

**ABOUT PROSPECTS
OF DEVELOPMENT AGRICULTURE
IN CHIRCHIK-AKHANGARAN BASIN (CENTRAL ASIA)**



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1. Chirchik-Akhangaran basin (ChAB) is located on territory of Uzbekistan (Tashkent province), Kazakhstan (Shimkent province taking water from Chirchik river – Keles massif), Kyrgyzstan (Jalalabad province part in Chatkal upper reaches). ChAB, as biogeographic units, is located in Western Tyan-Shan (WTS) between Kyzyl-Kum and Muyun-Kum deserts. WTS is a source of fresh water surrounding by arid areas and characterized by relatively low freezing, high precipitation (in low mountain 800mm/yr), moderate climate (average long-term air temperature is (-5°C) – (-10 °C) in January and 10-15 °C in July. WTS total area amounts for 90th.sq.km and is distributed between Kyrgyzstan (more than 60%), Kazakhstan (near 20%), Uzbekistan (more than 15%) and Tajikistan (about 4%).

Given paper concerns prospects of agriculture's development of ChAB in context of sustainable development of both national economy and ChAB states' water sector as well as their compliance with principles of integrated water resources management.

2. In the countries under consideration¹ near 90% of available water resources are used for irrigation in agricultural sector. According to statistical data², in national economies of ChAB countries production of irrigated agriculture is very important part of GNP. For instance, in 2000 irrigated agriculture product amounted for: in South Kazakhstan – 29%, Kyrgyzstan – 27%, Uzbekistan – more than 30% from GNP. In agricultural sector employment percentage is as follow: Kazakhstan - 22%, Kyrgyzstan - 53%, Uzbekistan – 36%. Rural population amounts for 60-70% (in Tashkent province – 30%). Accordingly, the basic accent is done at definition of the scripts of development agriculture in a context use of water resources in agrarian sector of the ChAB countries. Present agricultural sector situation and official studies of appropriate departments were analyzed regarding given issue: basin's countries economic development scenarios are used worked out by competent bodies, schemes of irrigated agriculture development for nearest and long-term perspective, other sources related to future water resources use including ChAB (Tashkent province).

¹ For Kazakhstan – South Kazakhstan with Keles massif – project zone.

² Report «Strategic planning and water resources sustainable development in Central Asia». – Tashkent, SIC ICWC, 2004 – p. 47-48.

3. SIC ICWC developed different scenarios³ of ChAB countries development, from which the following will be considered below:

- *«optimistic»(OS).*

Under «optimistic scenario» population growth rate is expected to be decreased by 2020 down to 1.0%/yr. In result of water saving technologies introduction specific water consumption in irrigation will decrease to 9.4th.m³/ha that will permit to increase irrigated area by 2020 up to 5,86mln.ha compared with 2000. (5.42mln.ha) including: South Kazakhstan – from 772 to 918th.ha, (growth – 144 th.ha), Kyrgyzstan – from 415,2 to 431,8 th.ha (16,6 th.ha), Uzbekistan –from 4234 to 4508 th.ha (274 th.ha);

- *«business as usual» (BAUS).*

Under «medium» scenario of ChAB countries development insignificant population growth rate decline is expected by 2020 down to 1.23 %/yr. Specific water consumption in irrigation will be 11.0 th.m³/ha. Irrigation area increase is expected as follow: in South Kazakhstan – 104 th.ha, in Kyrgyzstan – 11,2 th.ha, in Uzbekistan – 178 th.ha;

- *«medium» (MS).*

Under «business as usual scenario» population growth rate will amount for 1.9%/yr, specific water consumption in irrigation – 12th.m³/ha. Irrigated area increase is expected as follow: South Kazakhstan – 59.8th.ha, Kyrgyzstan – 7.1th.ha, Uzbekistan – 46.6th.ha.

Obviously, that OS realization will require revision of existing approaches to water resources use, since irrigated agriculture development is possible within existing water limits.

4. In accordance with “General Scheme⁴ ...”, following concepts of development are accepted:

-*development based on existing rate and structure of realized measures.*

Developing according this concept, agricultural production decreases in sustainable manner. By 2015 provision by food staff in Uzbekistan will decrease by 25%, area with favorable reclamation conditions will decrease, water and reclamation systems' technical state will grow worse.

Therefore, this concept is unacceptable;

- *stop-development (SD).*

Under this concept, irrigated area remains the same, new lands are not developed, all financial means are allocated to land reclamation measures and irrigation and drainage systems improvement. By 2015 all irrigation systems should be rehabilitated and upgraded. At that irrigated area will decrease by 51,2th.ha (due to land retirement for different objects and communication systems). Provision with food will increase only by 3% (from 61 to 64%) due to irrigated hectare productivity increase;

In accordance with expert evaluation, this concept is also unacceptable;

- *maximum development (MD) = recommended development (RD).*

Under this concept all measures of stop-development concept will be realized, additional irrigated lands will be developed allowing provide population with food.

According to «General scheme...», there is possibility to provide necessary land, water and labor resources under any scenario of development.

³ Report «Strategic planning and water resources sustainable development in Central Asia». – Tashkent, SIC ICWC, 2004 – p. 45-60.

⁴ «General scheme of irrigated agricultural and water sector of the Republic of Uzbekistan for the period up to 2015» (Summary) –Tashkent, «Vodproekt», 2002 – p.268.

But only under concept of maximum development food provision, irrigated land favorable reclamation state, effective water and land resources us can be achieved.

Scenario RD is based on concept of maximum development and analysis of all previous concepts' and real possibilities of investment in agricultural and water sector.

To certain extent, assumption about realization of political, social-economic prerequisites of transition to market in agricultural sector by 2015 as well as structural transformations related to transition to market relations between agricultural producer and the state.

Orientation on maximum development scenario (MDC) is justified in terms of IWRM and CAB principles' adoption that will allow substantial adjustment of proposed official scenarios of social-economic development of Tashkent province.

Concept of maximum (full) development (MDC) is realized by scenarios:

- I scenario. Agricultural production providing population with food by 70% of average weighted volume required for full provision according to optimal food allowance;
- II scenario. Agricultural production providing growing population with food by 65% against 61% currently that is in fact keeping positive trend of food provision not depending on number of population.

It is meant that levels of development by scenarios are stages of maximum development concept realization, ratio of water-related measures in these scenarios is adopted according to ratio obtained at maximum development. Only small amendments in volumes of measures according to specific conditions of province are accepted.

Thus, only realization of "optimistic" variants of development (OS – on SIC ICWC, MDS – on "General Scheme...") allows to satisfy needs of the population for products of a feed at an acceptable level. It is obvious, that the realization of "the optimistic scenario" of development will require reconsideration of the existing approaches to use of water resources in the ChAB-countries.

In particular, by 2015 in the Tashkent province should be reduced:

- need on irrigated water - on 314mln.cub.m (almost 8%),
- disposal water - on 749mln.cub.m (31%).

It is evident that irrigation water requirement decrease will require big efforts.

5. Water resources by river basins of Central Asia are defined in the middle of 1980-ties on base of surface and groundwater flow formation and discharge long-term observations. Water resources and their distribution between Central Asia republics are established in basin Schemes of integrated water use and conservation (IWUC) of Amudarya and Syrdarya rivers. These documents are recognized by appropriate interstate agreements, Agreement of 1992, International Conference on Sustainable development of the Aral sea basin (Nukus, 18-20.09.1995) and remain valid. In accordance with «Scheme ... of Syr-Darya basin» upstream Chardara reservoir average annual flow distribution between the republics is realized in following proportion: Uzbekistan – 73.3%, Kazakhstan – 7.2%, Kyrgyzstan – 9.8%, Tajikistan – 9.7%. Water resources distribution between ChAB states as follows: Uzbekistan – near 88%, Kazakhstan – near 12%, Kyrgyzstan – less than 1% from total long-term runoff.

Water resources use by ChAB countries in perspective should not exceed volumes established in appropriate Agreements. There are no essential disagreements between Uzbekistan, Kazakhstan and Kyrgyzstan, though Kyrgyzstan disputes water allocation principles established earlier. In particular, Jalalabad province is expected to increase water diversion next 15 years 1.7-2.2 km³/yr or by 26% on average.

Though prospective water consumption increase in Chatkal zone of Jalalabad region can't essentially influence on water diversion in ChAB, existing "status-quo" in interstate water allocation should be maintained to avoid precedent. Kazakhstan (Keles massif of Shymkent province) and Uzbekistan (Tashkent province) are going to develop economy within water limits established by interstate agreements.

6. CAB average long-term water resources are estimated as 9.32 km³/yr, from which surface flow constitutes 8.67 km³, or 93% of total volume.

Basic ChAB water sources are:

- **Chirchik River** (is formed by conjunction of rivers Pskem and Chatkal). Its length - 161 km, water catchment area- 14240 km², inflow regime: snow-glacier (SG). Average multiyear flow – 7.2 km³. Chirchik river takes water from two relatively big tributaries – **Ugam river** (length – 68 km, water catchment area – 866 km², inflow regime - SG) and **Aksakatasay** (48 km; 453 km², inflow regime- snow-rain (SR));

- **Pskem river**. Length – 70 km, water catchment area – 2540 km², inflow regime: SG;

- **Chatkal river**. Length – 223 km, water catchment area – 6580 km², inflow regime: SG;

- **Koksu river**. Length - 57 km, water catchment area – 372 km², inflow regime: SG;

- **Akhangaran (Angren) river** is the second significant water supply source in Tashkent province. Length 236 km, water catchment area – 5220 km², inflow regime: SR. Average multiyear flow – 0.72 km³.

- **Keles river**, Length – 241 km, water catchment area – 3310 km², SR, receives additional water from Chirchik. Average multiyear flow in mouth – 6.5 m³/s.

CAB water resources form also tributaries of specified rivers as well as small rivers and says flowing in reservoirs constructed on area of Tashkent province.

Water supply source of Tashkent province is Syrdarya river water too.

6.1. In order to regulate flow in CAB water reservoirs constructed in Tashkent province:

- Charvak (Useful Volume - 1580mln.m³, Regulation – seasonal);

- Tyuyabuguz (Useful Volume - 220mln.m³, Regulation – seasonal);

- Akhangaran (Useful Volume - 183mln.m³, Regulation – seasonal);

- Gazalkent (Useful Volume - 7mln.m³, Regulation – daily);

- Khojikent (Useful Volume - 9mln.m³, Regulation – daily).

Charvak water reservoir is waterworks oriented on irrigation and hydropower, Tyuyabuguz – irrigation, Akhangaran – irrigation and drinking water supply, Gazalkent and Khojikent reservoirs – hydropower.

The most developed and sophisticated irrigation infrastructure in ChAB belongs to Uzbekistan (Tashkent oasis), less sophisticated to Kazakhstan (Keless massif), relatively weakly developed because of mountainous area – Kyrgyzstan.

7. New land development. Water resources management in ChAB for perspective can't be considered without coordination with agricultural sector development, particularly irrigated farming – most water consuming economic sector. At the same time, according to the Concept of maximum development, to satisfy own requirements, it will be needed to introduce additional 286.8 th.ha of irrigated lands in agricultural turnover in Tashkent province by 2015 (that is 64.6% of requirements of the whole republic – 444,000 ha), from which in Tashkent province itself – 40,6 th.ha, in other districts – 246,2 th.ha.

In view of large capital intensity of new land development, it is necessary at the initial stage to keep within bounds of internal development, which requires less forces and resources, and concentrate efforts on improving the effectiveness of irrigated lands being used.

8. Reclamation condition of lands. In contrast to common tendency towards increase in lands unfavorable in reclamation terms all over the republic, such tendency has not been observed in Tashkent province (as well as in Namangan and Navoi provinces). Over the recent years, lands favorable in reclamation terms have increased by 135000 ha in Tashkent province owing to reduction in the portion of lands with satisfactory (113000 ha) and unsatisfactory (9200 ha) quality (see table). In 1998, lands unfavorable in reclamation terms amounted to 10200 ha, about 8500 ha in 2004. On the whole, lands of unsatisfactory quality are located in lower river reaches (3500 ha in Bekabad district, 2300 ha in Buka district, 2200 ha in Chinaz district, and about 500 ha in Yangiyul district).

Tashkent province is among the regions, in which the area of irrigated lands with salinity less than 1 gram/liter amounts to a considerable value, 63%. In the period under consideration, lands desalination was observed in Tashkent province in general. Overall balance of salts (in 2003) coming with irrigation water and removed from the province by collector-drainage flows is as follows: influx - 1.570 million tons, removal - 1.751 million tons. At present, lands of unsatisfactory quality in Tashkent province amount to about 2.2%. However, for agriculture in the part of Tashkent province located in ChAB lower area (Bekabad, Buka, Chinaz, and Yangiyul districts), they represent a serious problem.

9. Relatively low effectiveness of agricultural production causes low irrigation water use effectiveness. Large potentials for water resources saving are hidden in improving irrigated farming effectiveness. So, according to the Concept of maximum development (“recommended scenario”), it is supposed to achieve by 2015 in Tashkent province the level of average crop yields:

- cotton – 33.2 centner/ha (average 36.1 centner/ha in the whole republic); 19.8 centner/ha in 2003 (in fact);
- wheat – 34.9 centner/ha (41.7 centner/ha); 41 centner/ha in 2003;
- potatoes – 127 centner/ha (138 centner/ha); 212 centner/ha in 2003;
- vegetables – 221 centner/ha (234 centner/ha); 225 centner/ha in 2003;
- melons and gourds – 154 centner/ha (172 centner/ha); 170 centner/ha in 2003; etc.

Once the predicted yields of a number of crops have been already achieved (wheat, potatoes, vegetables, melons and gourds), then the level of yields predicted as for such a major crop as cotton (33.2 centner/ha) is far from the real (19.8 centner/ha).

The analysis shows that over the past 20 years, a sustainable tendency towards reduction in yields of the major export crop has been outlined. According to statistical data, cotton yields in the province amounted to average 30.2 centner/ha in 1985; 28.1 in 1990; 26.1 in 1995; and 23.9 centner/ha in 2000; over 20 years the crop yields has reduced 1.5 times.

In the context of separate districts in the province, the situation appears more critical. For instance, in these years in Kuyi-Chirchik district the following trends were observed: 32.7 centner/ha in 1985, 29.5 in 1990, 26.8 in 1995, 20.8 in 2000, 16.3 centner/ha in 2003, yields decreased by 2 times.

The main factors causing drop and low capacity of a number of irrigated crops, in particular cotton, and, as a result, reduction in water productivity (practically the same quantity of water is used to produce them) are as follow:

- *reducing mineral fertilizer application norms.*

This tendency has existed since the early 1990s (see table). In Tashkent province, according to data for 2003, nitrogen and phosphate fertilizers are applied in cotton production up to respectively 60% and 45% of scientifically recommended norms;

- *poor material and technical basis (MTB) of agricultural enterprises.*

The outdated machine-and-tractor fleet does not enable to carry out land treatment at a stated time, owing to which, according to expert evaluations, up to 30-40% of yields are lost. The untimely land treatment results in violation of irrigation terms and lowering of irrigation water effectiveness. A number of other MTB components (provision with sorted seeds, fuels and lubricants, chemicals, etc.) have a negative influence upon crop yields and water productivity as well.

The situation in agriculture is also aggravated by these factors:

- rapid shortening of governmental support for agricultural sector;

- disparity in market and purchasing prices for agricultural products;

- artificially overvaluation of material and technical resources supplied by the government to agricultural producers;

- others (limitation of capabilities of agricultural producers to dispose their own funds on banking accounts, problems of crediting, etc.).

All of that impedes to introduce market mechanisms in rural areas, limits capabilities of farmer, peasant, leaser to raise his labor productivity. These factors cause commercial impracticability of the most of private and shirkat farms not only in Tashkent province, but also throughout Uzbekistan.

10. Problems of pumping irrigation. Areas of pumping irrigation in Tashkent province amounted in 1998 to more than 58,000 ha (about 15% of total irrigated area). The most part of pumping stations was put into operation in the 1960s and 1970s; their equipment produced its resource. In the last years, supplies of spare parts for pumping and power equipment (PPE) were practically missing. PPE was subject to capital repair 5-6 times, while it requires replacement after 3-4 repairs. The service life of PPE is no more than 20-25 years.

One of urgent problems of pumping irrigation is its expensiveness due to high prices for energy resources. In this connection, it seems expedient to consider in future the issue on possibility of transferring a part of lands from pumping irrigation to gravity irrigation. The issue in ChAB requires a careful study.

11. Above problems solution is impossible without key persons support ideas of transition to integrated water and other natural resources management in ChAB, and it assumes carrying out a number of activities:

- developing plans of agriculture development (particularly – for basins: Keles river in Kazakhstan, Chatkal river in Kyrgyzstan, Chirchik and Akhangaran rivers in Uzbekistan) and combining them into a single plan of agriculture development in ChAB through coordination;

- seeking for ways to solve national water and environmental problems without causing damage to other countries, in particular by mutual coordination:

- strengthening powers and capabilities of BVO “Syrdarya” for organizing accounting and controlling water quantity and quality in ChAB;

- developing common approaches and programs of socio-economic development;

- solving the issues of water resources use damage assessment;

- disseminating positive experience in water management in ChAB;
- informing the community about the state of affairs in water resources in ChAB;
- providing participation of civil society institutions in IWRM ChAB; etc.

A number of water sector problems in ChAB countries, in particular:

- absence of mutual interest of water users and water authorities in water conservation problems. This is one of reasons for low productivity of water and irrigated hectare in all the project countries;

- over-norm deterioration of capital assets and poor material and technical basis (MTB) of water organizations, further deterioration of water infrastructure. As for this matter, it is necessary too identify priority investment objects;

- poor economic basis for regulation of relations between water supplier and water user organizations, in particular, imbalance between the cost of water supply services and resources of agricultural producers to pay for these services. For instance, water supply services are provided in Uzbekistan free of charge that significantly reduces financial resources of water organizations;

- issues relating to provision of water supply enterprises with office equipment, transport, modern water accounting and communication facilities and equipment. As a rule, their internal means are very poor and do not enable most of them to solve these problems;

- early transition of water organizations to self-repayment. In a number of cases, this leads to subsequent weakening of their MTB, worsening of technical condition of irrigation network within jurisdiction, and drain of water specialists;

- issues relating to establishing and governmental support to WUAs at the initial stage, absence of which reduces the efficiency of these advanced IWRM institutions; etc.

The ChAB countries can set national goals in regard to diverse development scenarios depending on priorities, political aspirations and economic capabilities. However, to exclude conflict situations in future, it is expedient to agree such plans with basin partners.

12. SIC ICWC in ChAB zone jointly with partners from Germany, Greece, The Netherlands, Sweden, Benin (West Africa), Kazakhstan, Kyrgyzstan and Uzbekistan is implementing «Rivertwin» project («Regional model for IWRM in river twin-basins»).

One of the main project goals is justification of transition to hydro-ecological water and other natural resources management in ChAB. In «Rivertwin» project implementation result following issues should be decided:

- perspective social, environmental and economic ChAB development goals;
- recommended measures on promoting sustainable water use without damage to water and environment quality and economically optimal combination of these measures;
- natural resources and water services taking into account predicted supplies and demand;
- ways of ensuring of basin upstream and downstream interests' equity in water resources use of appropriate quality;
- anticipation of anthropogenic impacts on water quality;
- public participation level in water resources management;
- other factors influencing significantly different aspects of social-economic development of ChAB states.

«Rivertwin» Project will define relatively to studied and analogous river basins sustainable development strategies and will be oriented on implementation of European Water Directive in part of water management at river basin level. It seems that in order to achieve long-term objectives of agriculture development and of IWRM in ChAB, the Rivertwin Project countries should be based on the following provisions:

- river basin or irrigation system is regarded as a single object, water management and protection is built on basin principle;
- water supply systems are orientated to application of modern water treatment technologies and integrated water resources management;
- reducing water losses and water accounting at all water use stages;
- when there is possibility to privatize parts of water resources scheme, state ownership to waters and large water facilities remains;
- participation of water users in recovery of waterworks operation and maintenance costs is provided as a basis for sustainable development of water sector;
- obligatory payment for water supply services;
- intruding differentiated tariffs for water supply services;
- seniority of household-drinking water supply and environmental flows;
- seniority of investments in reconstruction of waterworks facilities;
- governmental support for rehabilitation and construction of large facilities;
- establishing water use limits taking environmental rights to water into account;
- transparency of decisions on water resources management for all stakeholders;
- introducing market mechanisms for natural resources use;
- removing parallelism in functions of different water management agencies;
- ensuring coordination between activities of agencies relating to water resources management;
- developing effective tools for risk management in water use at all water management levels (interstate, national, basin, local).

Within the framework of the project the offers on optimization of different variants of agriculture development (for river basins: Keles, Chatkal, Chirchik and Akhangaran) and preparing of the uniform scenario of ChAB development.