

DOI: <https://doi.org/10.31073/mivg202301-361>

Available at (PDF): <http://mivg.iwpim.com.ua/index.php/mivg/article/view/361>

UDC 332.025:330:12

ANALYSIS OF METHODOLOGICAL APPROACHES TO THE FORMATION OF WATER TARIFFS FOR IRRIGATION AND COMPENSATION OF COSTS FOR RECLAMATION INFRASTRUCTURE: THE EXPERIENCE OF EU COUNTRIES

M.I. Romashchenko¹, Doctor of Engineering Sciences, R.V. Saidak², Ph.D.,

V.P. Pantelev³, Doctor of Economy Sciences, S.R. Goss⁴, Ph.D.

¹ Kyiv Agrarian University of the National Academy of Agrarian Sciences of Ukraine, Kyiv, Ukraine;

<https://orcid.org/0000-0002-9997-1346>; e-mail: mi.romashchenko@gmail.com;

² Institute of Water Problems and Land Reclamations of the National Academy of Agrarian Sciences of Ukraine, Kyiv;

<https://orcid.org/0000-0002-0213-0496>; e-mail: saidak_r@ukr.net;

³ Kyiv Agrarian University of the National Academy of Agrarian Sciences of Ukraine, Kyiv, Ukraine;

SE "Design and Technological Bureau" IWPRL NAAS, Kyiv, 03022, Ukraine;

⁴ Consultant, e-mail: Steve_Goss@hotmail.com

Abstract. *The practice of EU countries on the establishment of water tariffs for irrigation of agricultural crops and the procedures for recouping funds spent on water supply for irrigation is considered. As the main sources of information for the manuscript were noted publications and regulatory documents of Ukraine, reports of EU bodies, and the World Bank, in which a critical analysis of pricing practices in irrigated agriculture in EU countries for 2005–2023 was carried out. The grouping of information on the area of irrigated land, the level of return of funds spent on water supply, and attention is paid to a methodical approach to the development of tariffs for water transportation. The interpretation of the reasons for the natural character, which were guided by state management bodies when applying economic tools for irrigation management in their territories, are presented. For certain countries with big areas of irrigated land (Italy, France, Greece, Spain, Portugal, and Romania), significant achievements of tariff formation and reimbursement of funds have been determined. Aspects of water tariff formation, water accounting, development of water user associations, and taxation of water fees are disclosed. countries were classified according to water pricing, taking into account the state of water resources and melioration systems, types of tariffs, pricing mechanisms, the state of return of funds spent on water supply due to tariffs, measurement of water volumes, as well as solving additional problems of applying economic tools in irrigated agriculture – institutional (administrative, legal) measures, the impact of water charges on the country's agricultural economy, etc. Since the requirements of the Water Framework Directive (WFD) are the dominant approach in the implementation of tariff formation in irrigation in EU countries, the level of achievement of indicators of the quality of WFD implementation by countries was considered. It has been established that the vast majority of global practices for forming tariffs for water supply services for irrigation, capital investments in reclamation infrastructure, and its maintenance, show that they are based both on national interests and on the interest of water users and organizations that provide logistical support.*

Keywords: *water supply, irrigation, tariffs, cost compensation, management, system approach, European Union (EU)*

Relevance of research. Establishing tariffs for irrigation water supply is considered an important economic tool for implementing the state's water policy. The goal of the Strategy of Irrigation and Drainage in Ukraine for the period until 2030 [17] is to increase the potential of irrigation and drainage of Ukraine by stimulating the expansion of the areas of irrigated and drained land, the use of reclaimed land, and encouraging the efficient use of water by improving institutional efficiency and service to water users. The modern development of land reclamation using a systemic approach assumes

that the solution to methodological issues of tariff formation for water supply and drainage services for irrigation and drainage in Ukraine should be based on best global experience in irrigation infrastructure management. In the USA, China and India the development of meliorative agriculture makes an important contribution to the policy goal of ensuring food security, in the most Eu countries produce most of their grains and oilseeds without irrigation, so it is hardly the basis of their food security. Restoring the key role of land reclamation in ensuring the sustainability of Ukraine's agriculture under

climate change is one of the priority tasks of Ukraine's agrarian policy [6].

Analysis of recent research and publications. Researchers substantiated the feasibility of transferring irrigation in Ukraine to full self-funding, bringing the actual irrigated area to a higher design level, and to continue the useful practice of reimbursing the cost of water supply services until the implementation of the tariff system [3; 14]. For this, it was proposed to ensure the transparency of the tariff formation system, the necessity to involve water users in the formation of tariffs [11; 16], the participation of interested parties in decision-making in the relevant sphere of state policy, improving the quality of irrigation and drainage services and stimulating the public-private partnership mechanism [12]. Tariffs for irrigation water supply should cover all costs of those services, that is, their level should be sufficient to transfer irrigation to self-financing [16]. According to the results of calculations in 2019 prices, the transfer of irrigation to full self-funding will be possible with the average amount of water charges in the south of 3.0–3.5 UAH per m³ and bringing the actual irrigated area on each irrigation system to 65–70% of the design level [14; 6]. Calculations of the economic payback of investments in irrigated agriculture do not contradict the indicators of economic return with incomplete coverage of the control area in Ukraine now. Scientists previously noted that tariffs for services should be formed with the participation of all interested parties, which is realistic only under the condition of a transparent system of tariff formation [11; 14], at the same time, a transition from the practice of reimbursing the cost of water supply services to introduction of the tariff formation system [14].

The 2022 “Law on the organization of water users and stimulation of hydrotechnical land reclamation” provides the legal basis for Water Users' Organization (WUOs) [13] and states that “the determining the tariff for WUO services or the methodologies (formulas) for calculating such a tariff, the order and terms of payment for WUO services to the exclusive competence of the general meeting of the WUO” [13, Article 12]; “the components of the tariff for WUO services are the costs of maintenance of the WUO, remedial network, water intake, delivery to the water user and its removal, and WUO maintenance costs” [13, Article 20]; “the costs for maintenance of WUOs and maintenance of the reclamation network of WUOs are paid by water users in proportion to the area of their land plots included in the territory of WUO service” [13, Article 20]. At the beginning of the

21st century, there was a significant development of the literature on the assessment of ecological assets related to ecosystems [1], and the issue of improving water resources management in the EU countries was considered [1–5; 7; 8]. In Ukraine, there are no publications summarizing the experience of EU countries regarding water charges and refunds.

The purpose of the study is to generalize and systematize scientific approaches to the methods of forming irrigation tariffs and recouping funds spent on irrigation water supply, in the context of developing a tariff formation mechanism for Ukraine.

Research methods. Research employed the historical-logical method (establishing significant results regarding the processing of water tariffs and the return of funds spent on water supply), the logical-abstract method (expanding information from official reports, literary sources, and best practices), the analytical-synthetic method (processing the received information and synthesizing the results in the form of consolidated data on water tariffs and compensation of funds spent on water supply by EU countries), and systematic analysis for summarizing the results of research and implementation of best practices of EU countries regarding water tariffs and reimbursement of funds for water supply.

Research results. Improving the management of water resources has found support in the European Union. Water reform in Europe is based on the Water Framework Directive (WFD) [10], which entered into force in 2000. Currently, EU member states have transposed the WFD into national legislation as a general framework governing the water policy of each member state, with key dates for the national implementation of the WFD, including development of river basin plans (2009); introduction of price policy (2010); achieving environmental goals (2015); and complete implementation of the entire WFD (2027) [7]. Each country must find its own balance between the three main sources of financing (tariff, tax, and transfer, or “3T”) [7]. At the same time, typically countries of OECD (the Organization for Economic Co-operation and Development), where most of the agricultural sector (and domestic/industrial sectors) are connected to the water infrastructure network, rely heavily on water tariffs to cover the costs of operating and maintaining agricultural water supplies. EU regulations specify the role of water fees (water tariffs) as users' actual financial payment for water access. Tariffs are supposed to cover full costs (operation and maintenance, capital costs, environmental and other costs),

although in less economically favorable regions or for reasons of social security and stimulation of reclamation development, some deviations from this principle are possible to guarantee all consumers access to water.

Table 1 shows data on irrigation water tariffs for all 27 EU countries. The countries in the table

are placed in the order of their inclusion in the community during the period of formation and expansion of the EU, starting from 1957, until 2013, when Croatia became such a member.

The experience of tariff formation and cost compensation in countries with large areas of irrigated land are of greatest interest.

1. Summarized information on the availability of irrigated land, water tariffs for irrigation in EU countries

Name of the country, area of irrigated land, thousands of hectares, equipped/ actually irrigated [11]	Development of tariffs for supplied water [5]
Belgium, 23.8/5.5	Users who draw water from underground and surface sources pay a fee based on the declared amount of water.
Italy, 3977.2/2732.7	The tariff system is based on covering the current costs of servicing the territory. Only a small part of the irrigated area is measured and evaluated by volume. Water users pay directly for water (for a water abstraction license), as well as transportation tariffs.
Luxembourg, 0.036/0.027	Tariffs vary by the municipality but are calculated based on an agreed methodology.
The Netherlands, 476.3/119.2	Groundwater users pay a provincial fee to cover the costs of monitoring and controlling groundwater quality.
Germany, 515.7/234.6	The price of water is based on the costs of production, treatment, and transportation. Limits for calculating fees for water supply and drainage services are defined.
France, 2723/1939	Farmers pay a two-rate tariff (i) a fixed fee per hectare (ii) a volumetric fee for the water used.
Great Britain (as of January 31, 2020, the country left the EU), 228.9/147.3	Each region is allowed to set a fee to recover the costs of managing the water supply. Farmers pay a fee when they apply for a water abstraction license, as well as an annual fee that depends on location, type of water use, water quality and season.
Denmark, 299/–	A fixed rate of payment for water is established.
Ireland, No data available	Fees are charged based on the volumetric method.
Greece, 1521.6/1294.4	The amount of the water fee depends entirely on operating costs, including fuel or electricity consumption.
Spain, 3828.1/3437.4	The per-hectare fee is applied to 82 % of the irrigated area, the volumetric fee is applied to 13 %, and according to the two-rate (binomial) method to 5 % of the area.
Portugal, 647.4/248.0	Water users are obliged to pay an annual set fee (fixed) per hectare and depending on the profit from growing crops.
Finland, 103.8/15.0	Mixed tariff system (two-rate) fixed and volume.
Austria, 116.1/43.5	Mixed tariff system: fixed and volume fee; tariff systems differ between regions.
Sweden, 188.5/52.2	There is no data.
Poland, 82.3/70.5	Different schemes: mixed, fixed, volumetric.
Hungary, 208.4/148.7	The fee for water supply consists of a fee for water intake and transportation. It is established by the government to finance the costs of water resources management.
Czech Republic, –/17.3	Tariffs for water from public water supply systems are regulated by the Law: mixed tariff system, fixed and volume fee (additional for exceeding the limit).
Slovakia, –/57.0	Contractual prices for water supply and water for irrigation are not paid.

Ending of Table 1

Name of the country, area of irrigated land, thousands of hectares, equipped/ actually irrigated [11]	Development of tariffs for supplied water [5]
Slovenia, 15.6/7.1	There is no data.
Cyprus, 55.5/45.4	Government/State Irrigation Schemes: Single Volume Tariff with Variable Price Levels (Usage).
Malta, 3.6/–	Direct volumetric tariff for non-potable water supplied from public wells.
Estonia, 1.4/0.6	There is no data.
Lithuania, 4.1/1	Single volume tariff: volume fee for water intake depending on the source of water.
Latvia, 1.0/–	Single volume tariff: volume fee for water intake depending on the water source, extra-limit intake is taken into account.
Bulgaria, 545.2/–	Fee for water intake and water supply. Prices for irrigation depend on the methods of supply, it can be self-flow or with pumps.
Romania, 2149.9/221.1	Water prices are set by the government for each type of water use, and all farmers in the country pay a set fee. The government covers all electricity costs.
Croatia, 9.3/–	Mayors of municipalities must approve water prices; water suppliers publish price calculations.

Source: generated by the authors based on [5–7; 10; 11]

In Italy, all water bodies have been turned into public property (Law of 1933). The water supply system relies on “Reclamation and Irrigation Consortia” (RIC) (Consorti di Bonifica e Irrigazione), which are managed by landowner associations that control land reclamation and water distribution in a given region. RICs distribute about 50% of the water used for irrigation. There are two payment instruments (i) tariff and (ii) fee for unregulated water and self-service (equally for surface water and groundwater) for self-abstraction. At the same time, the fee for drainage services is calculated in proportion to the benefit received (ranking plan) and based on the service area [2; 3].

France has a wide range of irrigation facilities. The share of the area with low-pressure sprinklers dominates (90%) in the area of irrigated land. By 2005, more than 70% of farms and 85% of irrigated areas were equipped with volumetric devices, and since 2006, the installation of volumetric meters has become mandatory for farmers. Pricing systems range from “average costs” to “marginal costs” used in conjunction with quota systems. The water charge has two components: a basin charge (based on the average water intake) and a consumption component (charged from the difference between water intake and return flows). The criteria, used to set the fee vary significantly from basin to basin, are mostly dependent on characteristics such as drought probability, user type, capital expenditure, ownership, and other basin characteristics.

The main consumer of water in Greece is the agricultural sector. Irrigated area has increased by about 65% over the past 20 years as a result of a strong political commitment to increase both agricultural production and farmers’ incomes. There was only one country that transpose the Directive [10] into national legislation. The appointment of regional water directors and councils for each water region/river basin district has been established.

Irrigation provides 50% of Spain’s final agricultural output. Water management has traditionally been based on the existence of district basin administrations as the main bodies with the authority to regulate surface water, although they can enter into agreements to manage unregulated waters (e. g., tributaries of rivers without infrastructure) and groundwater. There is no charge for the use of groundwater. User communities (irrigators) function as associations of water users, which are controlled by farmers (irrigation associations), but mainly by the state.

Flood irrigation and gravity systems predominate in Portugal. The role of the state in promoting irrigation projects has traditionally been quite limited. Water tariffs for agriculture are charged by water user associations according to complex mechanisms and formulas. A fixed fee per hectare, taking into account the profit received, is dominant.

In Romania, ground (10%) and surface (90%) water for irrigation are used. In the southern regions, irrigation was created on three levels

(terraces), mostly using the water resources of the Danube River. Restoration of the existing irrigation potential is the main measure for the economic development of the agricultural sector. The implementation of integrated management of water resources at the level of river basins and the modernization and reconstruction of existing irrigation systems using energy-saving self-propelled irrigation are considered the main goals of agrarian policy [9].

Since the reform of the water management system of Ukraine involves a significant increase in the area of irrigated land, not only the experience of EU countries with large size irrigated areas but also with small and medium

areas of such lands are of great importance for Ukraine. Table 2 presents generalized information on tariffs for water supply for irrigation and on the return of funds spent on water supply through the tariff mechanism by grouping information by EU countries.

Conclusions of the European Commission report on the role of water prices [1]. Further and stronger efforts are needed in the EU countries to provide adequate incentives for the efficient use of water in the agricultural sector. Most often, the right to take or use water is first issued by a state authority through the granting of licenses or permits. Authorization and clearance procedures (e. g., permit requirements) may vary

2. Information on tariffs for water supply for irrigation and compensation of funds spent on reclamation infrastructure in EU countries

Measures / directions	Countries are the subjects of paid water use
<i>Tariffs for supplying water for irrigation</i>	
Water pricing	For use in agriculture (Greece, Malta, Spain, Cyprus, Hungary, and the Netherlands) or for irrigation (Estonia, Slovakia, and Finland).
Fee/tariff for direct water intake	The fee is paid above the specified threshold in Belgium, France, the Netherlands, Great Britain, the Czech Republic, Germany, Finland, and Ireland.
There is no minimum intake volume at which tariffs or the requirement for approvals start to apply	Denmark, Italy, Lithuania, Portugal, Bulgaria and Slovenia.
Fee for direct water intake	In Italy, small fees are paid for licenses or permits. In the Netherlands, farmers pay an area-based fee to cover the water board's maintenance costs.
The tariff depends on the level of service, where the pressurized water supply has a higher price compared to gravity-fed distribution systems	Volume (flat) tariffs are usually applied in Cyprus and Luxembourg. In Cyprus, a fee of m ³ is charged from irrigator organizations when irrigating on systems built at the expense of the budget. Some collective systems in Greece, Spain, and Italy apply volume tariffs.
Mixed tariffs. These fees combine a flat rate based on area or yield with a volumetric element	Austria, the Czech Republic, Hungary, Finland (livestock and dairy farming), Germany, Ireland, Poland, and Spain use mixed tariffs for water supply for agriculture. In Spain, the volume component depends on the volume or time of irrigation. In France, mixed or binomial tariffs are most often used for non-gravity supply systems.
Rate based on area irrigated	Spain, Greece, Italy, France, Poland, Malta and, to a lesser extent, Cyprus.
Penalties for exceeding limits or for excessive use in conditions of water scarcity	Some water supply systems in a number of member states as Cyprus, Spain, France.
<i>Compensation of funds spent on reclamation infrastructure</i>	
Countries do not feel the burden on the water when the funds are returned	Austria, Denmark, Finland, the Netherlands, Luxembourg, and Great Britain used money 100% refunds for financial needs.
Operation and maintenance costs for providing water are only partially covered	Spain, Portugal, Poland, Italy, Greece, Bulgaria and Cyprus.

Ending of Table 2

Measures / directions	Countries are the subjects of paid water use
An unspecified portion of environmental and resource conservation costs is reimbursed	Great Britain, the Netherlands, France, Belgium (Flanders), Germany.
Reimbursement of costs for maintenance of reclamation systems due to tariffs	Less than 100% of capital expenditure for Italy, the Netherlands, Ireland, Greece, Spain, Portugal, Poland, Hungary, Bulgaria, and France; close to 100% for Belgium, Luxembourg, Great Britain, Denmark, Finland, Austria, Sweden, Cyprus, Romania, and 100% of financial costs for Latvia.
Problems with water metering for water billing	On a small part of the irrigated area, water is measured and assessed by volume, tariff, and fee for unregulated water and independent water abstraction, the priority level for Italy; based on metered water metering in Ireland, volume tariff with variable price levels for Cyprus, single volume tariff with differentiation for Lithuania, base and over-limit volume meter readings for France, capped volume rates for Latvia.
Achieving the quality indicators of meeting the requirements of the WFD [1]	Belgium, the Netherlands, and Germany reached 80%; not reached Spain, Slovakia, and Estonia; movement towards the introduction of volume payments in Italy.
Countries are in the process of improving the evaluation and internalization of the ERC	Cyprus, Spain.
<i>Side/additional problems of applying economic instruments</i>	
Institutional mechanisms of water use	The role of regional governments in Belgium, Great Britain, and Germany; participation of government institutions and water boards of the Netherlands, Luxembourg, Greece, Hungary, Italy, Romania, and Croatia; ecological and economic accounting in Spain, price subsidies by governments in Bulgaria, Romania, the government covers electricity costs in Romania, state policy to increase agricultural production and farmers' incomes in Greece, restrictions for calculating fees for services, price calculation is based on extraction, cleaning and transportation costs in Germany, publication of price calculations in Croatia.
Creation of an association of water users	Austria, Bulgaria, Great Britain, Greece, Denmark, Ireland, Spain, Italy, Cyprus, Portugal, Romania, Hungary, Sweden.
The impact of water charges on the agricultural economy	Share of water charges in total irrigation volume (2-8%) in France, irrigation costs are 20% of total costs of growing major crops in France, water costs are less than 7% of total farmer costs in the UK, water charges are 20% of costs farmers for water and 0.5-2% of the gross value of cultivated crops in Hungary.
Water for watering (for irrigation) is not paid for by farmers	The Netherlands, Germany, Slovakia.

Source: formed by the authors based on [1; 4; 7; 9]

depending on the amount of water withdrawn or the capacity of the pumps. For groundwater, threshold values are sometimes more stringent than for surface water. The justification of the initial distribution may take into account the availability of water resources, the purpose of abstraction (use), ecological needs, and other types of uses and sources. The time periods or duration of authorizations for the withdrawal of

agricultural/irrigation water vary considerably between Member States.

There is great heterogeneity both in terms of structure and level of water prices. For water intake (with independent water intake), tariffs are usually volumetric, at low rates, and above the minimum limit. Some countries differentiate the tariff depending on the state of the resource. In more than a third of the Member States, farmers do

not pay for water withdrawals. These exceptions tend to exist in several southern European Member States that experience water scarcity. This means that a significant share of the volume of water for agriculture in the EU is not estimated.

There are several pricing mechanisms for water supply to farmers. For gravity supply systems, disincentive area charges are still common, while mixed systems and volume charges are becoming more important. The volume price may be limited to certain regions of the country and usually depends on the provided pressurized water service. Some Member States have introduced fines for excessive consumption.

The level of cost compensation in EU countries, as well as water tariffs, is very different. For at least one third of the member countries, operation and maintenance costs for water provision are only partially reimbursed. More often, capital investments are subsidized (at least in part) by the country/regions. Environmental and resource costs have not become a central element of pricing policy. The practice of state capital subsidies to irrigators in water-scarce regions helps farmers in their country to be more competitive.

Although the use of economic instruments, such as tariffs, taxes, benefits, fines, funding of reclamation programs from the budget, etc., can contribute to solving problems of water quantity and quality, economic instruments for water management cannot replace conventional management and supply policies; rather, they should be designed to complement said policy. Achieving payback indicators, developing water pricing and trading mechanisms, clarifying and changing water rights, and institutional mechanisms should be supported by more reliable information [7].

Using the experience of EU countries in Ukraine. For Ukraine, given the significant achievements in irrigation at the end of the twentieth century and its transformation into a guarantor of world food security [6], its necessary urgently implement the recovery of irrigated agriculture in large areas due to its strategic and export-oriented nature, the presence of different climatic zones, the achievements of both the irrigation “grands” of the Mediterranean region of Europe and new EU members with a positive experience of renewing the agricultural and water sectors of the economy. The search for appropriate approaches, factors, and procedures for tariff formation in Ukraine is underway. Information on water tariffs and compensation for individual countries (Table 2) will be used critically as analogs of decision-making in Ukraine.

The influence of the experience of the EU countries on the methodical component of tariff

formation in Ukraine will be the establishment of a clear procedure for fixing tariffs, the use of different pricing formulas by regions of the country, the use of progressive, seasonal and increased tariffs for water; introduction of regulations regarding tariff calculation, stimulation of efficient use of water resources; irrigation water accounting rules, ensuring compliance with the principle of justice (ensuring equal access to services and equal opportunities, strengthening trust in the system), effective coordination of actions between water user associations and reclamation system operators when owning the distribution/supply infrastructure. Tariffs are expected to be established while ensuring economic efficiency, financial stability, and fiscal clarity.

A combination of innovative water technologies, management measures, and economic tools (including a tariff-setting mechanism) will be needed to prevent water scarcity problems [2]. Effective use of reclamation (irrigation and drainage) infrastructure, on the one hand, and financing expected service requirements mainly through tariff levels (fees), on the other hand, will allow extending the life of irrigation infrastructure and improving the level of water use. This can lead to financial savings (providing better services and facilitating cost recovery), as well as assistance to avoid infrastructure deterioration and delay investment needs.

Conclusions. The positive experience of countries with a developed sector of irrigated agriculture will be valuable when transitioning from the system of water tariffs payment for water supply services to the introduction of tariffs. In terms of economic content, water tariffs for water supply services for the irrigation of agricultural crops are classified as an important economic tool of irrigation management. The study of the practice and experience of the EU countries shows that an effective tariff-setting mechanism for water supply services in Ukraine should be based both on the solution of administrative and legal problems in the plan of continuing water system management reforms [6], and on the approval of known schemes [13] and proposals regarding the combination of the interests of the state and water users regarding the effective use of irrigated lands.

Directions for further research: In order to obtain reliable data on the appropriateness of tariff options, should be ensured clear accounting of data concerning water volumes (payment and supply schedules), land areas, electricity, costs related to various areas of activity, making the calculation, and separate accounting of works on irrigated areas are required and drained objects of engineering infrastructure, drawing up plans for technical

maintenance, current, major repairs, investment and water users on the use of tariffs based on the plan; preparation of reports on the activity of WUOs results of pilot projects and individual systems.

References

1. Görlitz, S. & Interwies E. (2012). The role of water pricing and water allocation in agriculture in delivering sustainable water use in Europe – Theoretical Background. URL: <https://www.researchgate.net/publication/261471672>
2. Berbel J., Borrego-Marin M.M., Exposito A., Giannoccaro G., Montilla-Lopez N.M., & Roseta-Palma C. (2019). Analysis of irrigation water tariffs and taxes in Europe Water Policy. *World Water Council Open Access ISSUES*. Vol. 21.Iss. 4 (1). URL: <https://iwaponline.com/wp/article/21/4/806/66838/Analysis-of-irrigation-water-tariffs-and-taxes-in>
3. Berbel J., Calatrava J. & Garrido A. (2007). Water Pricing and Irrigation : A Review of the European Experience. Chapter 13. URL: <http://www.uco.es/~es1bevej/articulos/waterpricing.pdf>
4. Easter K.W. & Liu Y. (2005). Cost recovery and water pricing for irrigation and drainage projects. *Agriculture and Rural Development Discussion Paper*. No. 26. Washington, D.C. : World Bank Group. URL: <http://documents.worldbank.org/curated/en/493201468135598958/Cost-recovery-and-water-pricing-for-irrigation-and-drainage-projects>
5. Garrido A. & Calatrava J. (2010). Agricultural Water Pricing: EU and Mexico. *OECD*. URL: <https://www.oecd.org/eu/45015101.pdf>
6. Romashchenko M.I., Kuzmych L.V., Saidak R.V., Matiash T.V. & Muzyka O.P. (2022). Some aspects of reforming the water management system and efficient use of reclamation lands in Ukraine. *Melioratsiia i vodne hospodarstvo*. Vol. 2. P. 5–15. DOI: 10.31073/mivg202202-341
7. OECD. (2010). Sustainable Management of Water Resources in Agriculture OECD. Paris : OECD Publishing. URL: <https://www.oecd.org/greengrowth/sustainable-agriculture/49040929.pdf>
8. Ivanov B., Popov R., Bashev H., Koteva N., Malamova N., Chopeva M., Todorova K., Nacheva I. & Mitova D. (2020). Analiz na sūstoyaniето na selskoto stopanstvo i khranitelnovkusovata promishlenost. SWOT analiz – [Analysis of the state of agriculture and the food industry. SWOT analysis]. Sofia : Institute of Agrarian Economics. URL: https://www.mzh.government.bg/media/filer_public/2020/01/21/analiz_na_sstoianieto_na_selskoto_stopanstvo_i_khranitelno-vkusovata_promishlenost_izgotven_ot_institut_po_agrarna_ikonomika.pdf [in Bulgarian]
9. Dekhtiar O. & Briuzgina N. (2017). Suchasnyy stan ta dosvid vidnovlennya zroshennya v Rumuniyi – [Current status and experience of irrigation restoration in Romania]. *Melioratsiia i vodne hospodarstvo*. Vol. 105 (1). P. 76–80. URL: <http://mivg.iwpim.com.ua/index.php/mivg/article/view/41> [in Ukrainian]
10. European Parliament and the Council. (2000). Dyrektyva 2000/60/EC Yevropeyskogo Parlamentu I Rady vid 23 zovtnia 2000 r.: Pro vstanovlennia ramok dijalnosti Spivtovarystva v galusi vodnoi politiki – [Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy]. URL: https://zakon.rada.gov.ua/laws/show/994_962 [in Ukrainian]
11. Kozlenko Ye.V., Morozov O.V. & Morozov V.V. (2021). Prozoryi pidchid do formuvannia vartosti poslug z podachi vody – ody n iz napriamyv realizatsiyi strategiyi zroshennia ta drenazu v Ukraini na period do 2030 roku – [A transparent approach to the formation of the cost of water supply services is one of the areas of implementation of the irrigation and drainage strategy in Ukraine for the period up to 2030]. *Agrarni innovatsiyi*. Vol. 8. P. 47–55. [in Ukrainian]
12. Morozov O.V., Morozov V.V., Kozlenko Ye.V. & Morozova O.S. (2022). Konceptualni zasady rozvitku zroshennia v pivdennomu regioni Ukrainy z urakhuvanniam technichnogo stanu meliorativnoi infrastruktury – [Conceptual principles of irrigation development in the southern region of Ukraine, taking into account the technical state of the reclamation infrastructure]. *Tavriyskiy naukovyi visnyk. Seria “Technichni nauki”*. P. 163–174. [in Ukrainian]
13. The Verkhovna Rada of Ukraine. (2022). Zakon Ukrainy vid 17 lutogo 2022 r. № 2079-IX. Pro organizatsiyu vodokorystuvachiv ta stimuluvannia gidrotekhnichnoi melioratsiyi zemel. [About the organization of water users and stimulation of hydrotechnical land reclamation. Law of Ukraine dated February 17, 2022]. *Holos Ukrayiny*. No. 98. URL: <https://zakon.rada.gov.ua/laws/card/2079-20> [in Ukrainian]
14. Romashchenko M.I., Saydak R.V., Matiash T.V. & Yatsuk M.V. (2021). Efektivnist zroshennia salezno vid vartosti vody – [Irrigation efficiency depends on the cost of water]. *Melioratsiia i vodne hospodarstvo*. Vol. 2. P. 150–156. DOI: 10.31073/mivg202102-308

15. Romashchenko M.I., Kovalchuk P.I., Matiash T.V., Kovalchuk V.P., Balykhina G.A., Shevchuk S.A. & Pendak N.V. (2012). Metodika formuvannia vartosti poslug s podachi vody na sroshennia, promyslovi ta komunalni potreby – [The method of forming the cost of water supply services for irrigation, industrial and communal needs]. Kyiv : Institut vonhych problem I melioratsyї Natzyonalnoi Akademii agrarnykh nauk. [in Ukrainian]

16. Romashchenko M.I., Yatsuk M.V., Zhovtonog O.I., Dekhtiar O.O., Saydak R.V. & Matiash T.V. (2017). Naukovi zasady vidnovlennia ta rozvitku zroshennia v Ukraini v suchasnykh umovakh. – [Scientific principles of restoration and development of irrigation in Ukraine in modern conditions]. *Melioratsiia i vodne hospodarstvo*. Vol. 106 (2). P. 3–14. DOI: 10.31073/mivg201702-26 [in Ukrainian]

17. Kabinet Ministriv Ukrainy. (2019). Stratehiia zroshennia ta drenazhu v Ukraini na period do 2030 roku : Skhvaleno rozporiadzhenniam Kabinetu Ministriv Ukrainy vid 14.08.2019 r. № 688-r – [Irrigation and drainage strategy in Ukraine until 2030 : Approved by the order of the Cabinet of Ministers of Ukraine dated August 14, 2019 No. 688-r]. *Uriadovi kurier*. No. 170. URL: <https://zakon.rada.gov.ua/laws/show/688-2019-%D1%80> [in Ukrainian]

УДК 332.025:330:12

АНАЛІЗ МЕТОДИЧНИХ ПІДХОДІВ ДО ФОРМУВАННЯ ТАРИФІВ НА ВОДУ ДЛЯ ЗРОШЕННЯ ТА КОМПЕНСАЦІЮ ВИТРАТ НА МЕЛІОРАТИВНУ ІНФРАСТРУКТУРУ: ДОСВІД КРАЇН-ЧЛЕНІВ ЄС

М.І. Ромащенко¹, докт. техн. наук, Р.В. Сайдак², канд. с.-г. наук, В.П. Пантелеєв³, докт. екон наук, С.Р. Госс⁴, Ph.D.

¹ Київський аграрний університет НААН України, Київ, Україна;
<https://orcid.org/0000-0002-9997-1346>; e-mail: mi.romashchenko@gmail.com;

² Інститут водних проблем і меліорації НААН України, Київ, 03022, Україна;
<https://orcid.org/0000-0002-0213-0496> e-mail: saidak_r@ukr.net;

³ Київський аграрний університет НААН України, Київ, Україна;
<https://orcid.org/0000-0002-6979-8861>, e-mail bernstain@ukr.net

⁴ Консультант, e-mail: Steve_Goss@hotmail.com

Анотація. Розглянуто практику країн ЄС із запровадження тарифів на воду для зрошення сільськогосподарських культур та процедур повернення коштів, витрачених на водопостачання для зрошення. Основними джерелами інформації статті стали публікації та нормативні документи України, звіти органів ЄС та World Bank, у яких проведений критичний аналіз практики ціноутворення у зрошуваному землеробстві країн ЄС за 2005–2023 рр. Проведено групування інформації про площу зрошуваних земель, рівень повернення коштів, витрачених на водопостачання, увагу приділено методичному підходу до розробки тарифів на транспортування води. Викладено тлумачення причин природного характеру, якими керувалися органи управління державами при застосуванні економічних інструментів управління зрошенням на своїх територіях. За окремими країнами із значними площами зрошуваних земель (Італія, Франція, Греція, Іспанія, Португалія та Румунія) визначено вагомі досягнення (складові) тарифоутворення та відшкодування коштів. Розкрито аспекти тарифоутворення на воду, облік води, розвиток об'єднань водокористувачів, оподаткування плати за воду. Ознаками класифікації країн було: напрями ціноутворення на воду, врахування стану водних ресурсів та меліоративних систем, різновиди тарифів, механізми ціноутворення, стан повернення коштів, витрачених на водопостачання за рахунок тарифів, вимірювання обсягів води, а також розв'язання додаткових проблем застосування економічних інструментів у зрошуваному землеробстві – інституціональні (адміністративні, правові) заходи, вплив плати за воду на економіку агросфери країни тощо. Оскільки домінуючим підходом у реалізації тарифоутворення у зрошенні країн ЄС є вимоги водної рамкової директиви, розглядався рівень досягнення показників якості виконання ВРД країнами. Встановлено, що переважна більшість світових практик формування тарифів на послуги з подачі води для зрошення, капітальних інвестицій в меліоративну інфраструктуру та її обслуговування, свідчить, що вони базуються, як на загальнодержавних інтересах, так і на зацікавленості водокористувачів і організацій, що забезпечують логістичну підтримку.

Ключові слова: водоподача, зрошення, тарифи, компенсація витрат, управління, системний підхід, Європейський Союз (ЄС)