

8. Competition «Water Conservation» under low water 2000 year conditions

8.1. Features of growing period 2000

From positions of estimating perception opportunity of climatic changes by agricultural production, results of "Water Conservation" competition, conducted in region in 1999-2000 years under World Bank GEF project, are interesting.

The second stage of Competition was held strict low water 2000 year conditions. External factors promoted that in this complex situation competitors would be able to demonstrate practically real ways of overcoming water crisis.

Low water availability 2000 sharply aggravated problem of water sector functioning in Syrdarya and Amudarya basins. Water resources amount used by water consumers significantly reduced, ecological sustainability of river water systems, Priaralie and Aral Sea (Table 7).

Table 7 | Amudarya and Syrdarya basins water resources in growing period 2000 (on data BWO "Amudarya" and "Syrdarya" for period from April 1, 2000 to September 30, 2000)

Name	Unit	Norm	Fact	Deficit
Amudarya basin	km ³	47.592	34.182	13.410
Syrdarya basin	km ³	29.302	21.955	7.347
On two basins	km ³	76.894	56.137	20.757

On this background within Syrdarya basin in non-growing period emergency water releases in Arnasay sink were carried out, which were result of winter period Toktogul reservoir operation in power regime and limited flow capacity of Syrdarya river channel downstream Chardara. In non-growing period 1999-2000 years 2.81 km³ water was released in Arnasay.

Priaralie and Aral Sea received 0.614 km³ (under planned 3.0 km³) on Amudarya basin and 2.7 km³ (under planned 2.8 km³) on Syrdarya basin. This means that in summer in both basins' lower reaches tensed environmental-epidemiological situation remains, especially aggravated in Amudarya basin.

On the background of current situation water supply of water consumers was carried out extremely unevenly as in general for growing period, so in the most tense periods (July-August) (Table 8).

Table 8 | Water availability of the Aral Sea basin states in growing period 2000 (in % relatively limits established by ICWC)

Amudarya River basin		Syrdarya River basin	
Tajikistan	84	Tajikistan	107
Turkmenistan	69	Kirgizstan	125
Uzbekistan	64	Uzbekistan	97
		Kazakhstan ("Dostyk")	85
Average	72	Average	104

8.2. Reduced water availability impact on main agricultural crop yield capacity

Similar to 1999 year regional main crops in 2000 were presented by:

- Cotton – 33.8% of irrigated area (in 1999 – 37.5%);
- Winter wheat – 17.9% (in 1999 – 19.5%);
- Alfalfa – 10.5% (in 1999 – 7.0%);
- Rice – 6.8% (in 1999 – 3.3%).

The highest cotton share was in cropping pattern of South-Kazakhstan oblast – 61.2%; winter wheat in Osh oblast – 31.3%; alfalfa in Kzyl-Orda oblast– 30.3%; rice also in Kzyl-Orda oblast – 41.3%.

Reduction of factual water expenses for complex hectare at level of water diversions in rayon water organizations in general on considered region against 1999 year was small 0.36 th.m3/ha (i.e. within water account accuracy limits).

General reduction of volumes diverted by water users from water sources against established limits in total on region was 2.6 km³ (against 1.4 km³ in 1999) or per one complex hectare 3.09 th.m3/ha (against 2.00 th.m³/ha in 1999).

Analyzing data on main crop yield capacity (Fig.12) it can be noted that in general low water availability didn't effect substantially main crop yield capacity of competition objects except sharp reduction of winter wheat yield capacity in Kzyl-Orda oblast (Syrdarya basin lower reaches) and some reduction of yield capacity in Kashkadarya oblast (middle part of Amudarya basin).

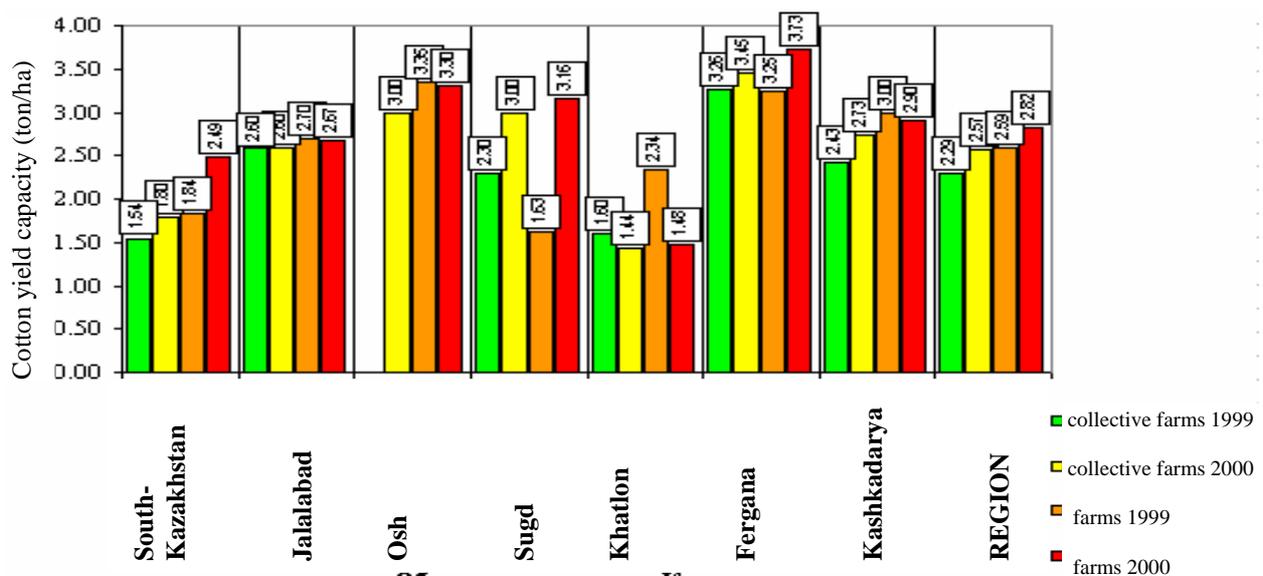


Fig. 12 | Comparative assessment of cotton yield capacity (1999-2000)

In Khatlon oblast (Amudarya upper reaches) cotton yield capacity significant reduction was rather result of lands' reclamation state and poor agronomic technique level, than water factor, because water availability level was the highest here in Amudarya basin.

Achievement of majority of competition participants was demonstration of sustainable results on the background of water availability reduced against conditions of growing period 1999.

8.3. Water resources use efficiency by rayon water organizations - "Water Conservation" competition participants

Over oblast-Competition participants (under assessments at level of water organization-Competition participants) contributions in water diversions reduction were formed in following way:

- South-Kazakhstan oblast	- 31 %
- Kzyl-Orda oblast	- 25 %
- Sogd oblast	- 16 %
- Kashkadarya oblast	- 11 %
- Jalalabad oblast	- 6 %
- Osh oblast	- 6 %
- Khatlon oblast	- 5 %
- Fergana oblast	- 0 %.

By the way, if consider main conditions providing this reduction, four ones can be underlined in order of their impact priority:

- lack of physical allocated water intake limit opportunity because of water shortfall in sources or lack of required command water levels in them
- allocated limits exceeding by real crop requirements for water
- water users' willingness to reduce costs for irrigation water (Kazakhstan, Kyrgyzstan)
- awareness of water conservation necessity, especially in low water conditions

Analyzing irrigated cropping pattern and using for assessment of crop water consumption, growing period irrigation norms – "net-field", given in reports of National Monitors, one parameter – Water Use Coefficient, recommended by some authors, in irrigation systems (water diversion in rayon – irrigated fields) is roughly estimated and compared with analogous parameter for 1999 (Table 9).

$$WUC = \frac{r * F}{W} \quad (8)$$

where

- WUC - Water Use Coefficient in irrigation systems
- r - useful crop water consumption, irrigation norm-«net», m³/ha
- F - irrigated system area, ha
- W - water intake volume in irrigation system, m³

Normal WUC values in irrigation systems (under efficiency of system of main, inter-farm, and on-farm canals at level 65%-75% and water use efficiency on the field at level 75-85%) constitute 55-65%.

WUC values less than 55 % prove insufficiently effective water use and available reserves for water conservation.

WUC values more than 65 % prove secondary in-contour irrigation water use in conditions of its scarcity.

WUC values more than 75 % prove «strict» irrigation water scarcity and low crop water availability.

Based on these criteria in conditions of strict water deficit water organizations carried out their activity:

- in South-Kazakhstan oblast (WUC =101 %), especially sharp deficit was noted here in «Dostyk» canal zone;
- in Kashkadarya oblast (WUC =97 %);
- in Kzyl-Orda oblast (WUC =75 %).

Water organizations of following oblasts demonstrated effective water use:

- Jalalabad oblast (WUC =68 %);
- Fergana oblast (WUC =63 %).

Water organizations of following oblasts decreased their indicators against 1999 year, where there are reserves for water conservation:

- Khatlon oblast (WUC =35 % against 43 % in 1999);
- Osh oblast (WUC =43 % against 58 % in 1999);
- Sugd oblast (WUC =48 % against 52 % in 1999).

8.4. Technological water conservation methods (not requiring additional capital costs for their implementation)

On Competition water users have demonstrated practically low-cost water conservation approaches.

Range of simple enough, not demanding substantial capital costs, water conservation approaches to certain extent increases water use efficiency and irrigation productivity as well. Basic ones related to category "technological methods" are given in Table 10. These methods were initiated by water users themselves, and their application zones under appropriate assessment and stimulation can be expanded. Presently this task is established in joint project of SIC ICWC-IWMI «Best practices».