

Irrigated agriculture under conditions of growing water crisis and social and economic reforms in CIS countries

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In 1990, irrigated agriculture in the former Soviet Union was concentrated in southern regions of the republics of North Caucasus, Central Asia, and Moldavia.

It is generally known that agricultural lands in the USSR belonged to kolkhozes (collective farms) and sovkhozes (state farms). Established large irrigation systems, including on-farm network, were built at the expense of the national budget and after the construction were transferred to the balance of kolkhozes and sovkhozes.

Taking into account vast intact land areas, they established optimum irrigation network with optimum crop rotation. When sprinkling irrigation was applied, irrigation modules on an area of 1200-1500 ha with on-farm networks and local pumping stations were set up.

All the systems were designed and constructed allowing for operation of agricultural machinery and reasonable crop rotation with a set of crops that were the most adapted to specific environmental and economic conditions.

After the collapse of the Soviet Union, reforms took place in agricultural sectors of all new formed countries; social and economic conditions changed. Most collective farms were liquidated. This resulted in breakdown of irrigation and drainage systems. The inter-farm network remained, as a rule, in state ownership and management, while the on-farm one was left virtually without master.

In some countries, the former kolkhozes' lands were broke up, which brought to the failure of functioning of on-farm systems and crop rotation, and in some cases brought to failure of intended use of agricultural lands.

Social and economic transformations in the new countries took place in different ways. Irrigated agriculture also took shape in different ways.

Countries with different climatic conditions had also different distinctive characteristics of the changes. Here, it should be noted that at setting up systems they followed also different approaches in arid and semi-arid areas.

Thus, in semi-arid zones, i.e. the southern areas of present-day Russia, Ukraine, Moldova, and Northern Caucasus, they created systems with selective irrigation in such a way that the irrigated lands in former kolkhozes and sovkhozes accounted for 30-40 %, and the rest were dry, not irrigated, lands.

Analyzing the dynamics of irrigated agriculture in CIS for the recent 20 years, it should be noted that the areas of irrigated lands in arid countries have changed slightly, which is due to almost full dependence of crop cultivation on irrigation. If consider the condition of irrigated agriculture in the countries where there are semiarid areas and irrigation systems with selective irrigation areas were constructed previously, one can see that revolutionary changes took place there.

Thus, in Moldova out of 330 ths. ha of irrigated areas in 1990, not more than 10 ths. ha are irrigated now; in Ukraine, of 2.6 Mha, 600-700 ths. ha are irrigated. The same situation is in Russia and in the Northern Caucasus countries, as well as in Romania and Bulgaria where the conditions are close to those of Moldova and Ukraine.

What are the outlooks for further development?

At present, dry years on the European continent have become more frequent. Whereas 34 dry seasons took place in 18th century, in 19th century – 40, and in 20th century that number came already to 46. Considering the period, it was April-July; in April-August, 53 years were dry, 7 ones of which were in the recent 15 years.

Despite such situation, agricultural producers, taking into account disaggregation of land plots, are not able to provide normal operation of on-farm network and, accordingly, irrigate crops. That problem became especially apparent in the systems with closed on-farm network where pumping stations serve 1200-1500 ha modules.

Today, with increasing water crisis and critical need for the provision of growing population with food there is no alternative for the reclamation and extension of irrigation areas.

In all countries, allowing for social and economic reforms, governments concern about the existing situation in irrigated agriculture.

In this context, they seek the ways for reclamation of irrigated lands and improvement of irrigation system management based on the accumulated experience of advanced countries.

Let us examine dynamics of the change of irrigated land conditions on the example of Ukraine as a country where in the 1960-1980s irrigation of 2.6 Mha of land was developed in the southern region.

The irrigation systems met the best world standards, and they even exceeded the latter in some aspects.

The on-farm network was made by means of pipelines. Irrigation system modules of 1200-1500 ha with automated pumping stations were tested. Irrigation of 96 % was carried out by sprinkling method. Far-reaching sprinkling machines “Fregat”, “Dnepr”, and “Kuban” operated on the field. The on-farm network was automated and enabled efficiently and effectively control water distribution and ensure operation of the system “on demand” of the customer. More than 33 000 sprinkling machines were operating on fields. Undoubtedly, such systems had drawbacks, especially with regard to energy and materials consumption.

For the recent 20 years, fundamental changes took place in both CIS countries and former socialist countries.

Agrarian reform took place, which in many cases did not take into consideration the specifics of irrigated areas. Abolition of large collective farms and breaking up of lands has brought to the breakdown of the engineering and reclamation system’s integrity.

Small land users arose, who were not able to operate the on-farm network. Thus, the on-farm networks which were on the balance of kolkhozes and sovkhoses were left without master. Small land owners have no capability to update the high-capacity sprinkling machinery. Consequently, the on-farm network and pumping stations in many cases were subjected to withdrawal or destruction. Such situation was observed not only in Ukraine, but also in the neighboring countries, i.e. Moldova, Romania, and Bulgaria.

What was done in Ukraine?

With the purpose to prevent complete destruction of the on-farm network, the government decided to transfer it to the balance of rural councils. Such a decision stopped the process of the on-farm network breakup.

Today, out of 2.6 Mha, 600-700 ths. ha are irrigated. About 8 thousand sprinkling machines remained, of which 5.5 thousand ones are in the operating condition, although their service life has expired long ago.

Small farms in some cases unite into associations of land and water users. Such decision facilitates restoration of the on-farm network.

Recently, large agricultural holdings are founded on former kolkhoz lands, which consolidate ten thousands of hectares of lands, including irrigated ones. This gives a hope for reclamation of irrigated lands.

New least-cost and effective sprinkling machinery of different companies appear on the field.

The well-known factory “Fregat”, which in its time provided irrigation systems of the Soviet Union and socialist countries with sprinkling machines “Fregat”, currently is restoring its manufacture of new modern sprinkling machines.

In many countries, widespread introduction of perennial planting and vegetable micro-irrigation systems takes place. To date, micro-irrigation systems function on over 50 ths. ha in Ukraine. This allowed raising the vegetable crop yields by more than two times as compared to those under sprinkling and substantially reduced water and energy consumption.

Romania has good experience in reclamation of irrigated lands. In some cases, land and water users associations function very successfully there. The irrigation systems in this country are not different in design to those created in semi-arid zones of the former Soviet Union.

Irrigated agriculture under water crisis conditions in all countries requires searching for new approaches to the irrigation systems, searching new water-saving methods, reliable anti-seepage lining of open canals, and optimization of water resources management on irrigated areas.

In connection with social and economic reforms in the CIS countries, new normative legal support is needed. In this context, it is required to summarize the experience accumulated in different countries and develop a full package of normative legal and legislative documents in these countries, depending of specifics of each country.