POSSIBLE WAYS OF RATONAL WATER USE IMPROVEMENT IN IRRIGATED AGRICULTURE IN THE ARAL SEA BASIN WITH REGARD FOR CLIMATE CHANGES

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Problem of water use improvement in irrigated agriculture in the Aral sea basin is not new but especially critical it became last decade with regard possible climatic changes. Background for climatic changes is sustainable population growth mostly dependent on irrigated agriculture. Proposed report contains recommendations and opportunities based on results of recent years researches:

- Staged transition to water saving irrigation technique;
- Improvement of irrigation water use productivity;
- Use of low-cost water conservation methods;
- Improvement of furrow irrigation operation characteristics;
- Water consumption reduction at expense of draught-resistant cotton species use;
- Water expenses planning based on actual yield level.

1. Problem of water scarcity in irrigated farming

Peculiarity of last decades situation is that water demand exceeds (especially in dry years) technically and ecologically accessible water resources in the rivers. This caused Aral sea tragedy and threats food and ecological security of the region.

Sustainable population growth increases number of water users and water consumers and water diversion from the river as well as reduces available water resources.

Existing different approaches to water resources use cause contradiction between interests of water users exploiting river power potential (Kyrgyzstan, Tajikistan) and water users using water for irrigated farming. Winter releases for energy generation cause water scarcity during growing season.

Example of the Republic of Uzbekistan shows that normative water consumption is not met in Karakalpakstan, Samarkand, Syrdarya, Bukhara and Namangan oblast. Simultaneously, strict limits established due to water scarcity is not provided by appropriate water losses reduction.

Many researches note substantial reserves in crop water requirement management and unproductive water losses reduction. In this connection, low water availability is determined by water losses in irrigated systems and during irrigation. Only 43% of water reaches plants in the Syrdarya basin and 37% in Amudarya basin.

High losses require both diversion increase and measures on land reclamation and return water withdrawal and disposal.

According to Uzvodproekt (1993) water disposal share is 39 % for republic, 51 % for Syrdarya basin and 31% for Amudarya basin.

In Syrdarya basin 32 % and in Amudarya basin 33 % of disposed water is lost as resource.

Since return water quality aggravates, water scarcity can be reduced mostly at expense of unproductive losses reduction.

Existing water account system does not permit determine share of drainage and return water within disposed water. Calculations show that irrigation mostly is released to collector-drainage network. This accounts for 65 % in Amudarya basin and 59 % in Syrdarya basin.

According to 3 scenarios mentioned in "First National Message of Uzbekistan within UN Framework Convention on climate change, phase 2" (2001): accelerated – population growth by 2050 55mln, medium –45mln. and slowed – 37mln., irrigated farming water requirements vary within 48.6 – 53.3 km^3. When scenarios were developed, it was assumed that area under cotton will remain the same. It was assumed also that by 2030 world level for most agricultural crops yield will be achieved. Water requirement growth should be compensated by water conservation measures.

It is true that water conservation measures do not increase water resources in the basin. Thus, first stage of water scarcity solution should be presented by improvement of management at all hierarchic levels with reduction of irrevocable losses during water transportation to the field.

Introducing advanced water conservation technologies cost of water will increase (details in Section 5). That's why at this stage low-cost water saving methods should be selected. At the same time, land reconstruction with advance technologies introduction is unavoidable.

According to Uzvodproekt (1993) potential losses reduction is distributed among irrigation system elements as follow:

- 25 % relates to field (irrigation technique);
- 30 % relates to in-farm irrigation network;
- 45 % relates to inter-farm and main canals.

"First National Message of Uzbekistan within UN Framework Convention on climate change, phase 2" (2001) noted that optimization results show possibility to satisfy growing needs of economy by limited water resources under present anthropogenic impact. Under this impact strengthening forecasts will be more pessimistic. No one Uzglavgidromet forecast supposes Amudarya and Syrdarya river flow increase. Syrdarya flow will reduce by 15-20% and Amudarya flow – by 20-30%.

In this connection, let us try to assess trends of meteorological parameters changes effecting crop evapotranspiration by example of one weather station of Uzbekistan.