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# Cost characteristics of water resources of Ukraine in the measurement of the market economy

## Introduction and literature review

Natural and resource potential is considered to be a powerful factor of development for each country in the world. One of the basic elements of the natural potential are water resources. All in all, taking into consideration the global warming, steep increasing of population and development rate, water resources are getting more and more valuable from the point of view of both society and ecosystem. According to the international experts' estimations, water is going to be a deficit ware of the same value as oil or gas in the nearest future.

In spite of their importance and uniqueness, water resources are not used rationally. As water resources are involved into economic circulation, they are affected by extraordinary anthropogenic factor, while the violations like pollution and excessive contamination of water resources have been ordinary phenomena of daily life. Surely, every government does its best to improve the state of water resources. The main ways of purification include technical equipments, when additional systems of purification are installed, and the industrial technologies are modernized with the view to reducing water consumption etc. Besides, the reaction to violation occurs mostly only after that violation took place, and results in redressing hardly the primary state of water.

Nowadays, there are good economic factors to influence the state of water resources. The financial motivation or financial limitations favorably affect the consumers of water resources. No doubt, changing of a consumer's behavior (population or enterprises) is subdued to financial factors. Financial factors are related to the possibilities of additional investments in this branch, because water resources have a significant (both real and hidden) potential to implement business projects. When necessary conditions, favorable environment and marketing environment are pre-arranged, water resources can be a very strong economic asset.

The success in implementation of these factors is closely related to indexes of real evaluation of water resources. When such evaluation is available, both the

opportunities of effective financial regulation in the branch and the opportunities of water resources involvement in financial and economic ambience are created actively.

Besides, currently, water and resources potential are being used for the development of finance and economy. Water resources are getting power to generate the market value. They are being smoothly included into various financial sectors' activities and defined by a significant potential of business processes.

There is a problem in Ukraine, which does not contribute to active positioning of water recourses within a financial and economical activities, which is low parameters of water resources evaluation. It results in a lot of investments being delayed because of a low level of cost justifying. The mentioned statement especially concerns the foreign investors, who need clear understanding of both water resources value within the area of their capital application and of single components of value.

Nowadays, there are scientific researches exposing the way of estimation of water resources. Basic positions, which give understanding of how the development of economy is going on, the value indexes and procedures of evaluation of water resources potential in our country in general, are presented in research works of many authors (Khvesyk, Zbaherska, 2000; Redkovskaya, 2007; Mandzyk, 2014). The special features of geographic evaluation are considered in research of Tsependa (2009). The problem is that these researches don't include marketing characteristics. Partially, the task is solved in the research of Levkovs'ka and Sunduk (2014), where the theoretical principles of costs evaluation along with marketing characteristics are formulated.

The world experience in the mentioned problem is also very important (*Water Resources Assessment. Guidelines for Review of National Capabilities*, 1997). Besides, we must admit that the experience of international organizations is quite difficult to adapt to Ukrainian realities due to significant irrelevance between available methodical approaches and a system of accumulating the information. To account the marketing characteristics, the further development of offered methods for the country and their adaptation to current marketing conditions are necessary. According to the said above, the objective of my article is to develop an approach on how to evaluate the costs of water resources for the state and for regions, as well as their real approbation.

## The methodology of cost characteristics of water resources

The routine of water resources evaluation for regions foresees an outlaying of basic principles composing the foundation. The principles create the idea of how to evaluate, and what possible basic results will be obtained.

1) Water recourses costs are different in their origin, so it is necessary to unite them within single groups. Referred to it, the whole procedure of evaluation is supposed to be divided into groups according to physical, marketing and

auxiliary features. The first group includes value characteristics of economical activities, the second group includes the characteristics that are created for water resources in finance and economical relations (rent, ecological services), the third one are auxiliary features for water recourses (e.g. virtual water).

As for the first group, the evaluation of water resources, which are really available within a definite territory, is carried out. The case in question is evaluation of considered water objects: 1) surface waters – natural reservoirs (lakes), water flows (rivers, brooks), artificial water reservoirs (storage pools, ponds) and channels, as well as other water objects; 2) underground waters and streams. The evaluation should define price characteristics of water resources in their natural ambience, before they are involved into anthropogenic circulation (Fig. 1).

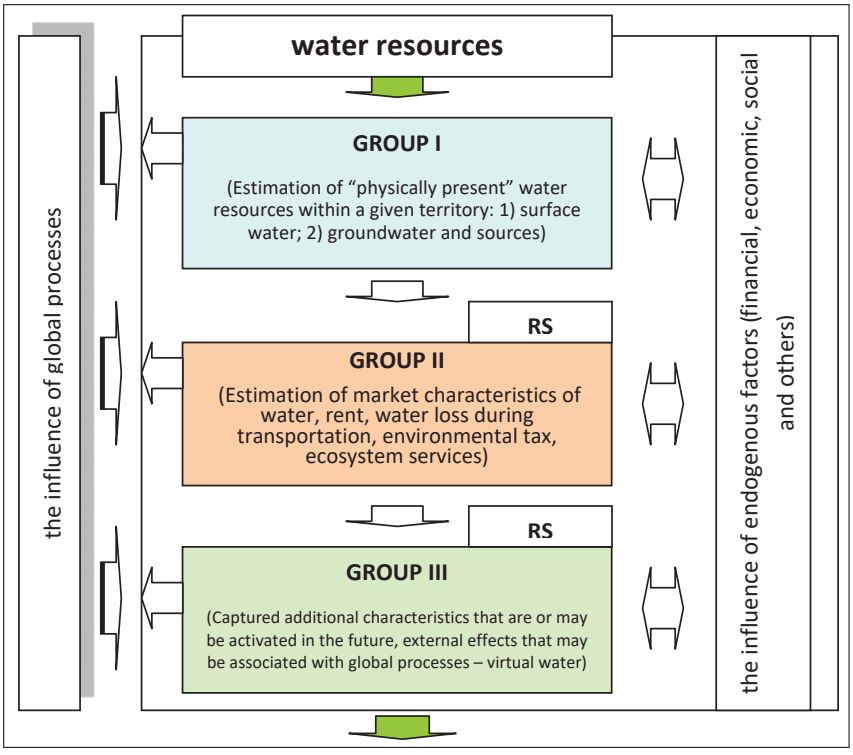


**Fig. 1.** Algorithm of cost estimate of water resources ( – beginning of the movement for resource assessment procedure, ⇒ – one-way effect, ⇔ – two-way effect, RS – rising cost)

In the second group, the evaluation of marketing characteristics for water resources is created, that is, such features come about, when water resources begin their economic circulation, so, when they get their marketing characteristics based on their physical characteristics. When we take into consideration the latter ones, we can admit that they increase essentially the price of water resources. In many cases, a share of marketing characteristics of water resources in regional consideration can exceed their physical value.

The third group considers additional characteristics. As they are not immediately related to the characteristics of water resources, it is reasonable to consider them outside the water features. Exogenous factors (system of external effects and characteristics) are mostly related to particularities of water resources, depending on the state of the market. The saying goes about water resources evaluation in the global sense, when their price is increasing every year. The example of additional characteristics is virtual water. Based on the offered characteristics, the summary evaluation of water resources looks as follows: GROUP I + GROUP II + GROUP III = TOTAL PRICE OF WATER RESOURCES.

2) An important part of the analysis of water resources value is defining the indicators that are to be formed reasonably on the basis of system approach. Within this approach, the indicators should be divided according to the mentioned levels, e.g. physical characteristics – marketing characteristics – auxiliary (additional) characteristics. Each of these characteristics is explained through specific features, which in their turn are being formed according to sub-features.
3) The calculations are offered to evaluate the costs according to internal and world prices (keeping in mind the euro-integration priorities of our state). The similar approach lets us define the level of conformity for prices, as well as to make recommendations of their possible corrections for water consumption in the national scale. A distinctive feature of the calculations is an approach, when the value is calculated separately for internal and external (international) ambience.
4) It is necessary to notice that the value of water recourses is differentiated in regions. For single cases, the indicators of territorial differentiation are significant (Khvesyk, 2014).

## Results of calculations

The calculations showed that water resources can generate a significant value. In internal prices, the indicator of their value accounts for about 68.8 bn hryvnas, in world prices – 78.1 bn U.S. dollars. The inequity between these values is huge and the main reason for this is the difference between prices for water recourses in Ukraine and the prices for water recourses in the world. Water recourses in Ukraine are underestimated a lot.

The physical characteristics contribute a great deal to the value. Their share in the national indicator of value is 69.2% according to internal prices, and 41.5% according to the world prices. Auxiliary characteristics play the least role in creation of national indicator of value.

There are significant variations in internal and world prices for different characteristics. As for physical characteristics, the internal prices mostly correspond to the world ones, for marketing and auxiliary characteristics – the correspondence between internal and world prices is not so good. Marketing characteristics have

the most differentiation in prices. It occurs because of the essential differentiation in payments for water resources consumption. The basic characteristic to create that differentiating was the indicator of ecologic services and its sub-indicators (Constanza, d'Arge, de Groot, Farberk, 1997). It shows that the ecologic services supplied by water resources of Ukraine (particularly the regulations of violations, regulations of water resources, water supplying, water purifying) don't correspond to the world price standards.

To illustrate sectors' features, let's analyze the indicators of rent and the characteristics of virtual water. The rent evaluations take into account the limitations of water resources. The costs for their development are averaged, that is why the economic evaluation is also more objective. Calculations showed that the financial flow generated by the rental mechanism can be defined at the point of 5.7 bn hryvnas in Ukrainian prices, and at the point of 4.8 bn U.S. dollars in world prices. The biggest financial characteristics are showed by industrial flows and irrigation. The main reason for such distribution in the first line are volumes of water that are the "area" to create the costs, as well as price characteristics of these water resources categories.

Virtual water considers the volumes of water resources, which were consumed for production of goods exported or imported between the countries (Allan, 1998). Under the condition of production moving, the migration of water resources also takes place within external trade, what in its turn results in redistribution of water potential significantly in the world scale. According to single scientific positions, taking into consideration the instruments of virtual water allows a state to balance the water characteristics.

Calculations indicated that the common export indicator for Ukraine was 19.5 bn $m^3$, which evaluated at the point of 8.5 bn hryvnas in internal prices, and 11.5 bn U.S. dollars in external prices. Export indicator is considered as the important one and says about an essential potential to create the virtual water within Ukraine. When compared to other indicators for water consumption, this indicator can be seen to exceed them significantly very often.

Considering the import characteristics, it is possible to declare that the virtual water values are not so essential and are limited by the point of 1.84 bn $m^3$, which is evaluated at the point of 5.5 bn hryvnas in internal prices, and 1.78 bn U.S. dollars in the world prices.

Therefore, the facts show that there is a significant misbalance between import and export volumes of virtual water, and this misbalance is 10 times. Let us make here the following conclusion – characteristics of external trade of Ukraine contribute to exceeding export of virtual water to abroad, what constitutes a menace to the national policy of water consumption.

It should be underlined that the costs of water resources are regionally differentiated. In single cases, the indicators of territorial differentiation are significant. The main reasons for forming these differences are the following: 1) Available

reserves of water resources (defined within their physical characteristics). Provided that region A has enough surface and underground waters, it affects considerably the indicators of physical characteristics, and therefore, the total indicator for the region; 2) Economical characteristics of the region. Providing the territory contains powerful industries, big cities concentrated within a region, it contributes to water resources being involved into economic activities. It results in affecting the evaluation characteristics; 3) Influence of additional processes. First and foremost, this is virtual water. Its major volumes are known to concentrate in exports and imports of cereals. Thus, the regions involved in majority of these operations will be affected mostly by these additional characteristics. An interesting feature outgoing from this research is a concentration of such characteristics for the city of Kyiv, the profile of which is not actually agrarian. However, it is its territory, where the head-offices of agrarian enterprises are concentrated. Nevertheless, the enterprises themselves corresponding to these offices are based in other regions.

To define the general features of value concentration, the regions of Ukraine were grouped into: the highest concentration (I), high (II), middle (III) and low (IV) value groups. The grouping allowed for differentiation of the territory of country in value generation, and for a long term, defining the leader and outsider regions according to their possibilities of implementing the investment projects, which were based on value indicator and on implementation of innovative instruments.

The grouping of regions shows that mostly the western and northern regions of Ukraine (including the capital) are of priority. Exactly those regions are often the territorial leaders in their defining of the values of water resources. Currently (as well as for a long term) they may become the areas of adaptation in order to implement the investment projects and use the innovative instruments for water resources.

Along with this, one of the challenges that can slow down the implementations like those is the fact that the value is formed by the physical characteristics for most cases (e.g. just by availability of water resources in the territory). It is necessary to enhance the influence of marketing and auxiliary characteristics, what would prove the active positioning of water resources in market relations.

Besides, a factor, which can slow down the marketing activities, is faint development of financial infrastructure for the majority of regions in group. For example, the implementation of financial instruments is quite a problem for Transcarpathian and Ivano-Frankivska regions. The capital and Kyiv region have better preconditions.

## Summary

Making the conclusions, let's notice that the forming of costs for water resources is a rather complex activity and depends on a lot of factors. It was shown that both national and regional water resources are able to generate a significant value what creates favorable conditions for water resources being involved in

economic activities. In its turn, it activates implementation of investment projects and application of innovative instruments (rent, ecologic services, capitalization etc.) founded on costs characteristics of water resources. The costs characteristics of water resources were defined in internal and external prices, which are quite different.

What are the possible ways to implement the received results of economic evaluation for cost characteristics of water resources? Firstly, valuable characteristics of water resources can be used for elaborating the state strategies of development for water sector. Besides the conceptual principles of development, the strategic documents deal with financial characteristics, which may be generated in complex, and which are necessary for its steady functioning. Calculations of costs let us define both the national and the regional indexes.

Secondly, costs characteristics can become a basis for implementation of innovative instruments of financial and economical regulations.

The finance and economy need new resources that are fairly difficult to obtain with the conservative instruments. Using the principles of rent, payments for ecologic services, as well as involving water resources into capitalization – these are the instruments, which along with others demand the real reasoning of price characteristics of water resources.

Thirdly, the value parameters are the guideline for private investors. It was declared at the beginning of the article that its authors intended to strictly focus on potential profits based on the ability to generate value. The profits can be defined on the basis of both general and sectoral indicators of price.

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### Abstract

The article investigates the positioning of water resources in systems of market economy. Water resources are considered as an important asset of the economic system. Formed methodical principle of procedure estimations of cost, on the basis of that research, base cost parameters of the state and regions for physical, market and additional features. According to the results, water resources of Ukraine can generate significant value, which differs considerably between domestic and world prices. Based on the cost characteristics of water resources it is possible for their inclusion in individual financial-economic processes (capitalization, rent formation, corporatisation etc.). Ways of integrating characteristics of water systems to the market economy are formed.

**Key words:** water resources, cost, market elevators, financial and economic processes

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