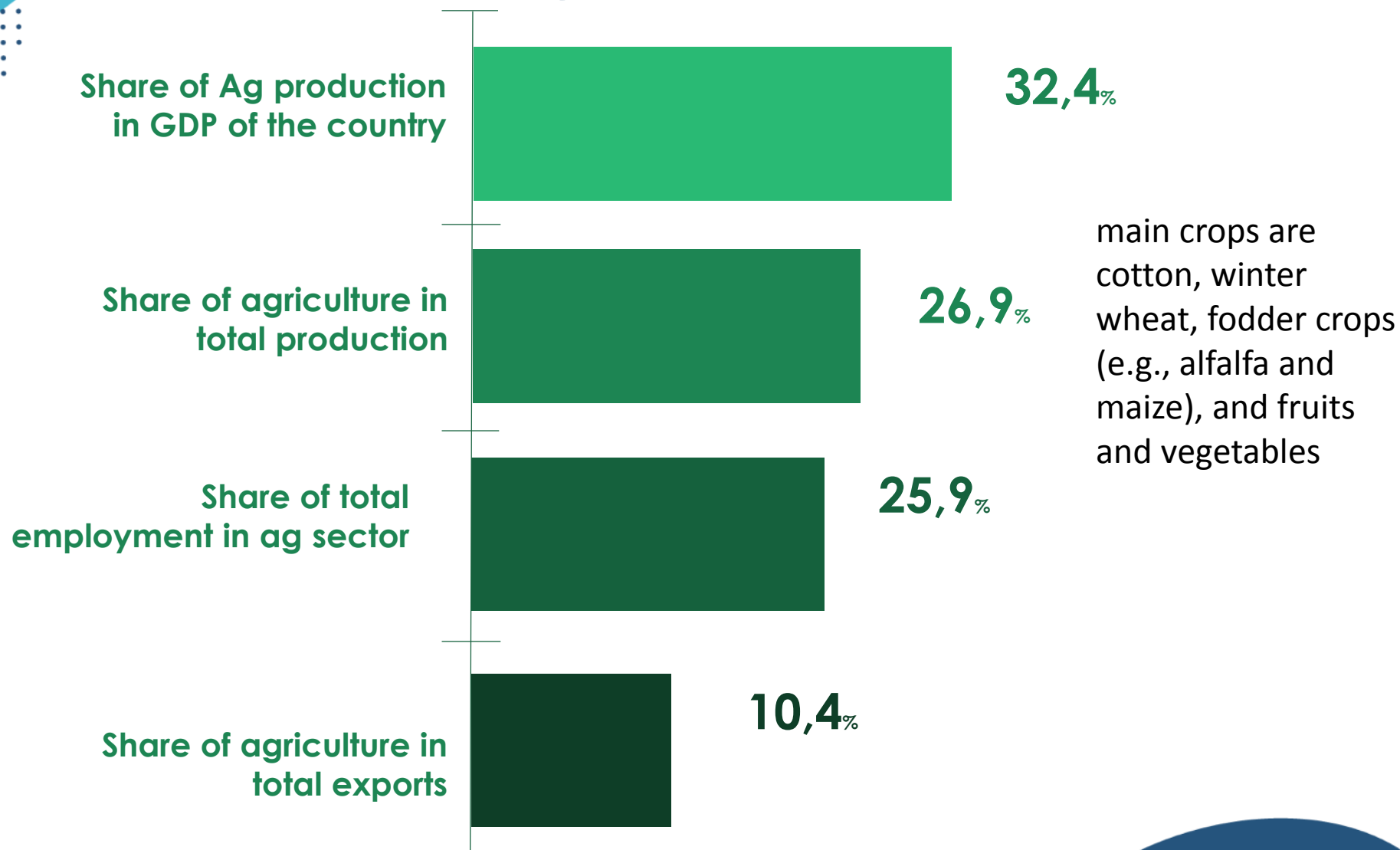
## USABLE VOLUME YEARLY AVERAGE



According to the World Resources Institute, Uzbekistan is included in Top 25 countries exposed to water stress countries

Surface water - 97,2%  
 Groundwater - 0,9%  
 Return drainage water - 1,9%

# Role of Agricultural Sector in UZB



Source: Ministry of Agriculture of the Republic of Uzbekistan, 2021

# Challenges of on-farm O&M in Uzbekistan

- ***Outdated infrastructure***
- ***Low Coefficient of efficiency of canals***
- ***Water losses (in average 37%)***
- ***Absence of water control and metering facilities, eyes measurements***
- ***Accountability and Transparency***
- ***no incentives, ISF area based, questions of full cost recovery***
- ***Conflicts and disputes btw Maxsus Xizmat, Clusters and water users (farmers, dekhan, kitchen-gardens)***
- ***No linkages btw actual water use and water charge/Irrigation service fee***

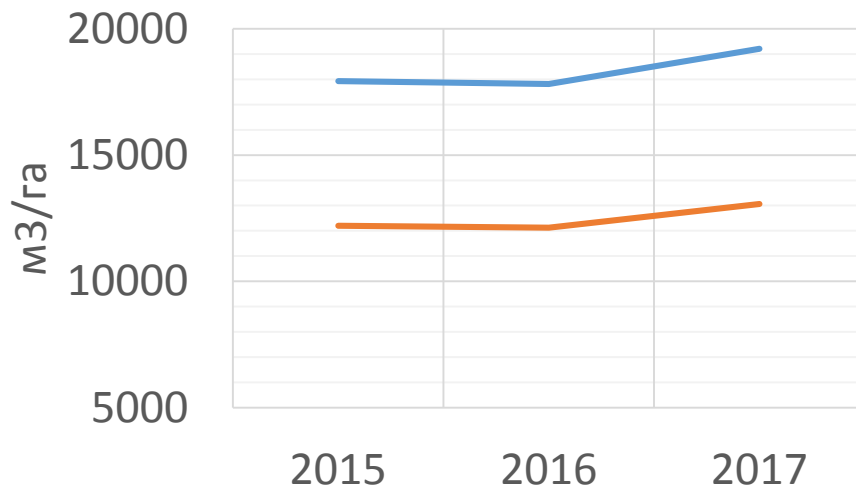


as if 01.04.2019	Electricity debt	Tax debts and other obligatory payments	Total
<b>Total Debt of 1503 WCAs, mln \$</b>	<b>16.8</b>	<b>3.46</b>	<b>20.26</b>
1 USD = 8354 UZS (Source: Ex Rate Oanda.com)			



## The average volume of water delivered from the source and delivered to the former WCA boundary (m<sup>3</sup>/ha) – 2017 data

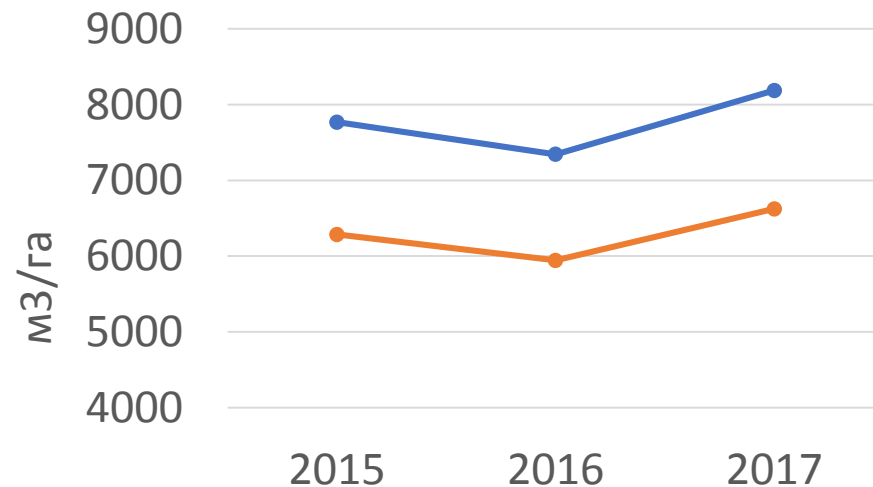
In **Shakhrixansay** irrigation system, the average volume of water delivered from the source and delivered to the WCA boundary (m<sup>3</sup> / ha)



— Water received from the source, m<sup>3</sup>/ha

— Water delivered to the boundary of WCA, m<sup>3</sup>/ha

In **Aksu basin**, The average volume of water delivered from the source and delivered to the WCA boundary (m<sup>3</sup> / ha)



— Манбадан олинган сув

— СИУ чегарасига етказиб берилган сув

# Recent Reforms at on-farm irrigation

Policy documents	Selected results
Cabinet of Ministers adopted Resolution No. 982 dated December 11, 2019 “On measures to improve the activities of water user associations”	<b><i>Dismantlement of 1503 WCAs – and creation of 1 WCA in one district, 158 WCAs in place of the previous 1,503</i></b>
Presidential order N PP-145 from 03/01/2022 About improvement measures water management and regulation of relationships between water users in the lower levels	<b><i>As part of the district irrigation departments, special water management services are being created so called Maxsus xizmat</i></b>
Government has adopted 11 resolutions those are targeted improved water management and improved water use in the irrigated agricultural sector	<b><i>Wider introduction of water-saving technologies</i></b>
Decree President of the Republic of Uzbekistan dated July 10, 2020 No. UP-6024 "On approval of the Development Concept water management of the Republic of Uzbekistan for 2020-2030"	<b><i>Expand the irrigated area of land with water-saving techs to cover 2 million hectares of irrigated area</i></b>
Decree of the Cabinet of Ministers dated December 12, 2022 No. 703 “On measures to further improve the water management system based on the experience of Kashkadarya region	<b><i>Transfer of state water management facilities to management of agricultural clusters based on the principles of PPP.</i></b>

# Dynamics of introduction drip irrigation in Uzb-n



Several Government Resolutions have been imposed to expand the irrigated area of land with water-saving technologies for the period of 2021-2030 to cover 2 million hectares of irrigated area.

These decrees describe expansion of water saving technologies such as drip irrigation in about 600,000ha across country.

Source: Ministry of Water Resources



# Types and number of clusters in Uzbekistan

Cluster Type	Number of Clusters	Total Irrigated Area (ha)	Average Area per Cluster (ha)
Cotton-textile	96	907,783	9,456
Wheat	157	1,038,104	6,612
Horticulture	146	116,024	795
Rice	29	21,010	724
Medical plants	8	1,406	176
Total	454	2,197,407	4,837

Creating an enabling climate for agribusiness/agribusiness and value chains

Agriculture Development Strategy of the Republic of Uzbekistan for 2020 - 2030

*Source: 2021, Data derived from communications with Ministry of Water Resources and Ministry of Economic Development and Poverty Reduction of the Republic of Uzbekistan*

# Деятельность хлопково-текстильных кластеров

2018

15

Кол-во кластеров

0,8

Заготовлено хлопка в кластерах (млн. тонн)

21,5

Ср. урожайность в кластерах (ц/га)

В 2019 г. урожайность на хлопковых кластерах на 4 ц/га выше, чем на полях вне кластеров

2019

73

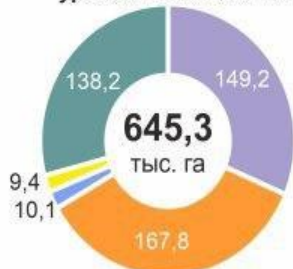
73% от площади, занятой под посевы хлопка

1,8

66% от урожая хлопка

26,9

Работы по повышению урожайности хлопка



созданы производственные мощности

42 проекта

в 29 кластерах

переработка хлопка-волокна

180 тыс. тонн

трикотажные полотна

11,3 тыс. тонн

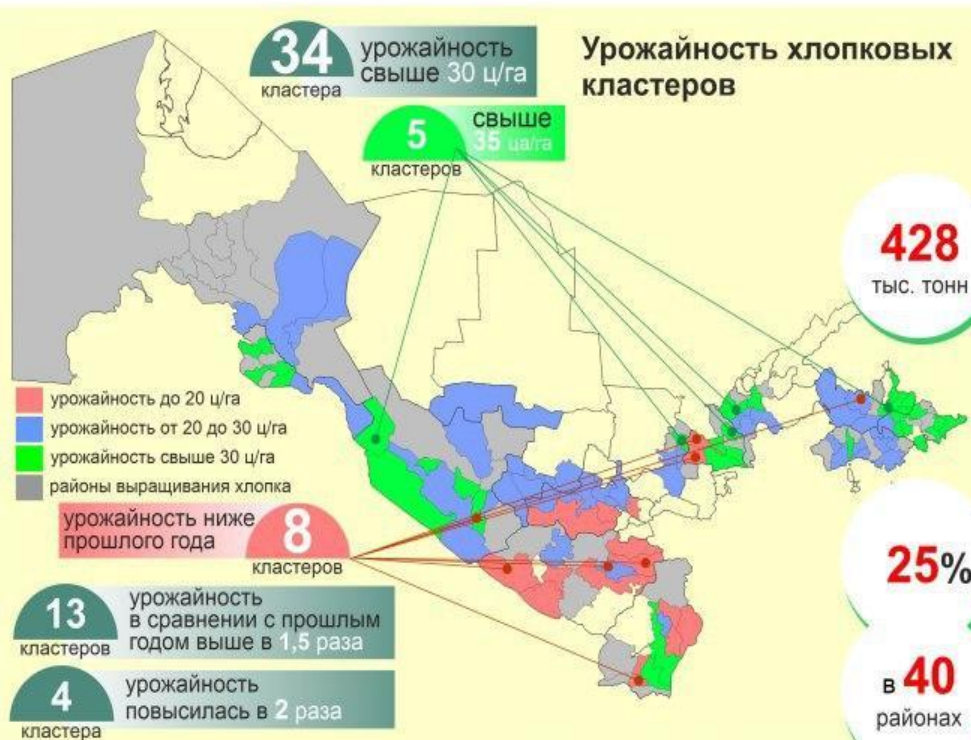
ткани

37,5 млн. п.м.

готовые изделия

32,2 млн. ед.

Реализованны инвестиционные проекты



428 тыс. тонн

рост объемов урожая хлопка-сырца в 2019 г. при тех же посевных площадях

Эффекты

25%

рост урожайности в кластерах

в 40 районах

урожайность выше чем за последние 10 лет

35-71 ц/га

урожайность на площадях с системой капельного орошения в кластерах

376 млн. долл.

экспорт 53 кластеров в 2019 г.

1,1 трлн. сум

экономия средств

11 тыс.

новых рабочих мест

Система капельного орошения в кластерах

46 кластеров

48 районов

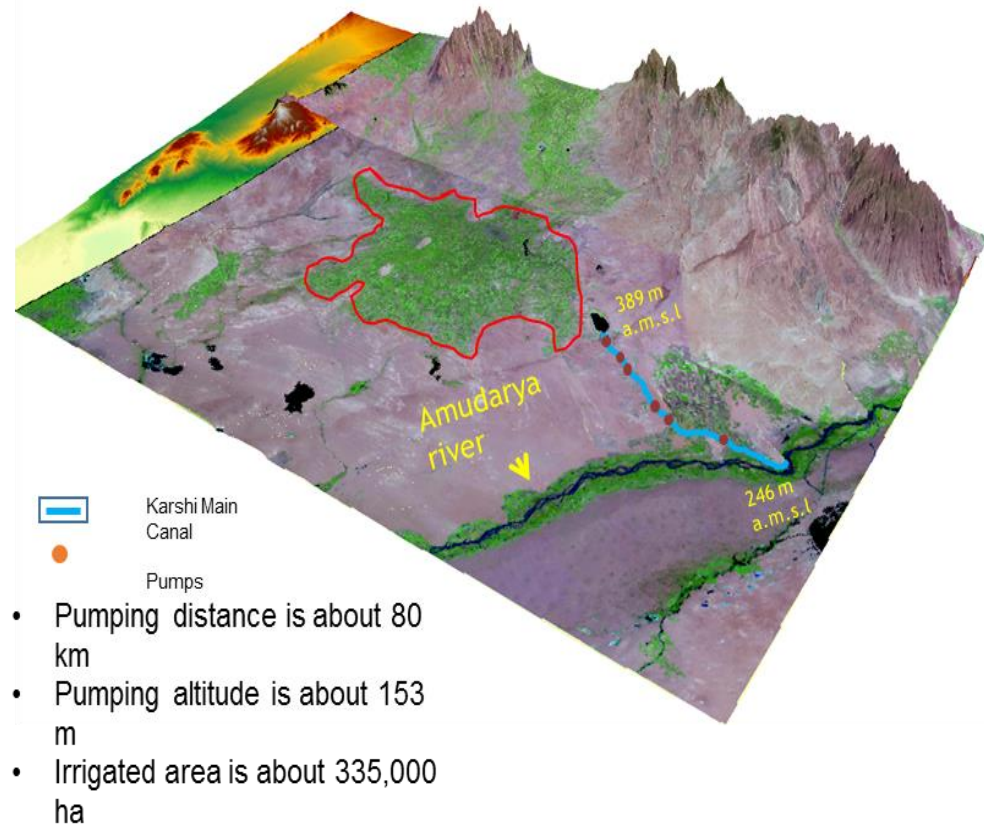
9,4 тыс. га



# Lack of WEF Nexus approaches results in high energy and water use in agricultural production

- ✓ Central Asia is known with its large pump stations, where the **water is lifted to large scale irrigation systems** from both Amudarya and Syrdarya rivers.
- ✓ 2.2 million hectares land out of 4.3 million hectare under pump irrigation. **70% of pump units outdated and have low efficiency.**
- ✓ About **21% of generated energy of Uzbekistan** is used for pump operations

Requests of clusters differ in lift irrigated area vs gravity flow areas,



# Preconditions for viable introduction and operation of water saving technologies as well as on-farm irrigation

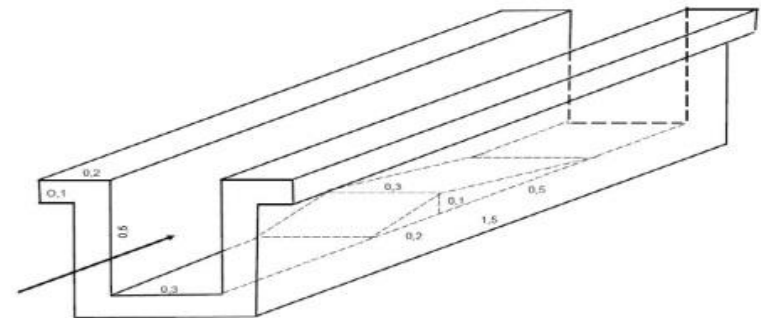
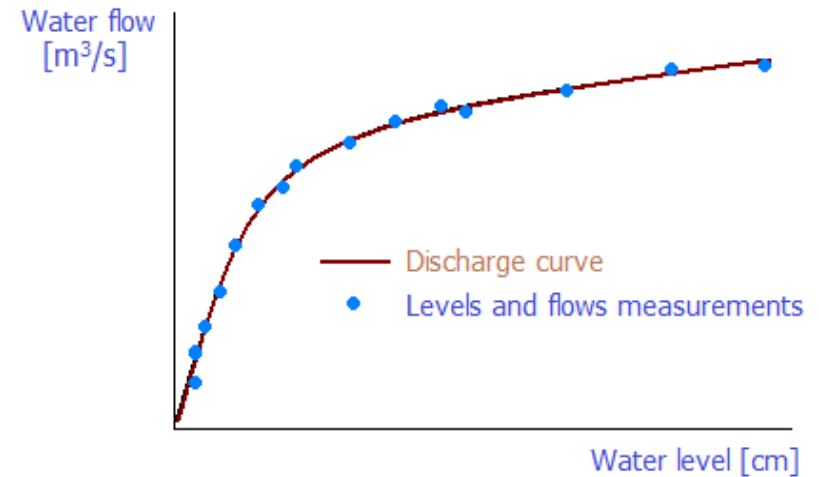


- 1. Policy dialogue (enabling environment) aspects:** Public-Private Partnership in introduction of water-efficient technologies; redirect some subsidies toward more efficient irrigation approaches and technologies that saves water and energy based on market mechanisms
- 2. Institutional aspects:** there is a need to clearly separate the roles and responsibilities between organizations in order to avoid conflicts, misunderstanding of the responsibilities and outcomes especially among Agricultural Clusters & Maxsus Xizmat –farmers.
- 3. Technical aspects.** Qualified irrigation specialist who can operate drip irrigation system (DIS) after installation, DIS irrigation scheduling specifically for cotton, Water accounting, Proper agronomic and farmer practices (irrigation, fertilization, pesticides application time and rates, weed control)
- 4. Capacity building.** Training of operator of DIS, involving national Research and Academic Institutions on the issues of training and retraining of personnel in the use of drip irrigation technologies as well as mgt of on-farm irrigation
- 5. Water Measurement and Accounting.** Agricultural Clusters and Maxsus Xizmat must be equipped with water measurement structures (mini gauging stations, smart sticks etc).

# Research areas: how to improve water user's adaption strategies as well as mitigate the conflicts;

- Although several institutional reforms introduced in the irrigated agriculture particularly on-farm level there are still exist challenges related water use efficiency as well as water productivity at on-farm level – what is missing?
- Our investigation indicates that under the new arrangements it is difficult for Maxsus Xizmat to properly control water use throughout the district, and territorial-administrative vs hydrologic boundaries of water distribution, leading to conflict?
- What are the incentives for direct farming clusters to take on their balance on-farm irrigation and drainage infrastructure and it is O&M?
- Direct farming clusters are responsible for all the water and agricultural management within their leasehold area. This may involve the management of secondary canals where there are other upstream and downstream water operators, which can pose a conflict of interest for the cluster operator concerning the provision of water supply for others versus preferential water supply for the cluster farm.

# Water measurement and accounting inside Ag Cluster's gauging stations



1. Площадь поверхности лотка без порога  
 $S = (0,2 + 0,5) \cdot 0,3 + 0,5 \cdot 0,2 \cdot 1,5 = 2,55 \text{ м}^2$
2. Объем бетона для лотка  
 $W = S \cdot h_{\text{лотка}} = 2,55 \cdot 0,1 = 0,255 \text{ м}^3$
3. Объем бетона на порог  
 $V = (0,2 \cdot 0,1) \cdot 0,3 + (0,5 \cdot 0,1) \cdot 0,3 = (0,003 + 0,0075) = 0,01 \text{ м}^3$
4. Всего  $= (0,255 + 0,01) = 0,265 \text{ м}^3$

By a simple level measurement and use of the discharge curve of the canal, it allows to determine its flow rate



# Impact from 2018-2019 work in Ferghana Province



Decreased conflicts of water allocations btw Water users & WCAs

Stimulated gradually shift to charge ISF based on volume

Improved water allocation among farmers: equity and reliability

Improved ISF collection rate & accordingly O&M

By the end of 2019 = 720 pcs mini-gauging stations

By the end of 2020 = 2100 pcs mini-gauging stations



# Decrease of electricity consumption in selected pump scheme

	2018	2019	2020
Electricity consumption by pump stations in the balance of Kuva Urta Buz Anori, Ag Cluster (former WUA) KwT	66,106	60,648	55,641

In average, yearly electricity saving was around 15- 16%

## Equity of water distribution in WCA Kuva Buz Anori, 2019

Name of canal	Average water availability along the canal,%	Water availability in the tail of canal, %	Equity of water distribution, %
May	60.8	62.8	103
Anor	106,7	86,8	81
Tolipov	77,4	73,2	95
Xasanov	100,1	77,5	77
Shodi	80,5	72,0	89

# Policy Uptake

- ❖ *IWMI jointly with Partners contributed to President's Order (ID-7865) on Approval of the Agriculture Development Strategy for 2020-2030 of the Republic of Uzbekistan (regulation.gov.uz/ru/document/7865).*
- ❖ Work contributes directly to the **Water sector development concept of Uzbekistan 2020-2030: Smart Water, ICT in water sector plus market mechanisms.**
- ❖ Published blogpost on “**How tech and modern market mechanisms can solve water scarcity in post-Soviet states**” @ Smart Water Magazine  
<https://smartwatermagazine.com/blogs/oiture-anarbekov/how-tech-and-modern-market-mechanisms-can-solve-water-scarcity-post-soviet>



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# Thank you

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