

Conceptual principles of reform of the water sector of Ukraine

Romashchenko M.¹, Yatsiuk M.², Dekhtiar O.³

Institute of Water Problems and Land Reclamation of NAAS, 37, Vasylykivska Str., Kyiv, 03022, Ukraine; e-mail: ¹mi.romashchenko@gmail.com, ²mv_yatsiuk@ukr.net, ³oksana.dehtiar@gmail.com

The purpose. To analyze and to justify conceptual bases of reforming aquicultural branch of Ukraine for building favorable conditions of its stable development and evolution of agrarian sector of economy. **Methods.** Analytical methods, methods of expert assessments, comparisons and analogues, statistical. Legislation of Ukraine, as well as investigations of domestic scientists, experts and the international experience is the methodological and theoretical basis for control and formation of water policy and implementation of the integrated water resources management on basin principle. **Results.** Contemporary state is analyzed of aquicultural branch of Ukraine and agrarian sector of economy which are characterized by crisis and negative trends. Basic problem questions and directions of further development of water economy as a whole and sectors of irrigation and drain in particular are specified. Implementation of integrated water resources management on basin principle will enable to create economic, legal and organizational conditions of stable development of aquicultural branch, intelligent use and reproduction of natural resources. Strategic directions of holding institutional reforms for provision of stable operation of the branch are displayed. **Conclusions.** Contemporary state of aquicultural branch and agrarian sector of economy of Ukraine does not yield an opportunity to solve basic problems of efficient operation without building organizational premises for heading market principles of managing in the sphere of aquicultural services and operations. Successful heading of integrated water resources management on basin principle requires implementation of structurally-institutional reform of sphere of control. Necessary condition for provision of intelligent use and water resources management, efficient and reliable operation of irrigation and drainage system and the further evolution of potential of reclaimed lands is the development of "Concept of reforming aquicultural branch" and «Strategy of restoring irrigation and drain in Ukraine up to 2030».

Key words: *integrated control, reclamative systems, irrigation, drain, restoration, evolution.*

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Sustainable development of the agrarian sector of Ukraine's economy, a significant increase in agricultural production is impossible without the effective functioning of water industry. In terms of water resources available for use, Ukraine belongs to the countries with relatively low water potential, which is also used inefficiently. There are a number of problems in the water sector, namely deterioration of water quality and depletion of water resources, degradation of water ecosystems, low water use efficiency and unbalanced management, high water consuming technology and production, and intensive aging of engineering infrastructure. Against the backdrop of the progressive negative impact of climate change and chronic underfunding of the water industry, key issues for today are the formation of a long-term water policy and reforming in the field of water management.

It should be noted that the existing water management system in Ukraine has mainly an administrative-territorial orientation, where management is carried out at the level of administrative units with a high degree of centralization. At that it does not take into account the main natural factors of formation and interconnection of surface and underground water resources within river basins. Thus, the management mechanism is unbalanced, does not meet the principles of good governance, and requires structural and institutional reforms as well as the implementation of international standards and best international practices in the field of water management [1, 2].

Analysis of recent researches and publications. A wide range of scientific works, researches made by the analysts of international organizations is devoted to the study of various aspects of the development of water industry, its importance in the agrarian sector of Ukraine, the ecological and economic issues of water use, the problems of reforming the management system, and the implementation of integrated water

management according to the basin principle [2-14]. Despite the numerous works in this area, the issue of implementing legal and institutional reform as the basis for the sustainable functioning of the water sector on the basis of decentralized management and the development of relevant legislation and effective economic mechanisms for the restoration and infrastructure development still have not been sufficiently substantiated.

The purpose of the research is to analyze and substantiate the conceptual foundations of reforming the water industry of Ukraine in order to create favorable conditions for sustainable functioning and development of the agrarian sector of the economy.

Research methods. Analytical methods, methods of expert assessments, method of comparisons and analogs and statistical ones were used when writing the paper. The methodological and theoretical basis is the legislation of Ukraine, the work of domestic scientists and international experience in management and formation of water policy.

Research results. At the present stage of development, the water sector of Ukraine is experiencing a period of complex challenges. Despite a decrease in the population (for the last 25 years - by 15%), a significant decline in production (for the years of independence, the GDP decreased by 35%) and substantial (starting from 30 km³ in 1990 to <9.2 km³ in 2017).) reduction of water consumption and wastewater discharge by various business entities (starting from 18 km³ in the 1990s to 4.7 km³ in 2017), the expected improvement of the ecological state of water resources, water quality, access to safe drinking water is not observed [2, 15]. On the contrary, against the backdrop of climate change there are negative tendencies of increasing water shortage due to pollution and depletion of water resources.

Ukraine is characterized by excessive water consumption and a high water intensity of GDP, which is significantly higher than the world level, which indicates the low efficiency of water use. In 2016, 9907 million cubic meters of water were taken from natural sources for the needs of population and economy sectors. In water sector (Fig. 1), the main consumers are industrial enterprises, which account for 4273 million m³ (43%) of water, agriculture - 3166 million m³ (32%) and communal services -2423 million m³ (24%) [15, 24].



Fig.1 Use of water by the main sectors of the economy

The agrarian sector is one of the leading ones in the Ukrainian economy, which forms 14% of gross added value and more than 40% of the country's exports, being a significant consumer of water resources, and therefore sufficient water amounts and its adequate quality are an important prerequisite for the country's food security [21]. Water consumption in agriculture in recent years is characterized by a significant reduction, the main factor of which is a significant decrease of irrigation areas - from 2,5 million hectares in 1990 to 475 thousand hectares in 2016. Efficiency of water use in the agrarian sector of the economy and the deficit of natural moisture in the conditions of climate change are negatively affected by such factors as:

- unsatisfactory state of engineering infrastructure;
- technological disintegration in water use and drainage;
- high energy consumption in water supply and high unproductive water losses while supplying it;
- non-compliance with ecological requirements for water quality;
- non-observance of crop production technologies;

- decline in budget finding;
- lack of the mechanisms for state support in the water sector and the environment for credit and investment attraction;
- incompleteness of land reform;
- imperfection of the existing management system and current legislation.

Existing problems are exacerbated by the annexation of Crimea and the armed conflict in the eastern part of the country, resulting in damaging water infrastructure, worsening water supply to the population and other water users.

One of the key reasons for the continuing deterioration of the water sector in Ukraine is an ineffective water management system due to the lack of:

- coherent state policy and a single independent authorized body responsible for its development and implementation;
- allocation of responsibilities in water management and provision of water supply services to all consumers;
- determination of the status and authority of the basin councils;
- involvement of water users at all levels in water management.

Over the years of independence, significant changes have taken place in the country's economy, requiring the use of new, effective approaches to the water management system, involving the best world's practices.

To meet the requirements of the Association Agreement between Ukraine and the European Union, the implementation of the Water Framework Directive 2000/60/EC of the European Parliament and the Council of the European Union on the establishment of the Community framework for action in the field of water policy and the achievement of the Sustainable Development Goals (SDGs) approved in 2015 at the UN summit, Ukraine should implement the measures aimed at environmental improvement of river basins and improvement of water quality as well as use the innovative approaches to the sustainable management of all water resources [1, 2, 14].

Changes in the discussion and implementation of water policy are envisaged by the Law of Ukraine "On the main principles (strategy) of the state environmental policy of Ukraine for the period up to 2020" [15], which defines the main strategic goals and tasks aimed at stabilizing and improving the state of the environment by integrating the environmental policy with the tasks of socio-economic development to guarantee an environmentally safe natural environment for life and health of the population based on the introduction of integrated water management by the basin principle, ecologically balanced system of nature management and preservation of natural ecosystems. A good precondition for that is the Sustainable Development Strategy "Ukraine 2020" [16], which defines the purpose, trends, road map, priorities and development indicators. According to the development trend, structural reforms are planned, such as agricultural, land, state property management, decentralization and public administration reform, etc. These reforms should create favorable conditions for conducting economic activity, building a transparent system of public administration, an effective system of territorial organization of government and ensuring a proper local self-government.

The National Security Strategy, approved by the Decree of the President of Ukraine dated May 26, 2015, № 287/2015, addresses the main objectives of achieving environmental safety, namely: preserving natural ecosystems, maintaining their integrity and livelihoods, improving the ecological state of water resources and the quality of drinking water [18].

The Strategy of Reforming the State Governing of Ukraine for 2016-2020, which was approved by the CM of Ukraine dated June 24, 2016 № 474-p, which determines the formation of an effective system of public administration as a key task, which is in line with the principles of the EU and is able to develop and implement a coherent state policy aimed at the sustainable development of our country and an adequate response to internal and external challenges, further specifies the task of reforming the water management system [19].

Adopted in 2016, the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine on the Implementation of Integrated Approaches in Water Management by the Basin Principle" creates the legislative

preconditions for reforming the water management system through the transition to a basin management, where a management unit is a river basin [20].

The direction to improve water management has been approved by the medium-term plan of the Government's priority actions up to 2020 [21], which prioritize the Government's tasks of achieving sustainable management of all water resources by:

- the transition to integrated water management by the basin principle;
- the application of European approaches to the establishment of strategic environmental objectives and policy indicators in the short, medium and long term prospects based on the baseline assessment of water resources and the implementation of environmental protection measures to achieve good ecological state;
- Establishment of the boundaries of major river basins, assessment of their current ecological state and development of river basin management plans (RBMP);
- Clear defining the functions of central and local executive authorities, local authorities on the sustainable water management;
- Improvement of the existing structure of basin and oblast water management departments functioning under the State Water Management Agency.

The Government of Ukraine in the National Report "The Objectives of Sustainable Development: Ukraine" identified the baseline indicators and results of the adaptation of 17 global DSBs for Ukraine, including for the purpose 6 - "Clean water and proper sanitary conditions", which provides for the fulfillment of tasks aimed at ensuring available proper services for safe drinking water supply, construction and reconstruction of centralized drinking water supply systems, modern sewage systems, increasing water use efficiency and introducing integrated water management [22].

It can be stated that Ukraine has consistently pursued a course to improve the state of water management and implement the institutional reform. Its further implementation requires, first of all, the revision of the functions of the Central Executive Authority (CEA) in the field of water management and land reclamation - the State Agency of Water Resources of Ukraine, which implements the state policy in the area of management, use and rehabilitation of surface water resources, development of water management and land reclamation and maintenance of state-run water management facilities, inter-farm irrigation and drainage systems; including the management of state-owned objects that belong to the State Agency of Water Management [23], and therefore simultaneously serves as the state regulator of the industry and is engaged in economic activities in providing water services. The combination of functions of the CEA with economic functions in the existing structure, parallel existence of two organizational structures - basin and administrative-territorial ones reduces the efficiency of management, leads to duplication and improper performance of functional duties, scatteration of financial, logistical and human resources, complicates the adequate response to the emergence of new economic, political, social and other problems.

In addition to the above stated, the need for institutional reform is determined by:

- global climate change, which for Ukraine is characterized by an increase in average annual temperature in the face of virtually unchanged rainfall, as well as the formation of prerequisites for reducing available for use of surface and groundwater resources;
- the progressive deterioration of the quality of surface and groundwater, due to its metamorphisation, as well as pollution of water bodies by harmful emissions, insufficiently treated industrial and municipal waste water;
- progressive degradation of water ecosystems as a result of anthropogenic pressure increase;
- unsatisfactory funding of the water industry due to the lack of state and investments;
- critical depreciation of fixed assets in the water industry;
- low participation of water users in the management and formation of tariffs for water supply services;
- need to increase the efficiency and ensure the environmental safety of water use.

Achievement of sustainable water use and reliable functioning of the water industry is possible only if new European approaches are developed, implementation of effective radical changes in the management structure through the transition from the administrative - territorial model of management to the integrated water management by the basin principle along with the improvement of relevant legislation.

The specialists of the State Agency of Water Resources have already developed a number of subordinate acts for the implementation of integrated approaches in water management. At the same time, the lack of an effective organizational structure does not enable to effectively use the modern tools of water and land reclamation management.

The introduction of the principles of integrated management and establishing an appropriate organizational structure should contribute to ensuring water security of the state through the development of legal, institutional and economic mechanisms aimed at:

- preventing the deterioration of the quality of surface, groundwater and seawater and achieving their "good" status;
- halting the degradation of water ecosystems and their recovery;
- elimination of the problem of inadequate good quality water supply for population in the required amounts;
- reducing the risks of floods and droughts;
- involvement of all water users and stakeholders in river basin water management;
- optimization of the interaction and delineation of functions and competences of the basin and territorial and administrative bodies of water management at all levels.

Currently, there are 9 basin and 19 regional water management departments operating under the State Agency of Water Resources, which implement state water policy on the ground, and the area of their activity covers the entire territory of the country. Improvement of institutional management approaches requires reformation in accordance with the following principles:

- preservation of the basic infrastructure objects in state ownership and management of infrastructure with the involvement of water users and stakeholders at the appropriate levels;
- separation of the functions of water management from the functions of water infrastructure management;
- implementation of the principles "polluter pays" and "user pays", "water pays for water in the basin";
- bringing all payments for water into the budget of the implementation of the RBMP measures;
- full coverage of the actual cost of ecosystem and other services.

In order to improve the management in the water industry, the basin water management administrations (BWMA) should be established within the river basins in view of the requirements of the current legislation (Fig. 2, table). According to the Order of the Ministry for Environmental Protection of Ukraine dated January 26, 2017, №25, in the territory of Ukraine within 9 river basins 13 sub-basins were allocated. [25]:



Fig. 2 Schematic map of hydrographical zoning of the territory of Ukraine by the basin principle (according to the State Agency of Water Resources)

An important step in the implementation of integrated management by the basin principle is the establishment of the Basin Council (BC), which will encourage the involvement of all water users in the process of developing, implementing and monitoring the RBMPs.

At the initial stage of the reforming basin councils can be set up in all major river basins as an advisory and consultative body under the State Agency of Water Resources. In the future, upon establishing the National Water Council (NWC), as a consultative and advisory body of the CM of Ukraine, BCs should be entitled to consider and approve the assessment of the ecological state of water resources, to analyze and assess the risks of failure to achieve good status, priority environmental objectives, to assess the socio-economic water use development and water balance for the fair and transparent distribution of water between water users, as well as the PURB, including the approval of financing through the revenue from water use and causing pollution in the basin.

List of river basins, sub-basins and BWMAs

№	Name of river basin district	Basin water management administrations
1	District of the Dnieper River Basin	of the Dnieper River of the Ros River of the Pripjat River of the Desna River
	sub-basin of the upper Dnieper	
	sub-basin of the middle Dnieper	
	sub-basin of the lower Dnieper	
	sub-basin of the Pripjat	
	sub-basin of the Desna	
2	District of the Danube River	of the Tysa River of the Prut and Siret Rivers
	sub-basin of the lower Danube	
	sub-basin of the Tysa	
	sub-basin of the Prut	
	sub-basin of the Siret	
3	District of the Dniester River	of the Dniester River
4	District of the Pivdenny Bug River	of the Pivdenny Bug River
5	District of the Don River	of the Siversky Donets and the lower Don Rivers
	sub-basin of the Siversky Donets	
	sub-basin of the lower Don	
6	District of the Visla River	of the Zakhidny Bug and the Syan Rivers
	sub-basin of the Zakhidny Bug	
	sub-basin of the Syan	
7	District of the Black Sea Coast	of the lower Danube and the Black Sea Coast Rivers
8	District of the Crimea	of the Crimea Rivers
9	District of the Azov Sea Coast	of the Azov Sea Coast Rivers

The representatives of Water Users' Associations (WUAs), authorities, public, scientific institutions and other associations should be involved in the BCs, so as to take into account the interests of various parties in water management [2, 3]. The representatives of all BCs that will be established in the districts of river basins and sub-basins should be involved in the NWC.

The main task of the NWC is to introduce integrated water management by the basin principle in accordance with the provisions of the EU Framework Water Directive by coordinating the activities of the central executive authorities involved in the use of natural resources in river basins, as well as local authorities and other stakeholders for developing unified regulatory and methodological approaches regarding:

- establishing and providing sustainable activities of BCs in the districts of river basins and sub-basins;
- preparing and implementation of the RBMPs in order to achieve the "good" ecological status of water resources in Ukraine and other ecological goals set for water basins;

- coordination of donor support and technical assistance in the process of preparation and implementation of RBMPs, as well as for ensuring sustainable BC activities;
- financing (co-financing) from the sources of the State Budget of Ukraine or its special funds those environmental or water protection measures to be implemented under individual RBMPs, but of national importance;
- preparation of amendments to the legislation in order to strengthen the role of BCs in river basin management, etc.

The reform in water industry management system should be phased out and implemented in a consistent manner. The main task of the reform is institutional changes in the management of the industry, which envisages a review of authority functions and the structure of the existing CEBs (Ministry of Environment, Ministry of Agrarian Policy, State Agency of Water Resources, Ministry of regional construction, Ministry of Fuel and Energy, Ministry of Infrastructure, Ministry of Health, State Social Insurance Service, State Geological Service, etc.) in terms of their participation in the formation and implementation of the state policies in the field of water management and land reclamation.

Financing the measures to implement the reforms in water sector will be provided at the expense of the state budget and revenues from water and pollution payments in the basin. To implement the intended plans, it is necessary to attract funds from international technical assistance, contributions from interested international organizations, as well as funds from other sources.

The specialists of IWPLR NAAS together with a team of experts from the World Bank, FAO, in cooperation with the Coordination Council, established under the Cabinet of Ministers of Ukraine prepared a draft of the "Strategy of Irrigation and Drainage in Ukraine until 2030", the main objective of which is the formation of an efficient irrigation and drainage services sector, which is managed with the participation of water users and ensures the sustainability of agriculture in a changing climate and contributes to solving the strategic task of agricultural development in Ukraine aimed at its achieving a competitive status of the world leader in sustainable food production.

Taking into account starting the systematic work on the Government's implementation of structural reforms in various spheres of state policy, the Ministry of Environmental Protection, having attracted all stakeholders, experts, scientists and international partners has developed a "The Concept of Water Management Reforming" aimed at achieving a "good" status of water through the establishment of legislative and institutional frameworks for the implementation of integrated water management by the basin principle on the basis of equal involvement of all stakeholders in the management process taking into account the best world practices.

The implementation of these strategic documents will enable to develop the specific mechanisms that will open the possibility for attracting investment to develop and restore engineering infrastructure, will contribute to creating economic, legal and organizational environments for sustainable functioning of the water industry, ensuring the state's water security and transforming Ukraine into a world leader in food production.

Conclusions. The current state of the water industry and agrarian sector of the Ukrainian economy does not enable to solve the main problems of effective functioning without creating organizational preconditions for the introduction of market principles of management in the field of provision and performance of water management services and works. Successful implementation of integrated water management based on the basin principle requires structural and institutional reform of the water management sector.

Implementation of the "Concept of Water Management Reforming " and the "Strategy for Irrigation and Drainage Restoration in Ukraine until 2030" will provide an opportunity to ensure the rational use and management of water resources, the effective functioning of reclamation systems and coordinated development of the promising reclaimed land towards the country's food security.

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