

# Food security and the improvement of water use efficiency

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Population growth and increasing demand for water resources connected with development of the world economy and the extensive use of the land and water resources in the developing countries are gradually leading humankind to the global water scarcity and food crisis. Situation is complicated because people have begun to use agricultural products, particularly grain, for fuel production under shortage and rise in oil prices. Under market conditions it is very difficult to stop such using of food products by administrative measures.

Central Asia belongs to the region with high rate of population growth. According to the WB's data, the total population of the countries within the Aral Sea Basin will be 173 million by 2050 (see Table 1).

Table 1.

Central Asian States	Population <sup>1</sup> , million		Expected increase, %
	2006	2050	2050
Afghanistan <sup>2</sup>	24,5	97,3	297
Kazakhstan <sup>2</sup>	14,8	13,1	-11,5
Kyrgyzstan <sup>2</sup>	5,3	6,7	26,4
Tajikistan	7,0	10,4	57,6
Turkmenistan	4,9	6,8	38,8
Uzbekistan	27,0	38,7	43,3
<b>Total (excluding Afghanistan)</b>	<b>59,0</b>	<b>75,7</b>	<b>28,3</b>
<b>GRAND TOTAL:</b>	<b>83,5</b>	<b>173,0</b>	<b>108</b>

Note: 1 – data of UNPFA, 2 – the whole territory, including outside the Aral Sea Basin.

At present, there is no food crisis in the Central Asian countries of the Commonwealth of Independent States but shortage of food is experienced all the time. Given such situation and lack of strategic reserves, any destabilizing factors can upset a fragile balance of food in region. An example in Tajikistan is early snowing and long-lasting frost during the past winter which didn't allow the wheat planting and destroyed the winter potatoes, frigid fruits and vine. The Government of Tajikistan anticipating the coming food crisis has requested international organizations about extraordinary help.

Theoretically, no state is capable to ensure full and sustainable food security for their population in the long-term since food demands depend on supply. However, countries with the developed agricultural production not only provide their people with food but are also the main suppliers of the food products all over the world.

There are a number of factors affecting the food sufficiency of country:

- ✓ effective agricultural production development policy;
- ✓ effective cropping patterns aimed to supply people with food;

- ✓ regular improvement of water and land productivity by applying intensive technology of agricultural production;
- ✓ development of a framework for tax and legal incentives encouraging to use the highly effective and water saving technologies in growing crops;
- ✓ regular expansion of irrigation land area according to the population growth;
- ✓ other factors.

In Central Asia, where the outdated irrigation technology is used, the main factor of food security is still irrigation. Nowadays in our region (excluding Afghanistan) the total irrigation area is about 8 million hectares. However, in order to develop new land, it is necessary to have available water resources that we haven't. More than 90% of water resources of Amudarya and Syrdarya rivers in the region are used for irrigation and under current level of irrigation technology we now experience shortage of water and moreover water supply to fields decreases sharply in dry years.

Central Asian countries, 2000	Area under irrigation, thousand hectares	Unit area, ha/capita
Kazakhstan	786	0,30
Kyrgyzstan	422	0,14
Tajikistan	740	0,11
Turkmenistan	1735	0,41
Uzbekistan	4295	0,19
Total	7971	

Table 2. Total and unit area per capita in Central Asian countries

Whereas in the 80s of the last century the cost of new land irrigation was US\$ 3,000-8,000 per hectare, now it is already up to \$12,000-15,000 per hectare. Given the such tendency, by 2020, the cost of one hectare irrigation can be more than \$ 20,000 USA. However, there is a major problem, which will restrain the development of new lands. It is lack of available water resources. As early as now, the countries in flow dispersion zone have depleted their prescribed water withdrawal limits in Amudarya and Syrdarya. Evidently, withdrawals of water exceed their limits in some places. Otherwise it is difficult to explain why the yearly formed plans of water supply to the Aral Sea from the Amudarya River are not frequently implemented. Meanwhile, it is necessary to emphasize that water delivered to the Aral Sea is not very fresh.

Production of major agricultural product ensuring minimal food security, i.e. of wheat in the region's countries strongly depends on available croplands. In this context, there are different conditions in the region's countries: Kazakhstan has huge land area where wheat grows on dry land and this country is the main exporter of wheat in the region; Uzbekistan and Turkmenistan possessing enough irrigation area could organize production of sufficient amount of cereals for their people during a short period of time. Difficulties with production of sufficient cereals remain in Kyrgyzstan and Tajikistan which have the lowest unit irrigation area per capita in the region. Tajikistan imports yearly up to 700,000 tons of cereals.

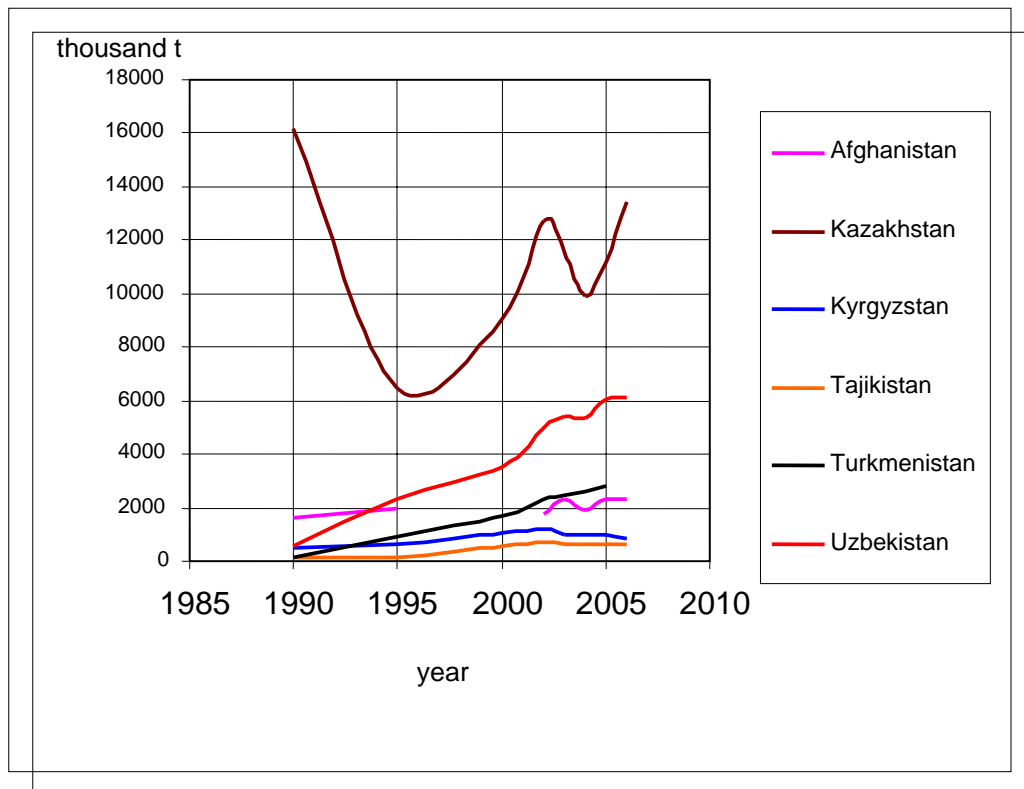


Figure 1. Wheat production in the Central Asian countries

One of the ways to reach food security for the region's vulnerable countries is to develop new lands and increase agricultural production. For example, there are up to 800,000 hectares of land suitable for irrigation. Simple analysis shows that to achieve the average regional value regarding unit irrigation area of about 0,2 hectares per capita, Tajikistan has to develop up to 650,000-850,000 hectares of land by 2015. To this end, it is necessary to put into rotation 10,000 hectares of new irrigation lands. In the nearest future, we have no such aim.

However, another, economically more beneficial and ecologically friendly decision of given problem is to increase productivity of irrigated hectare and of water. Increasing water productivity is a twofold task: increase soil fertility and crop yields under water saving. This is a complex problem and we just start to solve it in Tajikistan.

Observations implemented during 2002-2004 in North Tajikistan within the framework of the project "Integrated Water Resources Management in Fergana Valley" funded by Swiss Agency for Cooperation and Development highlighted that we have still low water productivity. According to the data of SIC ICWC, for recent 25 years water productivity has decreased 2-3 times.

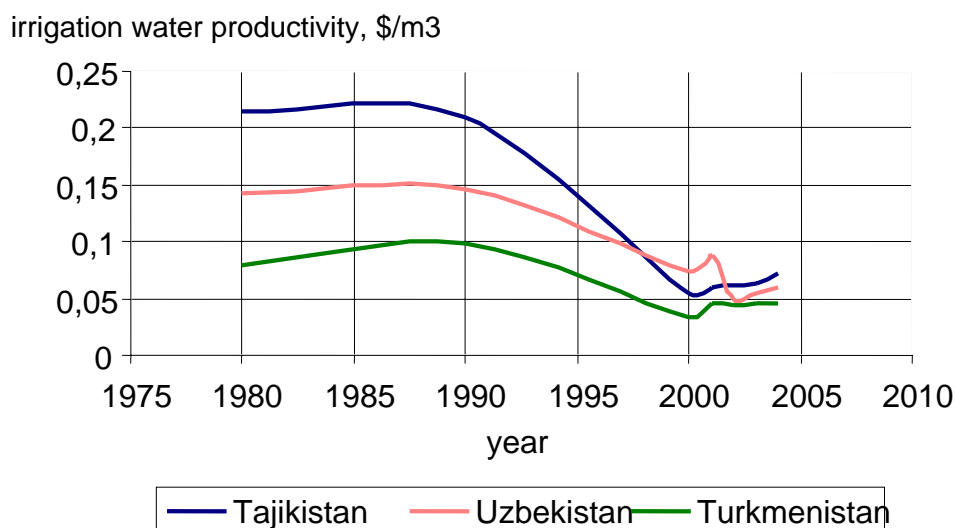


Fig. 2. Irrigation water productivity in Tajikistan, Turkmenistan and Uzbekistan

The world experience shows that only the improvement of water and land efficiency can be a guarantor for food security.

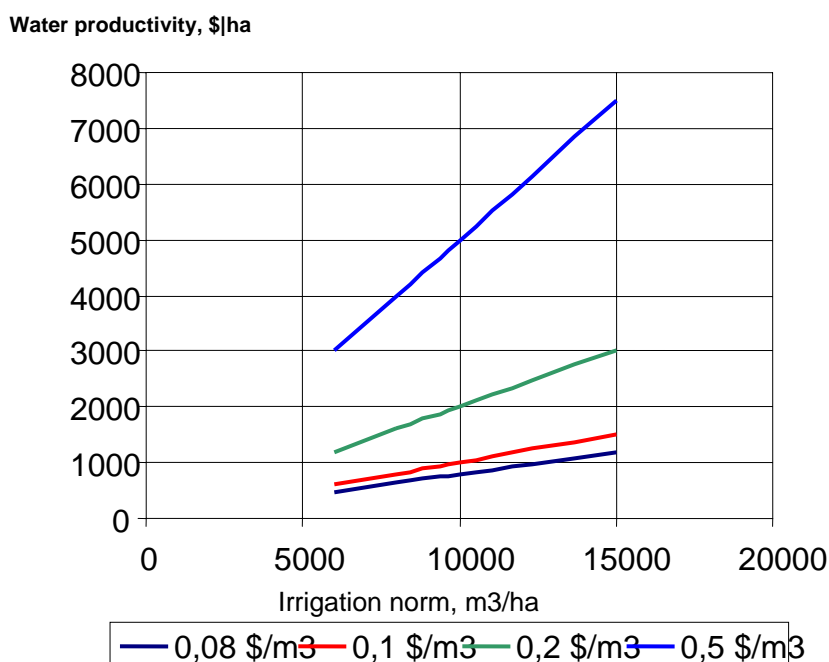


Fig. 3. Potential increasing of water productivity under various levels of irrigation rates in Central Asian countries.

Water productivity is a universal indicator, increasing of which can provide sustainable development of agricultural production and robust performance of irrigation and drainage systems, and finally, market saturation and food security. In order to increase water productivity, we have to develop a long-term program for increasing the effectiveness of water and land use, including solution of the next problems:

In water resources management:

1. Complete transition to the basin principle of management and establishment of basin governance for management of canals and widely involvement of all water users into water management.
2. Reconstruction, rehabilitation and modernization of irrigation and drainage systems at the inter- and on-farm levels in order to improve efficiency of systems and management.
3. Finalization of the process of establishing Water User Associations on the basis of private farms and at on-farm level.
4. Improvement of framework and approaches in water resources management at all levels.
5. Application of differentiated charges for water services; improvement of economic mechanism for water resources management.
6. Creation of suitable conditions for organization of production and implementation of water saving technology allowing for application of nutrients together with irrigation water and for significant increase of crop yields.
7. Implementation of improved irrigation technologies, including application of conventional furrow irrigation allowing for decreased surface and drainage outflows on the fields.
8. Restoration of professional training system for hydraulic engineers and training for irrigators.
9. Development and implementation of the system of material and moral incentives for water saving at all hierarchical levels of water management.
10. The State Long-term Program for Water Sector Development coordinated with agricultural production development.

In agricultural production:

1. Development of an economical model and legislative support of it's adoption for the balanced and stable turn-over of capital in irrigated agriculture, taking into account, as far as possible, all numerous factors.
2. Development of enforcement system for obligatory allocation of a certain part of farms' income for O&M of irrigation and drainage systems.
3. Government economic support for farms situated in the pumping irrigation area; granting of soft loans to them for application of water saving technologies.
4. Revision of cropping patterns aiming at high-yielding crops, subject to local and international markets, especially in the pumping irrigation area.
5. Establishment of agroservice and consulting centers (extension services) to support farmers with:
  - a. application of highly efficient agricultural machinery;
  - b. marketing of high-quality seeds, fertilizers, and sale of produced products;
  - c. research and development of recommendations for the improvement of soil fertility;

- d. development of measures to control agricultural pests and apply pesticides safely;
- e. application of water saving and land leveling technologies;
- f. organization of training for farmers.

Fulfillment of the above mentioned tasks will create legislative, economic and institutional basis for the improvement of water productivity and for the ensuring of food security. However, it is easy to note that all these measures are implemented in the countries with advanced irrigation agriculture such as USA, European countries, Israel, etc.

The achieving of food security is promoted also by regional differentiation of agricultural production. Thereto there is a need for close and stable long-term economic integration of the countries in the region, based on trust to one another. For example, on the basis of regional Food Agreement, Kazakhstan could supply needy countries with wheat, milk and meat, and Tajikistan – with fruits, vegetables, water and electricity.

The President of the Republic of Tajikistan Emomaly Rakhmonov said that only completion of the Roghun hydropower plant with the capacity of 3600 megawatt and the reservoir of more than 13 km<sup>3</sup> in volume will allow protection of more than 3 million hectares of land from severe water shortage in the lower Amudarya. Given the global warming, the dry years will occur more frequently and floods will bring not only damage but loss of water as the main resource of food production. The drought during 2000-2001 demonstrated to us the whole danger of such phenomena. Saying by words of our President we are sure that water partnership formed despite many difficulties in the Central Asian region is needed to be protected and strengthened comprehensively. It is necessary to use widely that potential for the benefit of creation.