Leibniz Institute of Agricultural Development in Transition Economies

Food and Agriculture Organization of the United Nations

WATER RESOURCES AND FOOD PRODUCTION IN AGRICULTURE

Mr., Abdusame Tadjiev

Prof., Olim Murtazaev

Samarkand Agricultural Institute

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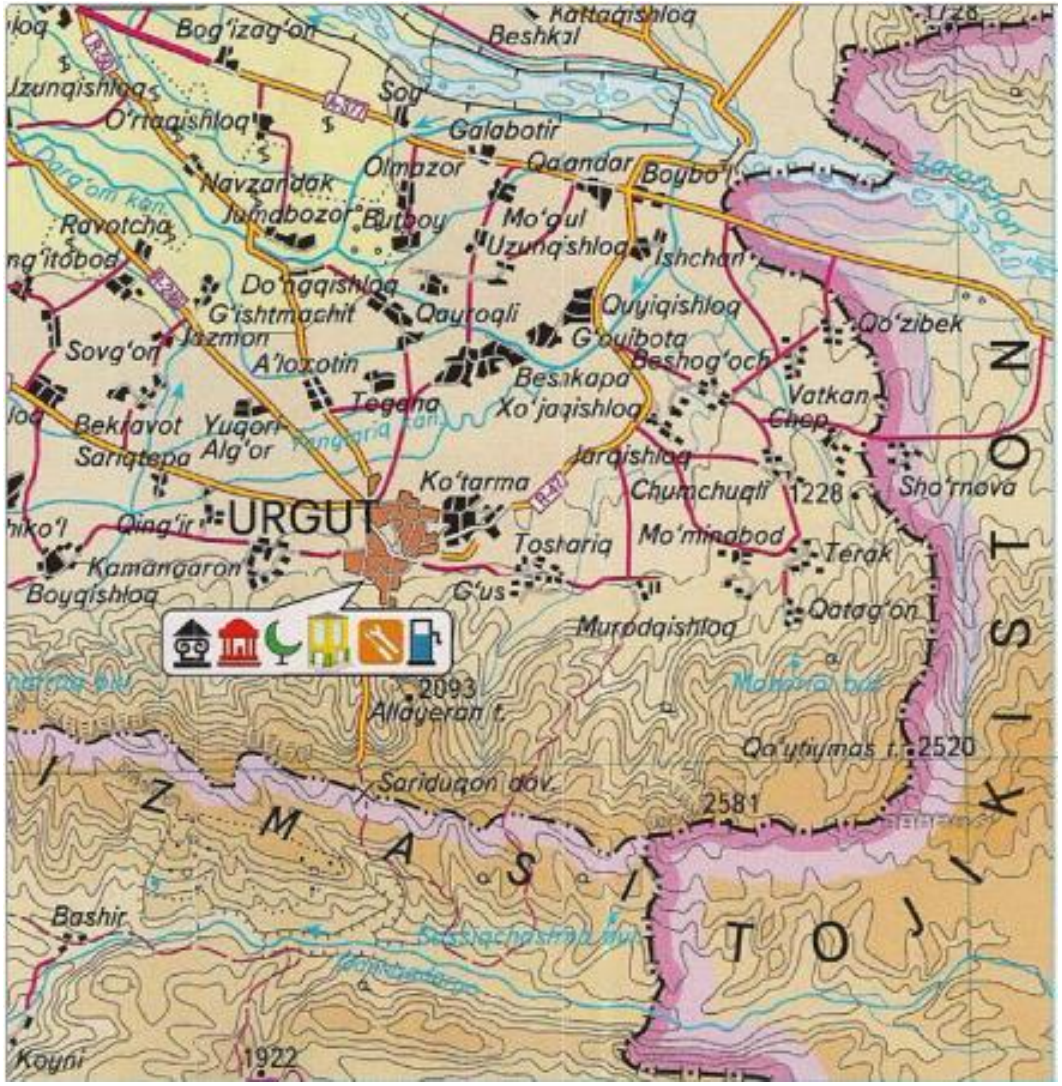
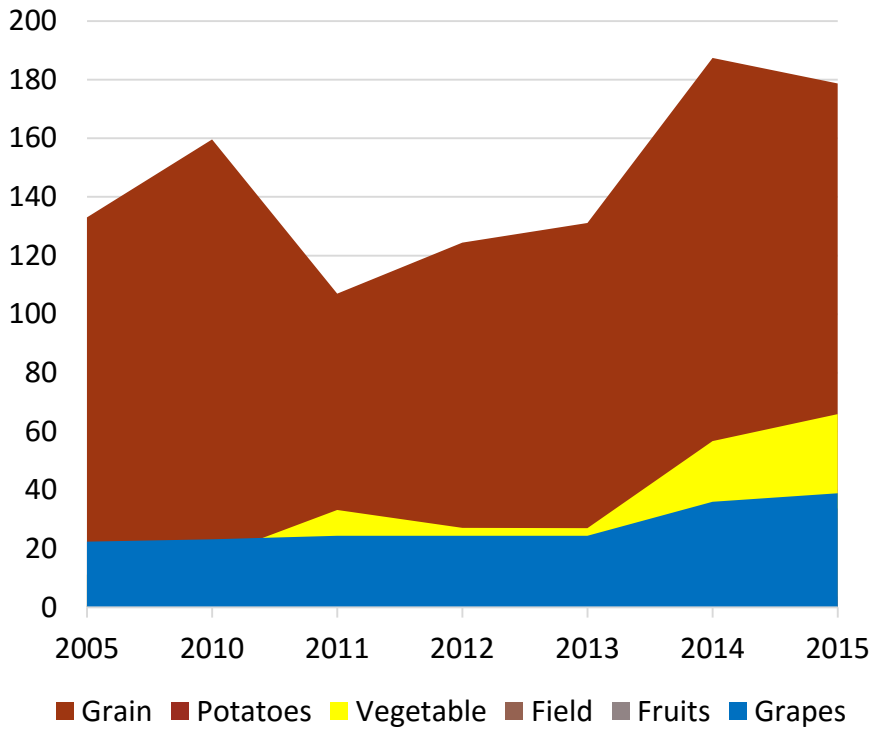
STUDY AREA

- Samarkand Province, Uzbekistan
- Urgut district

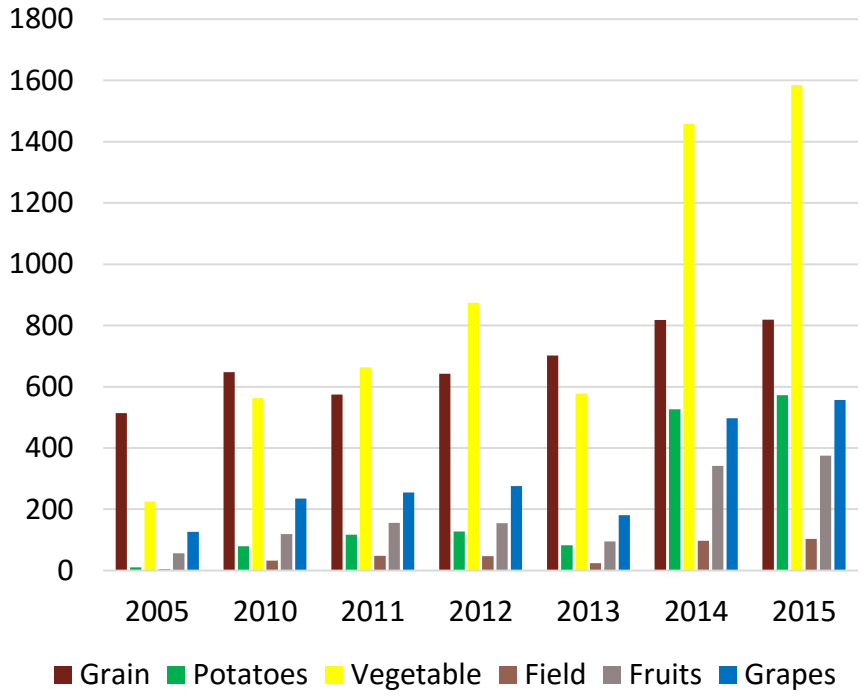


PRODUCTION FOOD CROPS IN AGRICULTURE, SAMARKAND/UZBEKISTAN

Sown area, 1000 ha



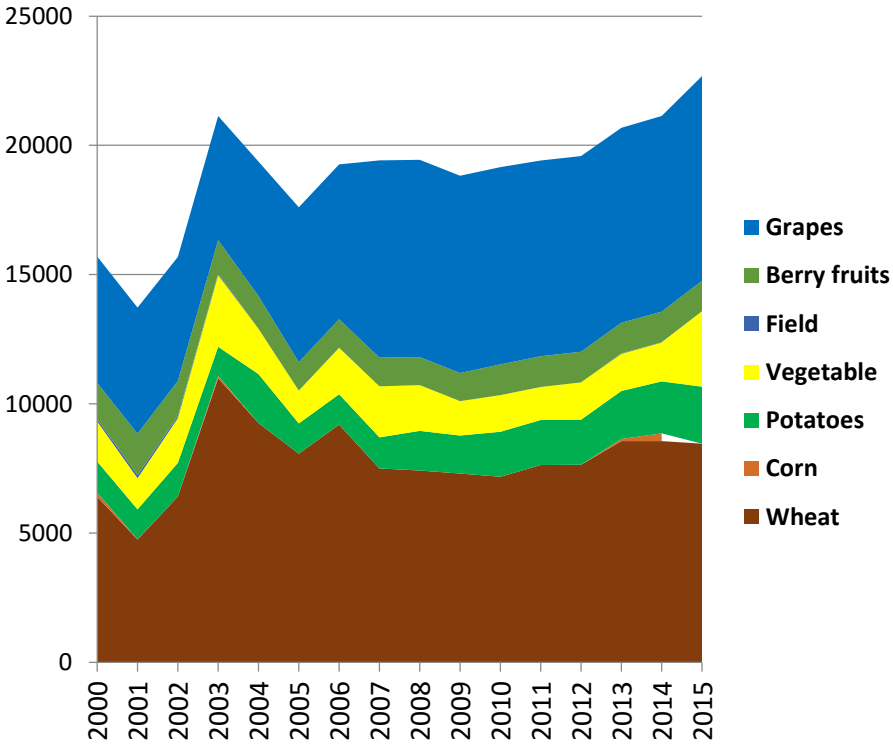
Gross product, 1000 ton



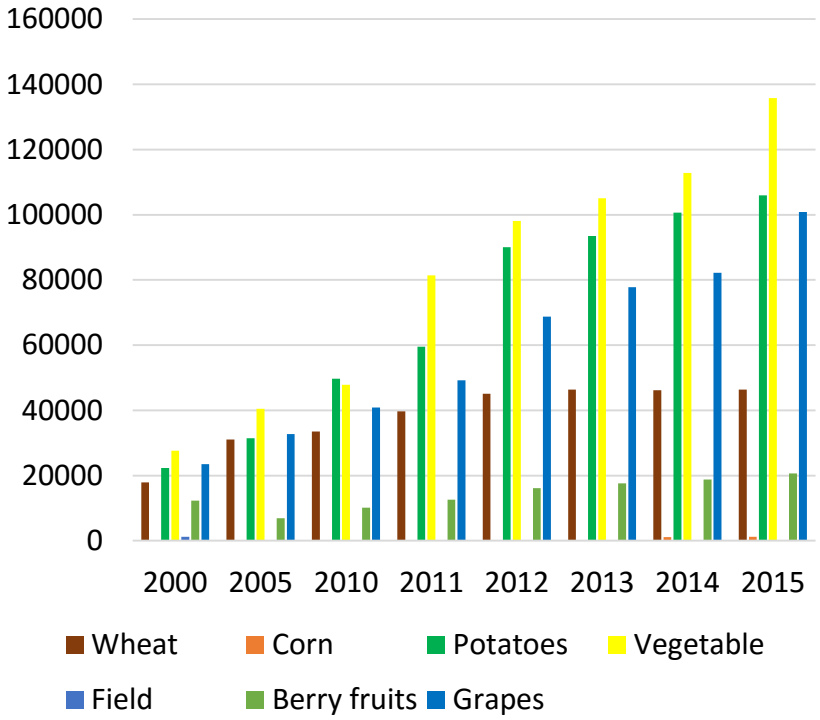
Source: State Statistical Committee

Production food crops in agriculture
Urgut district/Samarkand

Sown area, ha



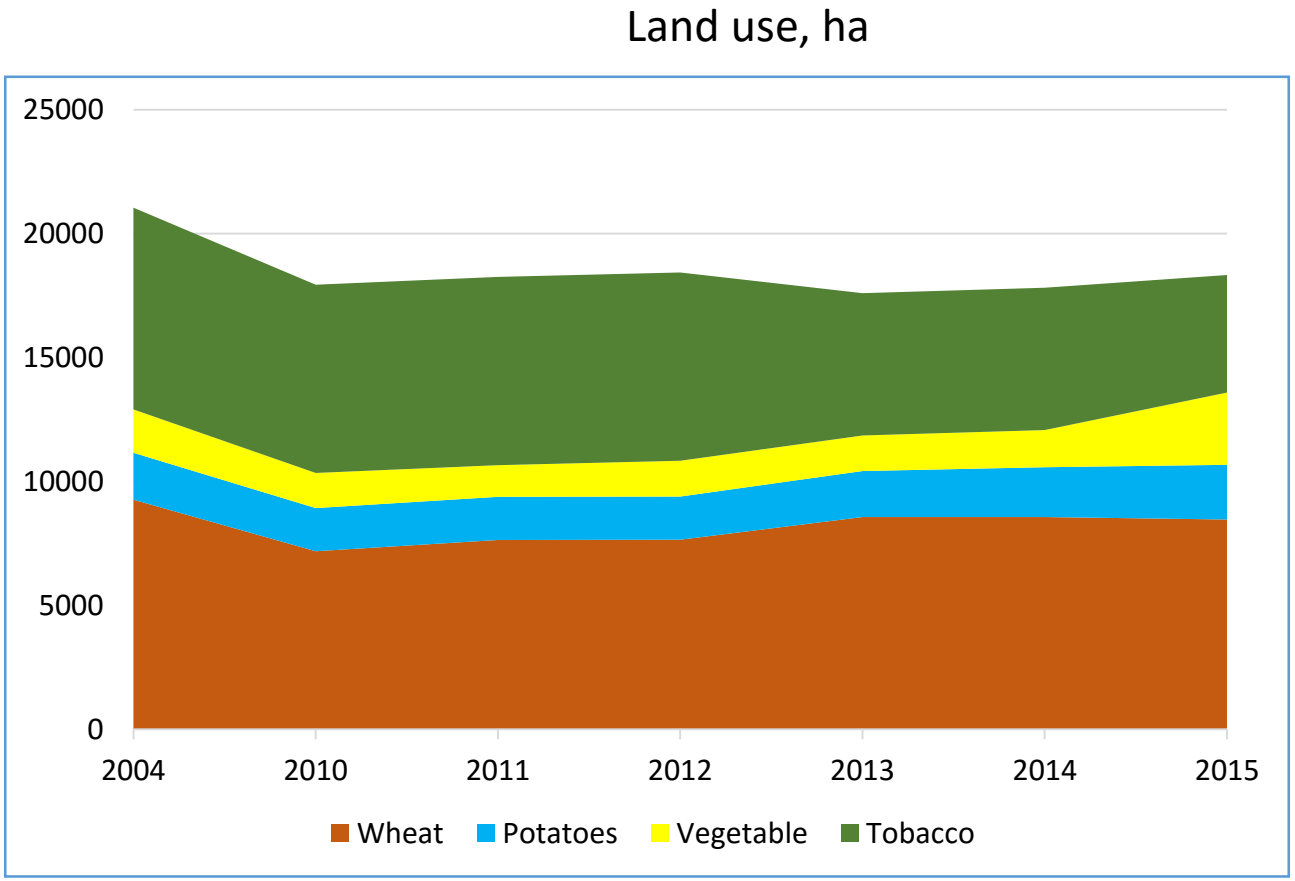
Gross product, ton



Source: State Statistical Committee

Regional cropping pattern

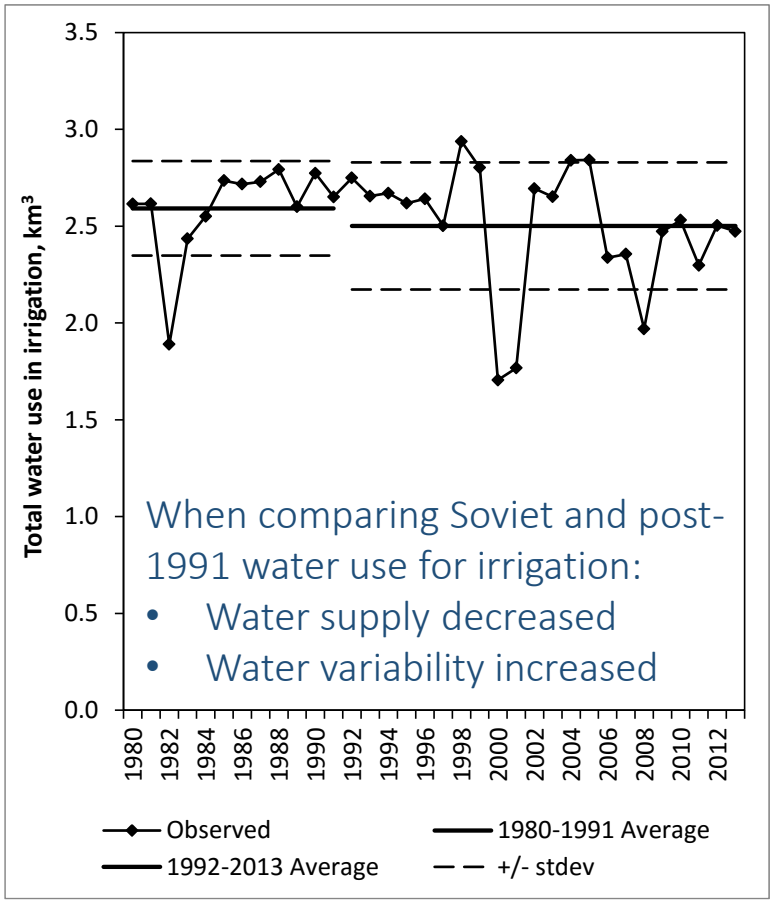
- Increase in vegetable and potatoes production
- Declining tobacco crop area



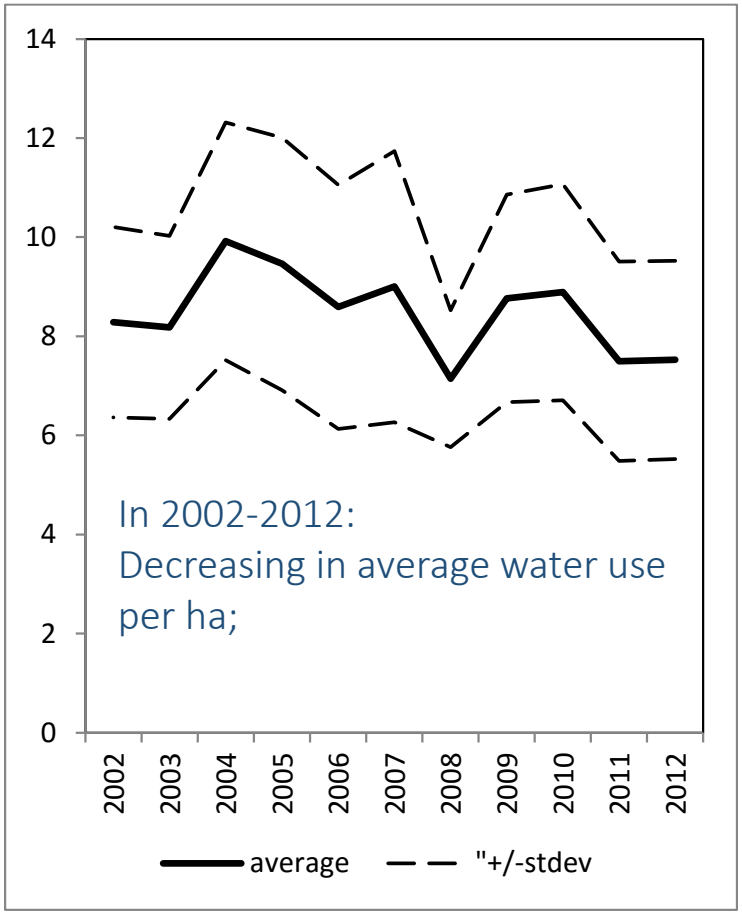
Source: State Statistical Committee

Water situation in Samarkand province

Total irrigation water use, km^3

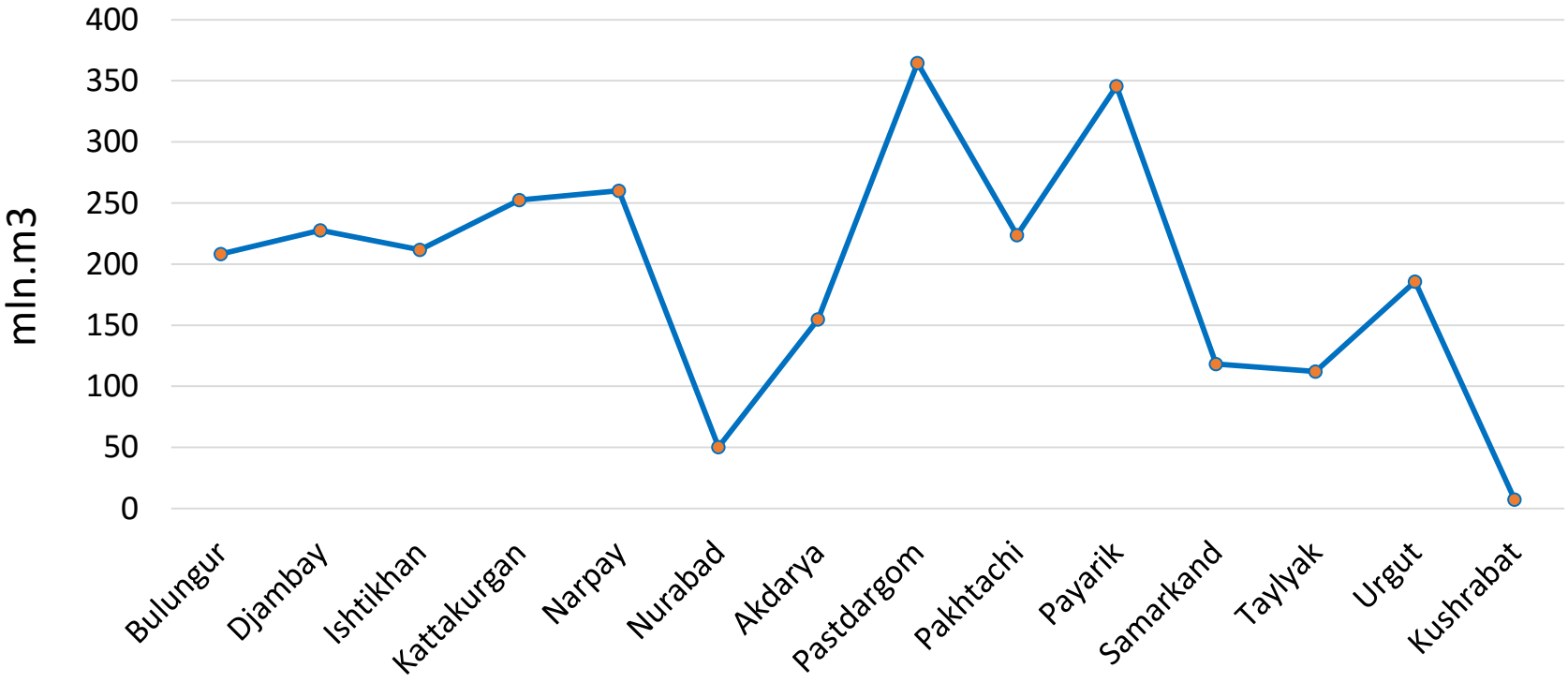


Irrigation water use per ha, 1000 m^3



Source: AGRIWANET database; MAWR

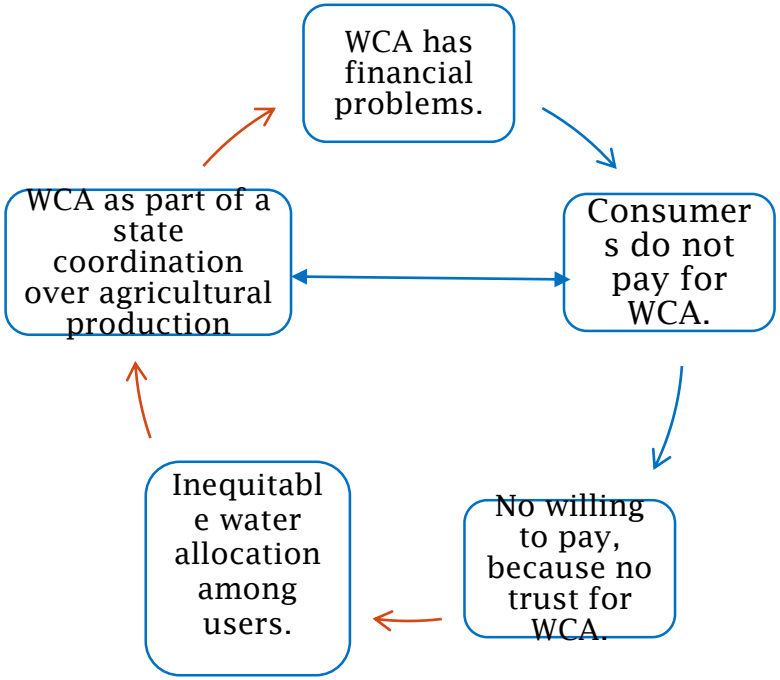
Water situation in districts of Samarkand province, 2015



Source: Zarafshan Irrigation Basin Department

PROBLEMS ON WATER USE

- Farmers do not have any economic interest to save water. Water users are irresponsibilitiy
- Lack of information flow on current water situation to water users
- Conflicts over water user in head, middle and end of irrigation canal



The objective of this study is

- To evaluate the effect of water resources to the productivity of agricultural crops

- To identify the benefits of farm cooperation in water use

Methodology

The analysis of the study is based on:

- a review of literature and relevant national legislation on water
- annual reports of state statistic department and basin administrative irrigation systems (BAIS)
- Farmers' surveys
- Game theory model

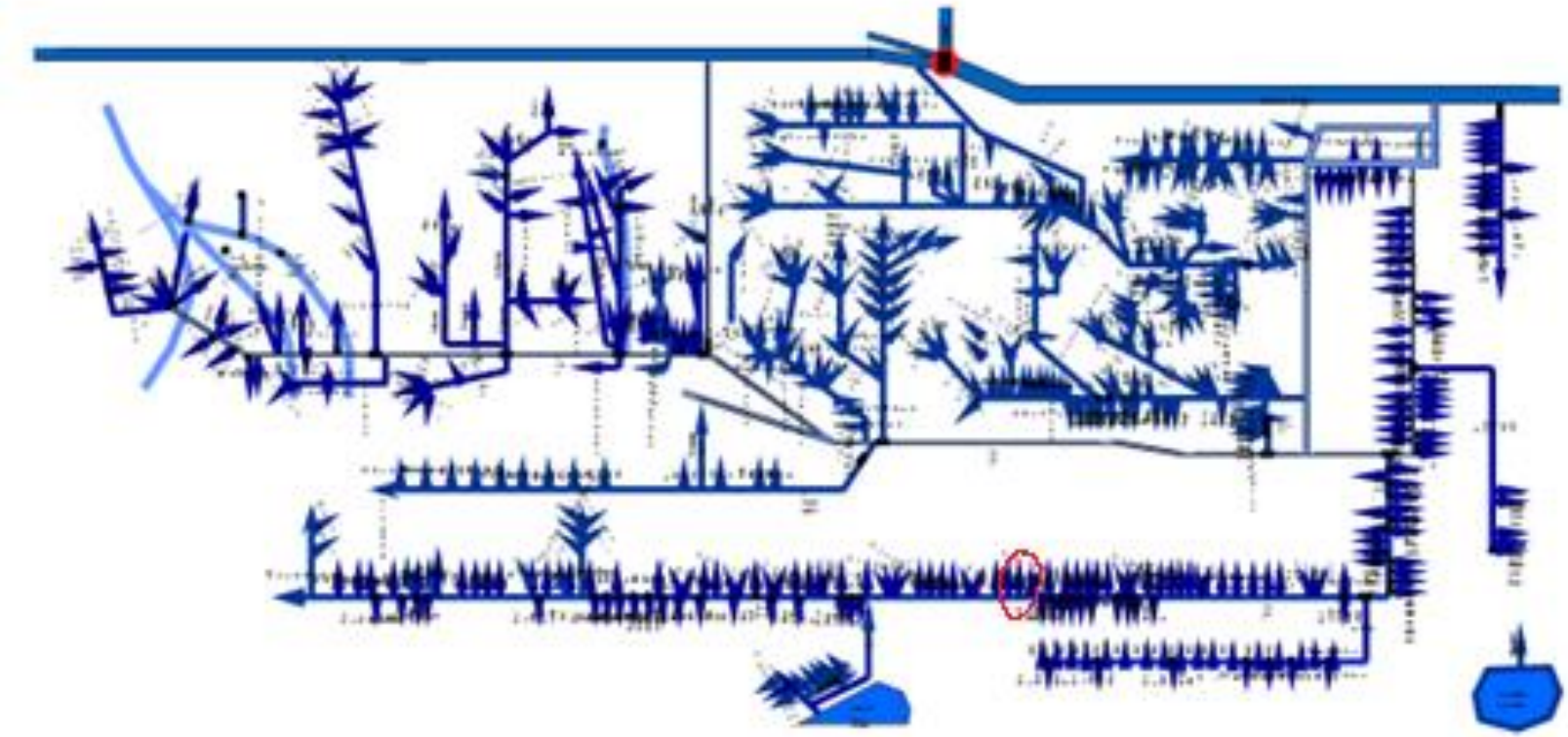
Farm-level data

145 grain, vegetable and potatoes producing farms
Average farm size: 38 ha
Average vegetable and potatoes sown area: 2.4 ha, min - 0.1 ha
Average gross product (veg+pot): 49 tons, min – 1.2 t
Approximately average water use: 11878.4 m3, min - 416 m3

	Mean	Std. Dev.	Max
Gross product (kg)	49047.52	46283.9	364860
Sown area (ha)	2.4	2.6	21.9
Water (m^3)*	11878.4	13725.6	120450

Source: Authors' calculation from State Statistic Committee dates

Dargom irrigation system department



Game theoretical approach

		Farm 2	
		Cooperate	Non cooperate
Farm 1	Cooperate	2, 2	1, 3
	Non cooperate	3, 1	0, 0

Maintenance cost game. In some parts of Urgut district

Source: Authors' calculation from farm survey data.
Used Kaveh Madani (2010) Auinash Dixit and Susan Skeath (2004)

Finite, n-person normal form game: ⟨N; A; u⟩:

Players: N = {1…….,n} is a finite set of n , indexed by *i*

Action set for player *i* A_i

$a=(a_{1\ldots\ldots\ldots\ldots}a_n) \in A=A_1 x\ldots\ldots\ldots x\, A_n$ is an action profile

Utility function or Payoff function for player *i:* $u_i : A \rightarrow R$

$u=(u_{1\ldots\ldots\ldots\ldots,}u_n)$, is a profile of utility functions

Conclusions

- ✓ Some farms have not enough water for vegetables and potatoes. So, it may be negative effect total harvest. Our findings showed that, if they use enough water on time their total harvest will increase about 3 percent;
- ✓ Cooperation is important on using common pool resources. By cooperation farms may get enough water as well as their utility may increase;
- ✓ Some land area of Urgut district is non irrigated or it is difficult to irrigate it (there are many mountain places). Our suggestion, it may be good to sow the crops that less water demand.

Thank you!
Rahmat!
Спасибо!

Acknowledgements
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Abdusame Tadjiev
aaabdusame@gmail.com