WATER RESOURCES AND FOOD PRODUCTION IN AGRICULTURE

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Content

Food production in Samarkand, Uzbekistan
Water situation and water cooperation issues
Methodology
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STUDY AREA

• Samarkand Province, Uzbekistan

• Urgut district
PRODUCTION FOOD CROPS IN AGRICULTURE, SAMARKAND/UGBEKISTAN

Sown area, 1000 ha

Gross product, 1000 ton

Source: State Statistical Committee
Regional cropping pattern

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

Source: State Statistical Committee

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Water situation in Samarkand province

When comparing Soviet and post-1991 water use for irrigation:
- Water supply decreased
- Water variability increased

In 2002-2012:
Decreasing in average water use per ha;

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 irresponsibility.
- Lack of information flow on current water situation to water users.
- Conflicts over water user in head, middle and end of irrigation canal.

WCA as part of a state coordination over agricultural production.

No willing to pay, because no trust for WCA.

WCA has financial problems.

Inequitable water allocation among users.

Consumer do not pay for WCA.

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

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<th>Mean</th>
<th>Std. Dev.</th>
<th>Max</th>
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<tbody>
<tr>
<td>Gross product (kg)</td>
<td>49047.52</td>
<td>46283.9</td>
<td>364860</td>
</tr>
<tr>
<td>Sown area (ha)</td>
<td>2.4</td>
<td>2.6</td>
<td>21.9</td>
</tr>
<tr>
<td>Water (m³)*</td>
<td>11878.4</td>
<td>13725.6</td>
<td>120450</td>
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Source: Authors’ calculation from State Statistic Committee dates

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Dargom irrigation system department
### Game theoretical approach

**Finite, n-person normal form game:** \( \langle N; A; u \rangle \):

- **Players:** \( N = \{1, \ldots, n\} \) is a finite set of \( n \), indexed by \( i \)
- **Action set for player** \( i \): \( A_i \)
- **Action profile:** \( a = (a_1, \ldots, a_n) \in A = A_1 \times \cdots \times A_n \)
- **Utility function or Payoff function for player** \( i \): \( u_i : A \rightarrow \mathbb{R} \)

**Source:** Authors’ calculation from farm survey data.


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<tr>
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<th>Farm 1</th>
<th>Farm 2</th>
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<tbody>
<tr>
<td>Cooperate</td>
<td>2, 2</td>
<td>1, 3</td>
</tr>
<tr>
<td>Non cooperate</td>
<td>3, 1</td>
<td>0, 0</td>
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Maintenance cost game. In some parts of Urgut district.

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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!

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