

State-of-the-Art and Prospects for Reconstruction of Effective Use of Irrigation and Drainage Systems in Ukraine

An amount of actually irrigated land is the real indicator of the conditions of irrigation and drainage systems and of irrigated agriculture effectiveness. Thus, **2.5 Mha were irrigated in 1998**, whereas in 2006 agricultural produces irrigated 619,400 ha, in 2007 – 694,400 ha, in 2008 – 640,500 ha, in 2009– 649,500 ha, in 2010 – 589,700 ha, and in 2011 – 594,000 ha.

Because of the poor condition of irrigation network and pumping equipment and the lack of sprinkling equipment, **about 1.5 Mha of land lack irrigation** in Ukraine. The sharp reduction of actually irrigated area is accompanied by:

- substantial deterioration of available irrigation system, especially at on-farm level, virtually complete freeze of reconstruction of old systems and construction of new systems due to great cuts in budget financing and lack of funds among land users;
- scarcity and poor replacement of sprinkling equipment. Given the total demand of about 26,000 units of sprinkling equipment, only 6,000 units are available and among them 5,000 units are in good working. In addition, the situation becomes worse because **there is no local production of sprinklers**;
- breach of integrity of irrigation systems. On the one hand, there is division of land into smaller parts and, hence, occurrence of multiple smaller land users; and, on the other hand, the on-farm system was transferred into the ownership of individual farmers and enterprises, while the inter-farm system remained under state ownership. In this context, state organizations divert and transport water to the field, while owners of the on-farm network perform irrigation themselves, i.e. those are mainly rural and village councils, land owners and users, who have neither funds nor necessary skills or professional personnel for such work. In this case, land owner or user virtually is not involved in irrigation system management;
- breach of crop growth technology and cropping patterns, quite low level of inputs into crop production that led to abrupt drop of crop yields. Now crop yields from most irrigated land is at the same level with those generated by dry farming;
- complication of irrigation system management and land and water management and more troubled implementation of measures for protection and improvement of irrigated soil, also due to a great increase in number of irrigated land users. There are 191,700 land users, and now this makes use of irrigation systems more difficult;
- poor condition of irrigated land. According to land reclamation cadastre, in Ukraine only 15-20% of irrigated land falls into the category of good land, 60-70% is in satisfactory condition and tends to degradation, and 15-20% of land is bad in general.

Hence, even this incomplete list describing the status of land irrigation in Ukraine allows characterizing this situation as critical, with tendencies, which could lead to complete loss of irrigation. Moreover, one may state unambiguously that irrigated land has already lost its role as a security reserve for food and resource supply of the state. However, natural-climatic conditions and clear tendency towards transformation of irrigation from subsidiary, as it was before, into obligatory element and, for many crops, into determining factor demonstrate that farming without irrigation is impossible in Ukraine. Therefore, restoration of irrigation capacity is among priorities of agricultural development in Ukraine.

Measures to maintain the on-farm irrigation systems

Because of reformation of agro-industrial enterprises that used reclaimed land in their activity, the number of water users has been multiplied and the structure and ownership of on-farm irrigation and drainage assets have changed. Such situation caused deterioration of some elements within irrigation and drainage systems and led to breach of their integrity. In order to stop these negative tendencies, in 2003, the Ukrainian law, which introduced amendments to the “Law about collective agricultural enterprise”, stipulated free transfer of the on-farm irrigation and drainage systems into community property. For fulfillment of this law, the Cabinet of Ministers of Ukraine approved in August 2003 the Procedure for free transfer into community property of social service objects, housing stock, and on-farm irrigation and drainage systems of collective agricultural enterprises that were not subjected to division during re-structuring of these enterprises and were transferred into ownership of successor enterprises.

However, it should be noted that since putting this law into effect, most local government bodies, by getting the on-farm irrigation and drainage systems, have not been taking care for them. Local budgets do not include respective funds for maintenance of these systems.

In order to preserve irrigated farming, according to Decree of the Ukrainian Cabinet of Ministers of 06.09.2011, water management organizations at the State Agency for Water Resources together with the Ministry of Agrarian Policy and Food, central authorities of agro-industrial development at provincial state authorities, administrations of agro-industrial development of Sevastopol municipal authority, and rayon state authorities made inventory of irrigated land and the on-farm irrigation infrastructure located on it.

It was identified from the inventory that the on-farm irrigation systems occupied 2.2 Mha. Irrigation systems on 1.2 Mha were transferred into community ownership, the systems occupying 483,000 ha were on the balance of individual farms and collective enterprises, and ownership of irrigation systems on 412,000 ha was not identified.

Out of available irrigated land, 1.4 Mha are not used in irrigated agriculture and only 738,000 ha can be irrigated without additional investments.

The inventory commission concluded that irrigation systems on an area of 361,000 ha were to be withdrawn and transferred into dry land stock.

At the same time, irrigated agriculture can be rehabilitated on an area of 885,000 ha.

The main causes of poor irrigated agriculture in Ukraine include:

- poor physical condition of the on-farm engineering infrastructure (926,000 ha);
- lack of sprinkling machines (660,000 ha);
- bad condition of pumping equipment within the on-farm systems (122,000 ha);
- unsatisfactory hydrogeological-reclamative status (10,000 ha).

The following **conclusions** can be made from the results of inventory:

1. Existing on-farm irrigation network does not meet the requirements of modern sprinkling machines and irrigation equipment and needs to be modernized.
2. As a consequence of re-structuring of agro-industrial enterprises that used irrigation systems, the number of land users increased to 191,700. This causes certain problems when using these systems in agriculture.

Such fragmentation had a negative effect on performance of irrigation and drainage systems and on effectiveness of irrigated land and sprinkler use in the newly formed economic entities. In this context, the on-farm network in those new entities formally plays a role of the inter-farm network and this can be a reason for transfer of this network into state ownership.

3. The efforts that should be taken in irrigation systems to rehabilitate irrigated agriculture are enormous and cannot be fulfilled by individual agricultural producers. To this end, it is necessary to implement a state program for reconstruction of irrigation and drainage systems.

By present, the on-farm systems, which deliver water for irrigation, are used effectively and operated by leaseholders or owners of these systems. Therefore, such systems are advisable to leave under community ownership at given stage.

Water management organizations inform that 725 rayon and village councils should make decisions on transfer of the on-farm irrigation systems from community into state ownership. Taking into account the number of refusals regarding transfer, positive decisions can be taken by only 550 rayon and village councils.

However, work on organization of transfer of on-farm irrigation and drainage infrastructure from community into state ownership is underway. For example, in January 2012 the state enterprise "Vodexpluatatsia" (Water operation) was established to manage and operate the above structures after their transfer into state ownership.

Under implementation of a protocol of the Ukrainian Cabinet of Ministers of 06 October 2011 the agency "Derzhvodagentstvo" together with the Institute for Water Affairs and Land Reclamation developed amendments to current legislation, i.e. to:

- Land Code in part of allocating zones with a special utilization regime for subsurface irrigation and drainage networks and attributing reclaimed land to particularly valuable land;
- Tax Code of Ukraine in part of exemption from added value tax of operations related to transfer of on-farm irrigation and drainage systems into state ownership;
- Law of Ukraine about reclamation of land in part of: determining status of irrigation and drainage systems and their ownership; powers of executive authorities and local governments in the sphere of reclamation; operation and retirement of I&D systems; financing of land reclamation measures; and responsibility for violation of law about reclamation of land;
- Law of Ukraine about legal regime of land in the protection zones of main pipelines, in part of attributing subsurface irrigation and drainage network to a system of main pipelines that are defined in the Ukrainian law about pipeline transportation.

Organizational and technical measures for reconstruction of effective use of irrigated land and irrigation systems

In order to solve the problem of effective use of irrigated land and irrigation systems, it is necessary to:

- ensure continuous and reliable functioning of irrigation and drainage systems;
- reduce energy- and inputs intensity of irrigation and drainage systems;
- enhance reclaimed land use efficiency;
- improve environmental condition of irrigated areas;
- build capacities, upgrade equipment and facilities, and revise laws and regulations in the water sector;
- adopt a state support mechanism in irrigated agriculture by regulating economic and legal relations in water use, energy saving and agricultural production as an integral part of the state agrarian policy.

DRAINAGE SYSTEMS

Drained land occupies 3.3 Mha in Ukraine. Almost 70% of the area is covered with subsurface drainage. Bilateral control of water regime is practiced on an area of 1.1 Mha, and polder systems cover 317,000 ha.

Design and construction of drainage systems in this area consisted of three stages: first stage (1946-1960), design and construction of surface drainage; second stage (1961-1975), construction of horizontal drainage; third stage, design and construction of modern systems with bilateral control of water-air regime, water rotation systems and draining-wetting systems with automated water control, and reconstruction of earlier constructed systems.

In 2007-2008, the Ukrainian Ministry of Agrarian Policy, State Committee for Water Resources, and State Agency for Land Resources made inventory of drainage systems.

The inventory results show that under conditions of insufficient financing of inter- and on-farm irrigation and drainage system maintenance, non-repair of the network and non-fulfillment of reclamation measures in drained land from the side of farmers, the condition of the systems and state of land have worsened substantially.

This leads to deterioration of irrigation and drainage stock and failure of engineering infrastructure components. Thus, reconstruction of drainage systems needs to be done on an area of 202,000 ha.

At present, drainage systems face the same problems as irrigation systems. Here, the issues related to system management due to fragmentation of land users are also topical. Given the presence of small systems mainly, organizational problems can be solved in these systems more easily as compared to irrigation systems.