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O. Nechyporenko,
candidate of economic sciences National Scientific Center "Institute of Agrarian Economics"

Directions of innovative development of irrigation farming in Ukraine

Goal. To generalize the modern problems of the effectiveness of irrigated agriculture in Ukraine and to offer possible directions for its innovative development. Methods. General sciences: system approach, modeling, idealization, scientific generalizations; special: monographic, statistical-economic, balance, calculation-constructive. Results The present state and the main causes of low efficiency of irrigated agriculture in Ukraine are investigated, which does not use potential opportunities for growing crop production. The model of innovative process of providing of development of irrigation industry, preservation of ecological stability of artificially humidified agrolandscapes is offered. Conclusions Improving the efficiency of irrigated agriculture in Ukraine is possible provided that there is a comprehensive innovation process. The best solution, taking into account the financial crisis and the world's experience of irrigation, will be the gradual rehabilitation of worn-out engineering infrastructure with a somewhat forward-looking transfer to farm producers of management of the farm network.

Key words: irrigated agriculture, efficiency, reclamation infrastructure, model, innovation process.

Formulation of the problem. Irrigated land use in Ukraine is one of the main factors directly affecting the growth of crop production, especially in conditions of increasing intensity of climate droughts. It is thanks to the potential of increasing the volume of restoration and modernization of the infrastructure of irrigation systems, and especially of the South of Ukraine, it is possible to achieve greater security of state security and its sustainable competitiveness on world grain markets, since each artificially hydrated hectare gives crop production in 2 to 3 times more than unpolluted (rainbow). At the same time, the total area of the actually irrigated lands for the years of independence has decreased fourfold. So, in 2014, there were only about 480 thousand hectares of politics, of which almost 13% was moistened by the actively implemented innovative drop method. In this case, the efficiency of growing cereals and oilseeds the crops in these arrays are at a level that does not stimulate further production. It is possible to change the situation for the better, taking into account world experience, only through the urgent organization of a large-scale innovation process.

Analysis of recent research and publications. Issues of increasing the efficiency of domestic irrigated agriculture under conditions of natural and climatic changes were also investigated by VV Docuchayev Recently, the problems of the functioning of irrigated lands in Ukraine have devoted their work to PI. Kovalenko [1], MI Romashchenko [4, 6], VO Ushkarenko, S.A. Balyuk [1], VP Gudz, VI Blessed, II Andrusenko, MA Khvesik [8], VS Snowy, A.O. Lymar, O.O. Sobko, OI Zhovtonog, Yu.O. Tararico, R.A. Vozhegova, LM Granovsky and others However, the current state of use of disintegrated artificially humidified areas requires further research, in particular, to increase the efficiency of their use on an innovative basis with the unconditional priority of the economic, social and environmental interests of farmers and share holders.

The purpose of the research is to generalize the main contemporary problems of irrigated agriculture in Ukraine and to offer possible directions for its innovative development.

Research methods. The following methods are applied: general science - system approach, modeling, idealization, scientific generalizations; special - monographic, statistical-economic, balance-sheet, computational-constructive.

Research results. The crisis situation of the irrigation industry needs to be assessed separately for each component of this phenomenon, starting with the main channel and ending with the indirect water user, who in this case is an agricultural producer.

According to the results of the conducted research, we note that we have irrigated land in Ukraine with a total area of 2170.5 thousand hectares (1770 thousand hectares, excluding Crimea), compared with 2.5

million hectares that were politicized in 1998. In fact, in recent years only about 600 thousand hectares were artificially humid. Each year more than 1.2 million hectares of productive land reclamation are used without watering. It should be noted that almost one third of them are privately owned and 68% leased. For further analysis, let's take into account the area of irrigated land that is actually watered, and separately the arrays that have so far been used without watering.

The root cause of the current low level of management on land reclaimed land is the distribution of land shares to peasants in kind on the ground. At one time, the irrigated lands were decomposed more than 190 thousand pieces of shares with an average area of about 13 hectares, which in the future led to the breakdown of the technological integrity of irrigation systems and the poor technical state of engineering infrastructure, especially its internal part. Regarding irrigated lands, which are used without irrigation, the results of the inventory of inter-farm and domestic irrigation systems revealed that only 738 thousand hectares can be humidified without additional investment, on the area of 361 thousand hectares irrigation systems are subject to write-offs and Almost 107 thousand hectares in general are unprotected in the rainforests [3].

The most problematic is the internal economic network, transferred to communal ownership by 56% - in the countryside or rayon councils. For most communities, such a step by the state in the future has greatly complicated the already inefficient use of reclamation infrastructure. At the same time, the new challenge caused by the disintegration of irrigated lands has caused long uncertainty with the balance of belonging to the field network. The absence of the owner prevented the maintenance of irrigation systems and mechanisms in the operational technical state by more than a third of the reclaimed arrays and the situation deteriorated. Thus, according to the State Agency of Water Resources of Ukraine, the unsatisfactory technical condition of the engineering infrastructure of internal telecommunication systems in 2013 took place on an area of 819.5 thousand hectares, and in 2015 - by 926 thousand hectares. Significantly limits the possibilities of irrigated agriculture to maintain a low level of agrarian supply by sprinkler technology. With a total need of 25.3 thousand cars, which should service up to 90% of the existing floor space in Ukraine, only 5.6 thousand units are in working condition. Half of the irrigated lands that are not used for designation, namely 660 thousand hectares, were left without sprinklers. In addition, the existing farm network, according to its technical characteristics, does not meet the requirements of modern sprinkler machines and other irrigation mechanisms. On the area of 122 thousand hectares is unsatisfactory state of pump-power equipment. In addition, inventory materials show that 10.1 thousand hectares have a hydrogeologically-reclamation state of soil unsuitable for cultivation [3].

Consequently, the non-use of the target value of almost 70% of accounted irrigated areas is mainly due to a violation of the technological integrity of reclamation systems due to the unplanned dispersal of agricultural land, as well as the inadequate condition, in particular, unauthorized dismantling, engineering infrastructure. At the same time, according to some estimates, after reconstructing and modernizing the infrastructure of irrigation systems, it is possible to restore irrigated agriculture to an area of up to 1 million hectares. This will increase the gross production of crop production by at least 10 million tons annually [7]. Such a forecast may raise some doubts, since for its realization it is necessary to pre-implement management and organizational innovations, and then to grow only crops, which will provide yields not less than 100 c / ha.

The effectiveness of using irrigated lands, in addition to the need for modernization of worn-out infrastructure, is influenced by other factors. Significantly reduce the profitability of crop production: high cost of irrigation services and electricity; lack of technology of growing and irrigation of crops, large losses of irrigation water - up to 40% for filtration in irrigation canals, silting and overgrown with their algae; destruction of the structure of sown areas and reduction of soil fertility; a growing year-on-year shortage of skilled personnel, especially middle-level recruiting specialists.

At the same time, the results of the research show that for a more complete assessment of the crisis situation in the area of irrigation, we need to distinguish between the main problem-generating factors, namely: certain inconsistency with the current challenges of the current legislative and regulatory framework governing the use of irrigated lands; lack of investment; the imperfection of water resources management in general and irrigation in particular; destruction of the state system of training of the corresponding personnel.

Thus, the legislation of Ukraine does not regulate the status of reclaimed systems and does not specify the ownership of them. There is no legal mechanism for ensuring the participation of executive bodies and local self-government, especially public associations and organizations in the management of irrigated land, and the creation of a favorable investment climate. Not entirely adequate is the responsibility for violating the requirements of the current legislation on preservation of irrigation systems and protection of reclaimed land.

Regarding the financing of the industry, the amount of funds allocated by the state for the operation of the economic complex, primarily of state-owned and inter-state state reclamation systems, according to the Accounting Chamber of Ukraine, in recent years ranges from UAH 0.95 to 1.2 billion the general fund of financing, and 0,7 - 0,9 billion UAH - under the special fund of budget programs. At the same time, more than 80% of all cash funds in the general fund is only one payroll with accrual, and 65% of the special fund is spent on payment of the cost of consumed electricity. In such circumstances, capital expenditures were possible only at the expense of the funds received from the payment of services provided by the water utilities and in fact they accounted for only 4-5% of the amount of the special fund. Gradual cessation of budget financing of capital investments, as well as a shortage of own funds from landowners and users who are practically excluded from participation in the management process and deprived of opportunity to raise investments, have led to technical and technological decay of the irrigation sector.

The process of implementing integrated water resources management in the country was too late in time, which would make it possible to decide on the distribution and use of water, while taking into account the interests of each water user and the impact of each type of water use on other. Such management should be continuous and ensure the sustainable development, distribution and monitoring of water resources in the context of social, economic and environmental objectives [5, 8]. The complexity of the management of these resources is not ensured, which in turn would, at the same time, solve the legal, social, political, economic and technological issues of water use, including for the rest. In addition, the transfer of domestic systems to communal property and the balance of farm and corporate enterprises that were not prepared for preservation of state ownership of the inter-farm sector led to the situation when the water was taken and transported to the field by state institutions, and The pollen itself is carried out by the owners of the field network, that is, mainly organs local governments, landowners and users who do not have the necessary resources and experience to perform these work.

Along with the listed factors that led to the crisis situation of irrigated land use in Ukraine, it is also necessary to highlight the purely technical and technological problems that require a comprehensive solution within the framework of the proposed innovation model of ours, in particular: setting up an automated accounting for the use of water and energy not only on the irrigation network, but also on rain-fed machines; bringing in the capacity of pumping stations to the actual volumes of orders for water users; ensuring the proper quality of irrigation water, etc.

Almost all of the actual and 90% of the potential irrigation area in Ukraine is mechanized by mechanization: by sprinkling and dripping, that is water supplied by pumping stations [4, 9]. This requires special attention of water users to the globalization of the growing international market of mechanized irrigation systems every year. In 2013, the market exceeded $ 2 billion. The USA and, according to experts' estimates, should increase by 2019 by more than 15%. Among the key factors of this trend are: low cost of irrigation by mechanized technology and the growing awareness of farmers about the benefits of innovative irrigation systems [10].

So, irrigated agriculture in Ukraine needs a new, unconventional solution problems, and studies conducted suggest that the revival and further development of domestic systems of artificial humidification of agricultural land are possible only on an innovative basis. A radical rebuild of irrigated agriculture in general, as a system, is needed, creating a new variant with a change in most of the primary properties, but retaining the former functional principle. This approach will make it possible to adapt this system to qualitative changes in the environment with a clear focus on the end result, which should provide a socio-economic and environmental impact.

The essence of our proposed model of the innovative process of increasing the efficiency of irrigated agriculture is the creation and direct implementation and dissemination of innovations, their practical application and, in some cases, possible commercial realization (Figure).

Taking into account the number and contradictory nature of scientific proposals for the classification of innovations, we consider the most suitable for further research on the development of the system of cultivated agriculture, their grouping in the field of application: organizational and managerial (new methods and forms of organization of irrigation management); technological (new technologies of irrigation and soil cultivation, introduction of modern information systems, alternative energy sources, etc.);

technical (development of the best world models of irrigation and soil machinery, aimed at saving resources and ecologically unsafe use); economic (innovations in the financial and accounting areas of the organization of artificial humidification of fields, assessment of the results of management); social (changing working and living conditions in irrigated areas, solving problems of occupational population, progressive training of personnel); legal (new legal acts defining the status of irrigated land and regulating the process of organizing their effective use); ecological (the removal of varieties of plants resistant to diseases and pests to minimize the use of chemical agents to combat them, as well as cultivars successfully vegetable on saline soils in arid and wetlands, the controlled cultivation of genetically modified crops and etc.). In general, the ecological component has to be represented to a greater or lesser degree in all investigated innovation groups [8].

The key points in achieving the stated objectives of the proposed model of the innovation process should be the requirements for a cost-effective ratio to each cubic meter of water and every kilowatt-hour of electricity, as well as the priority of the interests of commodity producers.

Conclusions

Improving the efficiency of irrigated agriculture in Ukraine is possible under the condition of a comprehensive innovation process which, taking into account new technologies and management system reform, will ensure the return on operations, as well as increase the efficiency of water use and water productivity, expand the actual area irrigation, better serve agricultural producers, achieve steady handling of the process. The best solution, taking into account the financial crisis and world experience of irrigation, will be the gradual rehabilitation of worn-out irrigation infrastructure with a somewhat faster delivery to agricultural producers of the management of the domestic supply chain, rather than a typical model for realization of one-time large-scale rehabilitation projects, after which, as a rule, occurs the collapse of the infrastructure as one that remains dependent solely on the capabilities of the state, and not on the water users for which it was created.

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