# Assessment of water availability and system efficiency in Central Asia[1]

## 1.1. Impact of flow regulation by large reservoir hydroschemes on irrigation water supply

**59.** With the current flow regulation pattern in the small Amu Darya basin and energy-oriented operation regime of Nurek HPS (i.e. maximum electricity is generated in autumn and winter), the annual water deficit may approach 25–30% of water withdrawal in 15 cases out of 100. Under operation of Nurek HPS in irrigation-energy regime (close to irrigation water diversion schedules, with maximum energy generated in the course of year), water deficit will not exceed 20% of water withdrawal and number of such cases (years) will decrease to 11 out of 100. Moreover, the irrigation-energy regime excludes idle discharges from HPS and consequent energy losses.

Calculations indicated to the need for multiyear regulation of the Syr Darya under energy-irrigation operation regime of Toktogul HPS, which ensures additional water releases of 3-3.5 $km^3$ from the reservoir during the growing season above energy needs (2.8-3.0 $km^3$) in dry years. Under energy-oriented operation of Toktogul HPS (3.0 $km^3$ of water is released during the growing season and 8.5 $km^3$ during non-growing season), water deficit (water delivery to canals from the Naryn and the Syr Darya) of 20-30% in dry years causes a decrease in water supply in the Fergana Valley: by 15-25% on average during the growing season and even by 40-50% in some ten-day periods in summer.

## 1.2. Water management effectiveness indicators

**60.** Development of RS-based monitoring in Uzbekistan allowed combining it with ground-based observations in a special WUEMoCA tool and analyzing degree of water supply of different provinces in the republic and the region. The results show that the above mentioned shortcomings in accuracy of fulfillment of water delivery schedules and water use plans and gaps between supply and use impacted the uniformity of available water supply in some provinces and districts. As diagrams below show, over the period from 2012 to 2017 irrigated land areas in Uzbekistan were 80% provided with water on average, except for provinces in the Fergana Valley and Samarkand province, where this indicator is close to 100% or even higher.

[1] Materials taken from section 8.5 of the DIAGNOSTIC REPORT ON RATIONAL USE OF WATER RESOURCES IN CENTRAL ASIA AS OF 2019. Prepared by the Scientific-Information Center of the Interstate Commission for Water Coordination in Central Asia (SIC ICWC) for Commissioned by the Organization for Economic Cooperation and Development (OECD)

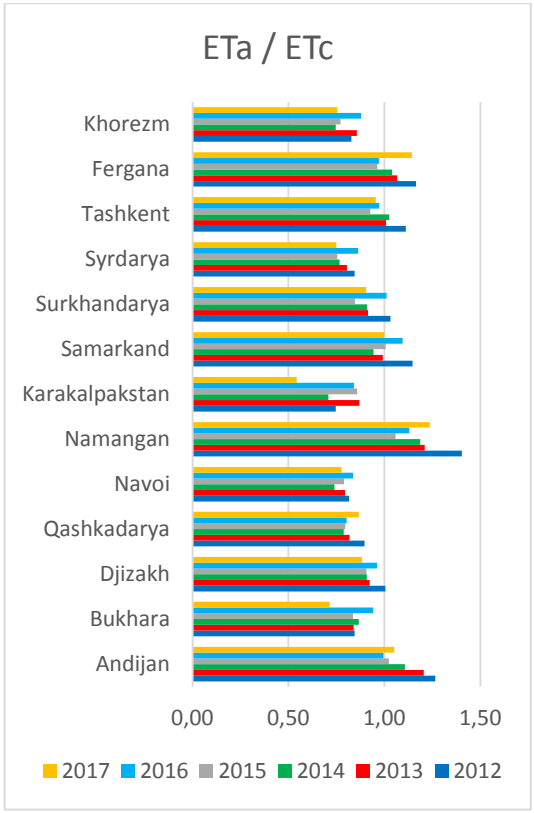


**Figure 8-1. Dynamics of available water supply by province in Uzbekistan**

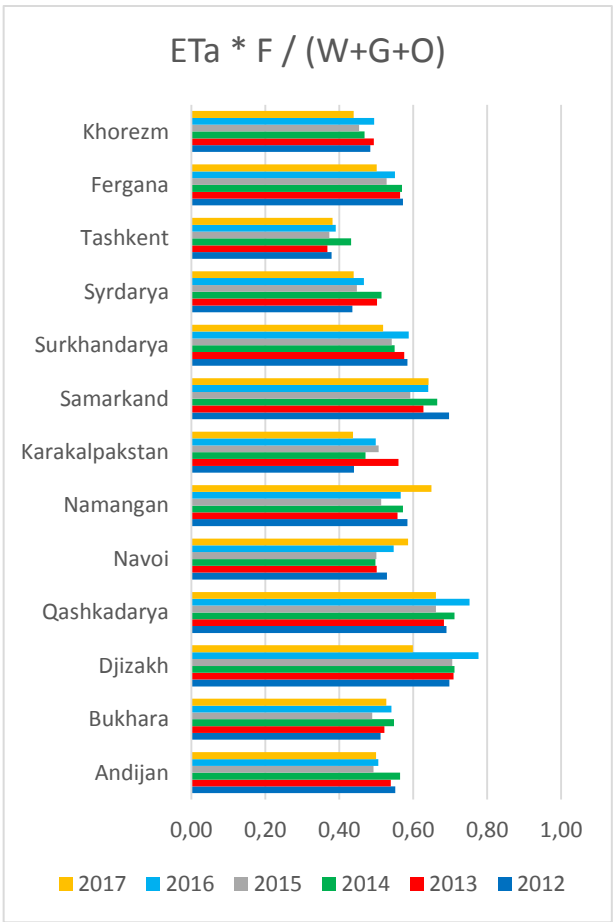


**Figure 8-2. Dynamics of water use efficiency by province in Uzbekistan**

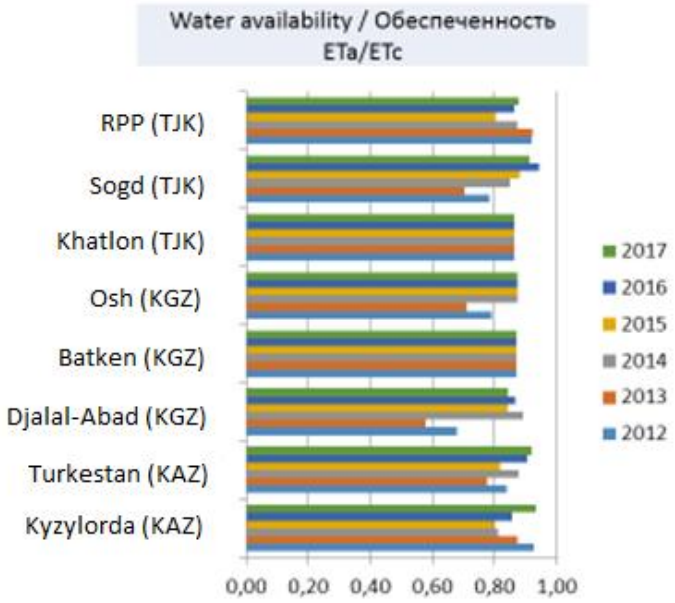


**Figure 8-3. Dynamics of available water supply by province in Tajikistan, Kyrgyzstan and Kazakhstan**

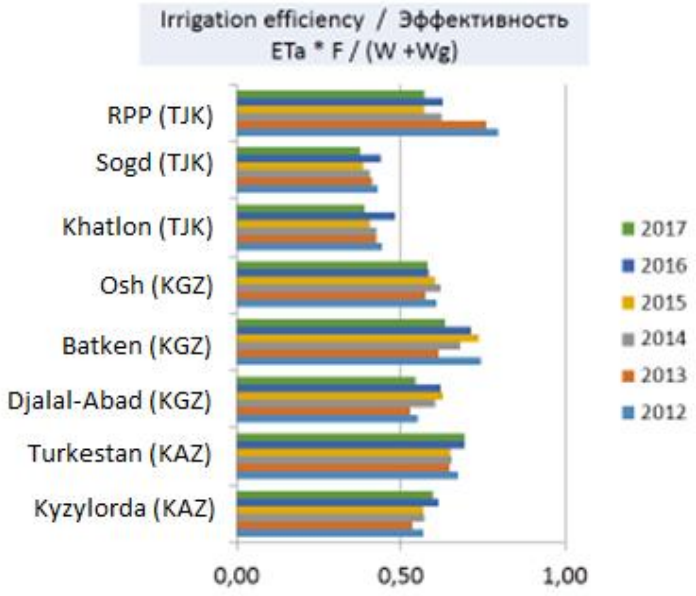


**Figure 8-4. Dynamics of water use efficiency by province**

Similarly, water use efficiency was assessed as a ratio of RS-based active evapotranspiration to total water delivery. The average indicator of water use is 50-52%, ranging from maximum of 75% to minimum of 30%. It is characteristic that this factor in the country increased on average to 58–59% in dry years. Thus, the need for detailed studies of the state of water supply and water use efficiency at each water use level and for differentiated measures to improve these indicators as part of the developed Program for rational water use is obvious.

In fact, the above factors do not consider losses in river channel and in inter-provincial main canals up to province boundaries. In the Aral Sea basin as a whole, those losses, as mentioned earlier in Chapter 3, amount to 15 $km^3$, of which half is unproductive losses or additional 78% of total water withdrawal. If those losses are taken into account in general water use, the water use efficiency will not exceed 43-45%.