

**ՏԵՂԵԿԱԳԻՐ  
ԲԱՐՁՐ ՏԵԽՆՈԼՈԳԻԱՆԵՐԻ**

**ИЗВЕСТИЯ  
ВЫСОКИХ ТЕХНОЛОГИЙ**

**BULLETIN  
OF HIGH TECHNOLOGY**

**3(7)/2018**

**ՇՈՒՇԻ - ШУШИ - SHUSHI**

**2018**

ԲԱՐՁՐ ՏԵԽՆՈԼՈԳԻԱՆԵՐԻ ՏԵՂԵԿԱԳԻՐ  
ИЗВЕСТИЯ ВЫСОКИХ ТЕХНОЛОГИЙ  
BULLETIN OF HIGH TECHNOLOGY

**ՀԱՄԱՎԱՐԳՈՂ ԽՈՐՀՈՒՐԴ**

Ավետիսյան Վահան (տ.գ.դ., ԼՂՀ), Բալյան Պարզև (տ.գ.դ., ՀՀ), Գուլյան Արտակ (տ.գ.դ., ԼՂՀ), Թոքմաջյան Հովհաննես (տ.գ.դ., գլխավոր խմբագիր, ԼՂՀ), Թոքմաջյան Վաչե (տ.գ.դ., ՀՀ), Մարկոսյան Աշոտ (տնտ.դ., ՀՀ), Մարկոսյան Մհեր (տ.գ.դ., ՀՀ), Մինասյան Ռոբերտ (երկր.գ.դ., ՀՀ):

**КООРДИНАЦИОННЫЙ СОВЕТ**

Аветисян Ваан (д.т.н., РА), Балджян Паргев (д.т.н., РА), Гулян Артак (д.т.н., НКР), Маркосян Ашот (д.э.н., РА), Маркосян Мгер (д.т.н., РА), Минасян Роберт (д.геол.н., РА), Токмаджян Ваче (д.т.н., РА), Токмаджян Оганес (д.т.н., главный редактор, НКР).

**COORDINATION BOARD**

Avetisyan Vahan (Doctor of sciences (engineering), RA), Baljyan Pargev (Doctor of sciences (engineering), RA), Gulyan Artak (Doctor of sciences (engineering), NKR), Markosyan Ashot (Doctor of sciences (economics), RA), Markosyan Mher (Doctor of sciences (engineering), RA), Minasyan Robert (Doctor of sciences (geology), RA), Tokmajyan Hovhannes (Doctor of sciences (engineering), Chief editor, NKR), Tokmajyan Vache (Doctor of sciences (engineering), RA).

**ԽՄԲԱԳՐԱԿԱՆ ԽՈՐՀՈՒՐԴ**

Ավետիսյան Վահան (տ.գ.դ., ԼՂՀ), Բեկուպիլի Ալեքսեյ (տ.գ.դ., ՌԴ), Գագոշիձե Շավվա (տ.գ.դ., Վրաստան), Գավարդաշվիլի Գիվի (տ.գ.դ., Վրաստան), Գուլյան Արտակ (տ.գ.դ., ԼՂՀ), Թոքմաջյան Հովհաննես (տ.գ.դ., գլխավոր խմբագիր, ԼՂՀ), Թոքոնյան Արմեն (լ.գ.դ., ՀՀ), Իսրայելյան Ռուդոլֆ (տ.գ.դ., ԼՂՀ), Իվանով Կոնստանտին (տ.գ.դ., ՂՀ), Կոզին Իգոր (Ֆ.ճ.գ.դ., ՂՀ), Հարությունյան Համլետ (տ.գ.դ., ՀՀ), Հարությունյան Ռուզան (պատասխանատու քարտուղար, ԼՂՀ), Ղազարյանի Էդուարդ (Ֆ.ճ.գ.դ., ՀՀ), Մարկոսյան Աշոտ (տնտ.դ., ՀՀ), Մարկոսյան Մհեր (տ.գ.դ., ՀՀ), Մելիքյան Վազգեն (Ֆ.ճ.գ.դ., ՀՀ), Մինասյան Ռոբերտ (երկր.գ.դ., ՀՀ), Պետրոսյան Վահե (աստղ. դ., ԱՄՆ), Ջենևորիս Ռինալդո (տ.գ.դ., Իտալիա), Սարգսյան Հայկ (տնտ.դ., ՀՀ), Սովադյան Արզիկ (տնտ.դ., ՀՀ), Վարդանյան Արևշադ (տնտ.դ., ՌԴ), Ուլախյան Արամ (տ.գ.դ., Լեհաստան), Օրսիսյան Վիկտոր (տ.գ.դ., ՌԴ), Օնուխով Վիկտոր (թ.գ.դ., ՌԴ):

**РЕДАКЦИОННЫЙ СОВЕТ**

Аветисян Ваан (д.т.н., РА), Арутюнян Гамлет (д.т.н., РА), Арутюнян Рузан (ответственный секретарь, НКР) Бескопильный Алексей (д.т.н., РФ), Вартанян Аревшад (д.т.н., РФ), Гавардашвили Гиви (д.т.н., Грузия), Гагошидзе Шалва (д.т.н., Грузия), Гулян Артак (д.т.н., НКР), Дженоворис Ринальдо (д.т.н., Италия), Иванов Константин (д.т.н., РК), Израелян Рудольф (д.т.н., НКР), Казарян Эдуард (д.ф.-м.н., РА), Козин Игорь (д.ф.-м.н., РК), Маркосян Ашот (д.э.н., РА), Маркосян Мгер (д.т.н., РА), Меликян Вазген (д.т.н., РА), Минасян Роберт (д.геол.н., РА), Обуховец Виктор (д.т.н., РФ), Онучак Людмила (д.х.н., РФ), Петросян Ваге (д.астр., США), Саргсян Гайк (д.э.н., РА), Суварян Арзик (д.э.н., РА), Токмаджян Оганес (д.т.н., главный редактор, НКР), Тручунян Армен, (д.б.н., РА), Уджма Адам (д.т.н., Польша)

**EDITORIAL BOARD**

Avetisyan Vahan (Doctor of sciences (engineering), RA), Bezkapilni Aleksey (Doctor of sciences (engineering), RF), Gagoshidze Shalva (Doctor of sciences (engineering), Georgia), Gavardashvili Givi (Doctor of sciences (engineering), Georgia), Genevois Rinaldo (Doctor of sciences (engineering), Italy), Ghazaryan Eduard (Doctor of sciences (physics and mathematics), RA), Gulyan Artak (Doctor of sciences (engineering), NKR), Harutyunyan Hamlet (Doctor of sciences (engineering), RA), Harutyunyan Ruzan (Executive Secretary, NKR), Israelyan Rudolf (Doctor of sciences (engineering), NKR), Ivanov Konstantin (Doctor of sciences (engineering), RK), Kozin Igor ((Doctor of sciences (physics and mathematics), RK), Markosyan Ashot (Doctor of sciences (economics), RA), Markosyan Mher (Doctor of sciences (engineering), RA), Melikyan Vazgen (Doctor of sciences (engineering), RA), Minasyan Robert (Doctor of sciences (geology), RA), Obukhovets Victor (Doctor of sciences (engineering), RF), Onuchak Ludmila (Doctor of sciences (chemistry), RF), Petrosyan Vahe (Doctor of sciences (astronomy), USA), Sargsyan Hayk (Doctor of sciences (economics), RA), Suvaryan Arzik (Doctor of sciences (economics), RA), Tokmajyan Hovhannes (Doctor of sciences (engineering), Chief editor, NKR), Trchunyan Armen, (Doctor of sciences (Biology), RA), Ujma Adam (Doctor of sciences (engineering), Poland), Vardanyan Arevshad (Doctor of sciences (engineering), RF).

Տեղեկագիրը հրատարակվում է Ակադեմիկոս Ի.Վ.Եղիազարովի ջրային հիմնահարցերի և հիդրոտեխնիկայի ինստիտուտի, Հիդրավիկական հետազոտությունների հայկական ազգային ասոցիացիայի, Երևանի կապի միջոցների գիտահետազոտական ինստիտուտի և Շուշի տեխնոլոգիական համալսարանի կողմից: Հիմնադրվել է 2016թ.: Լույս է տեսնում տարեկան 2 անգամ: Երաշխավորված է տպագրության Շուշի տեխնոլոգիական համալսարանի գիտական խորհրդի կողմից:

Известия издают институт водных проблем и гидротехники им. академика И.В. Егизарова, Армянская национальная ассоциация по гидравлическим исследованиям, Ереванский научно-исследовательский институт средств связи и Шушинский технологический университет. Основан в 2016г. Издаётся 2 раза в год. Рекомендована к публикации решением ученого совета Шушинского технологического университета.

Bulletin is published by Institute of Water Problems and Hydro-Engineering Named After I.V. Yeghiazarov, National Association of Hydraulic Research, Yerevan telecommunication research institute, Shushi university of technology. Established in 2016. Published 2 times a year. Recommended for publication by the decision of the Academic Council of Shushi university of technology

Գրանցման վկայական՝

Տպաքանակ՝ 101 օրինակ:

Պատվեր թիվ 12:

Ստորագրված է տպագրության 12.12.2018թ.

Թողթը՝ օֆսեթ: Ծավալը 12 մամուլ:

e-mail: [info@bulletin.am](mailto:info@bulletin.am)

Հասցե՝ Երեւան, Արմենակյան 125, Շուշի, Աշոտ Բեկորի 4

Адрес: Ереван, ул. Арменакаяна 125, Шуши, А.Бекора 4

Address: 125 Armenakyan street, Yerevan, A.Bekor 4, Shushi

Tel. +374(43) 04-08-04

Url: [www.bulletin.am](http://www.bulletin.am)

© Բարձր տեխնոլոգիաների տեղեկագիր, 2018

© Известия высоких технологий, 2018

© Bulletin of high technology, 2018

## THE STRATEGIC WAY OF SOLVING THE PROBLEM OF THE SEVAN

H. V. Tokmajyan<sup>1</sup>, T. S. Martirosyan<sup>2</sup>

<sup>1</sup> Shushi University of Technology

<sup>2</sup> National University of Architecture and Construction of Armenia

---

*Lake Sevan is a freshwater and highland lake. The lake is bordered by the mountain ranges of Geghama in the west, Vardenis to the southwest and Areguni, Sevan and Eastern Sevan in the north-east. The lake is composed of the Greater and the Small Sevans which are separated from each other by the capes of Artanish and Noratus connected with an underwater hill. Before the artificial lowering of the lake level its length was 75 km long, the average width was 19 km (maximum 32 km), the average depth was 41.3 m and the depth of the deepest part called the Small Sevan was 98.7 m. In these conditions the total capacity of the lake was 58.5 billion cubic meters and after an artificial reduction of water level it comprised about 33 billion cubic meters minimum. 28 rivers are flowing into Lake Sevan: Dzknaget, Gavaraget, Argichi, Vardenis and so on. The Sevan is also fed with underground springs and atmospheric precipitations. Only the Hrazdan originates from the Sevan. The Sevan is the only major natural drinking water reservoir in the region. But over the last decades under the anthropogenic impacts the lake's ecosystem has been damaged causing marsh processes which may become irreversible in the near future. In this work it is proposed to raise the water level in Lake Sevan up to 1915.57 m as a solution to the problem and the technical capabilities of its implementation are given.*

**Key words:** water, spring, evaporation, water level, reservoir, Arpa - Sevan tunnel, ecosystem.

### Introduction

In 1930-1960 of the XX century Sevan-Hrazdan cascade was built on the river Hrazdan with its 6 hydropower stations the exploitation of which recessed the stage of the lake. It turned out that during the water runoff the ecological condition of the lake gets worse more quickly than it was supposed. In 1964 the lake had already lost 40% of its ancient supplies, the maximum depth of the lake had reached up to 80 meters, the average water stage was recessed by 13,5 meters. As a result the bed of the Small Sevan recessed by 36,5 km<sup>2</sup>, that of the Great Sevan by 116 km<sup>2</sup>, the amount of oxygen in water was recessed, the lake began to freeze more often (after 1947 for more than twenty times). To prevent the disaster it was decided not to let the water runoff of the lake any more with the purpose of getting electricity. However, despite the activities being held (mainly the operation of Arpa-Sevan tunnel), for the country's survival it was necessary to realize water intake of 1,5 billion cubic meters annually during Artsakh war with energetic purposes. In the beginning of the XXI century the lake stage was recessed by 19,25 meters.

In the last decades of the XX century as a result of physico - chemical and biological changes the lake began to get old and to swamp, to cover with green and blue algae. These changes had negative influence on the fauna of the lake. The first alarm on the distortion of ecosystem of the lake was in 1958 when by the negotiation of central committee of the Communist party of Armenia and the council of Ministers the government of Soviet Union had recessed the stage of the Sevan till 500 mln cubic meters from which 380 mln cubic meters were allowed to be used for irrigation. However, even after this important decision the lake stage continued to lower. The distorted ecosystem contributed to swamping of lake Sevan as possible. It was urgent to search for new ways of energetics and providing irrigation and to prevent further recession of lake stage of the Sevan. A new project of utilization of the Sevan was admitted in 1961 which foresaw to keep the lake stage on 1898 meters and in this case, as a result of evaporation and recession of underground flows it would be possible to outlet 180 mln cubic meters water from the Hrazdan without further recession of lake stage (in natural conditions instead of 50 mln cubic meters). To cover the shortage in water for irrigation many pumping stations were built through which the southern rivers of the republic were directed to the working canals of Artashat, the lower Hrazdan and Ejmiatsin. Particularly, Artashat pumping station was built in 1967 which lightened the «bother» of the Sevan for 50 mln cubic meters. Later on the pumping station of

Mkhchyan was built in 1968 which supplies the agriculture with additional 125 mln cubic meters water. In 1966 Aparan, in 1976 Azat and in 1981 Akhuryan reservoirs were exploited with respectively 91 mln, 70 mln and 525 mln cubic meters capacity [1, 2, 3].

By the authorities of the Republic of Armenia consistent activities have recently been done to rise lake stage of the Sevan and to improve the water ecosystem. The Law «On lake Sevan» was accepted [4] and by the order of the president of the RA the Committee on the issues of lake Sevan was created [5].

It is worth to mention that before the collapse of the USSR in the condition of unprecedented capacities of reservoir construction the regular water course of Armenia was already supported by 83 reservoirs which were accumulating 1,1 billion cubic meters water (without Sarsang reservoir) [6]. The problem of energetics was solved by the construction of Metsamor nuclear power station. But our nation had to suffer another great disaster: after the earthquake of Spitak in 1989 the station had been stopped and it was reoperated only in 1995 which had had not only great economic, but also social and political significance.

The construction of Vorotan-Arpa-Sevan hydro-technical complex was of utmost importance for the protection of Lake Sevan and the efficient utilization of its supplies. To rise the lake stage Vorotan-Arpa-Sevan tunnel transports part of the flow of the Vorotan, Arpa and Yeghegis rivers to the lake. The annual technical capacity of the tunnel is estimated as 465 million cubic meters. It is formed by Arpa-Sevan tunnel (built in 1981, it can transport up to 300 million m<sup>3</sup> per year from River Arpa to Sevan) and Vorotan-Arpa tunnel (built in 2004, it can transport additional 165 million m<sup>3</sup> annually from Vorotan River via Arpa-Sevan to Lake Sevan) [7]. For the protection of the ecosystem of Lake Sevan “Sevan” National Park was created in 1978.

It was decided to rise the stage of Lake Sevan up to 1905 m above sea level at the beginning of the 21st century [8]. According to the program, the actual water level will be 1903.5 meters. The remaining 1.5 meters will make the height of the wave. Currently, the lake stage is 1900.13 m which is equal to the lake stage in 1963. During the elevated water level 1697 buildings and structures will be covered with water, only 481 of which are officially registered and the remaining 1216 are illegal. 7 km watercourses, 18 km of electricity transmission lines, 35 substations, 19 km of gas pipelines will be covered under the water. 15 km of road will be covered with water. It was foreseen to rise the level stage of the Sevan by 1903,5 meters up to 2032 meters. Annual water level should rise to approximately 21.6cm [7].

The importance of the work done to prevent the recession of the level of Lake Sevan and to rise it is evident. But today these actions can not be considered sufficient to solve the problem of Lake Sevan. There is a need to adopt a strategic decision to rise the level stage of Lake Sevan up to the recorded rate of 1915.57 m which was registered in 1915. This should become the target for solving the problem of Lake Sevan.

By one of the first steps to solve the problem of Lake Sevan it is necessary to determine the water balance of the lake more completely and accurately and the dimensions of its individual components. It primarily refers to the determination of the dimension of evaporation which is the largest component of the balance and which greatly influences the most important element of the level stage flashing - the active yield of water.

The hydrometeorological monitoring has been done in the basin of lake Sevan for more than hundred years. The necessary measurable dimensions are recorded and necessary analyses have been done. Since the water amount out of the lake exceeded the natural runoff (1933), the controlled water intake is also measured (to the Hrazdan) with its transportation indexes through Arpa-Sevan tunnel (since 1981). However, the calculated dimensions of water balance elements and especially evaporation value are not reliable which make the estimation of total water balance dimension. The main reason of this is the lack of objects of monitoring realized towards the components of the balance, the old equipments and the imperfection of determination of calculating methods. Hence, we have the need to improve the calculating methods and to realize the monitoring [9].

The reliability of the formation of water balance of lake Sevan will increase in case of the complete determination of its components, expanding of the mentioned observations, overviewing the methods of their operations and improving them. It is possible only in realization of hydrological monitoring and improving the methodology of balance projecting. It will enable

➤ To get complete and reliable hydrological information about Lake Sevan and the description of water objects of its basin for timely calculating intervals,

➤ For the purpose of making justified decisions on hydroeconomic activities, to determine more precisely the water supply of the lake for the estimated period and the values of water regime change,

➤ To make an adequate water and hydroeconomic balance of the lake which will include the integrity of its components, the accuracy of its determination and its reliability.

The evaporation of the surface of lake Sevan is greater for 3,5 times than its average water yield. Hence we have the importance of determination of measuring the evaporation and its summative value. Now the value of evaporation is determined by calculating method using the previous statistical and other empiric relations on the basis of the measurments [10]. The aimed task is to provide the opportunity of realizing the monitoring with contemporary methods and to review the methods of the calculation of evaporation.

The surface indraft is the main in its natural indraft. The flow measurments are not sufficient and the methodology to determine the surface indraft is not reliable through them. It is necessary to operate new approaches by which it will be possible to account the river flows, the water intake of the rivers and flow change.

The precipitations on the lake surface, as a rule, are less than on coastal line and have chronological fluctuations. So they should be immediately measured (mainly on the Great Sevan) and new empiric relations should be created to clarify the seasonal amount of the precipitations.

Measurements of the stage of Lake Sevan the volume of water accumulated in the lake is determined by, along with the measurements of the lake managing components, allow for immediate determination of the lake's active water lubrication and water balance error. The inflow of groundwater in the lake is now taken in the water balance equal to 93 million m<sup>3</sup>, stable over the years per month. This size and its ability to be persistent and equal are susceptible. The groundwater inflow rate, as a rule, is estimated by different dimensions at different levels for the gradual stages of the development of the lake's problem. Particularly, after the cessation of the recession of lake level the inflow was calculated equal to 120 million m<sup>3</sup>, the correctness of which is also very suspicious. There is a need to develop a new calculation method for the level rise, taking into account the fact that, along with the rising water level, it is supposed to activate filtration phenomena on coastal ground. While reviewing groundwater inflow it will be necessary to compile the water balance of the lake's catchment basin to determine the flow of deep water and to determine the amount of water filtration and to reconsider calculations done previously.

It is desirable to make the water balance of the catchment basin of the lake making it "correspondent" to the lake's balance and evaluating the annual and seasonal fluctuations of groundwater inflow of the lake. This will require additional climatic observations and episodic measurements.

### **Conflict setting**

To solve the problems of lake Sevan, the following tasks are set forward:

1. Determination of the evaporation amount from the surface of lake Sevan;
2. Estimation of underground runoff and river inflow of lake Sevan;
3. The justification of rising the lake stage up to 1915,57 meters and road map development.

### **Research results**

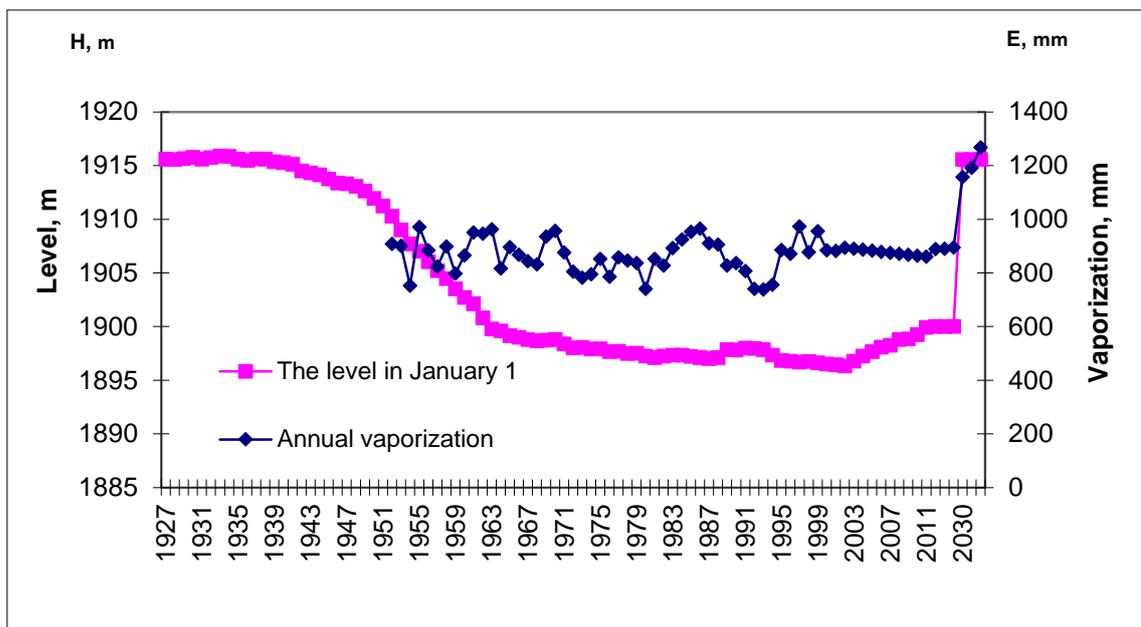
The following research program is suggested to be applied:

- Review and improvement of the methodology of determination of the evaporation amount from lake surface and development of calculation package program,
- Improvement of surface inflow estimation methodology,
- Revaluation of seasonal and annual precipitation on the surface of lake Sevan, modernization of calculating methods,
- Modernization of prediction of the methodology of natural flow of the lake (active yield of water),
- Making the water balance of the catchment basin and balance estimation of hydrological parameters of underground water inflow of the lake,
- The clarification of the methodology of determination of underground inflow and runoff of the lake according to the lake stage changes,
- Modernization of the method of balance development of the lake and development of guideline of correcting the previous mistakes and balances of the lake,
- Development of the methodology of determination of the influence of climatic change on the lake and water resources of its basin and the determination of calculation characteristics. Development of scenarios on air temperature, moisture and wind speed changes of the Sevan basin on the basis of global change of climate and the results of regional models.

The vaporization is one of the main components of outcome of water balance of the lake Sevan. In the conditions of natural high level of the lake (1915,57 m above sea level) it comprised more than 90 percent of inflow water balance, i.e. more than 90 percent of the water flowing into the lake was lost as a result of vaporization. Parallel with the recession of lake stage as a result of its surface reduction the amount of water used for vaporization was also reduced. Nowadays, i.e. in case of horizon about 15 m below natural level the size of vaporization comprises about 80-85% of its inflow. However, this value needs to be clarified and the issues connected with the evaporation of the lake are modern.

Various methods were developed to determine the factors which the vaporization of lake Sevan is conditioned by such as limnetic air layer temperature, moisture, wind speed and water surface temperature. The evaporation value of lake Sevan was determined by these methods for different times and the predictions have been done on the vaporization.

In Figure 1 the annual sizes of vaporization of lake Sevan calculated by the methods of turbulent diffusion and evaporators are shown. The long term process of lake stage is also shown there.



**Figure 1. The parameters of annual vaporization and the levels of lake Sevan**

Despite the certain annual fluctuations (740...970 mm) according to evaporation size and conditioned by weather and climatic factors its value has not been changed. It means that the thickness of annual layer of evaporation of lake Sevan is not significantly dependant on lake stage. However, in case of the change of mentioned size of lake stage (14 m) any relation between the value of evaporation of the lake and the stage has not been found. The average annual value of evaporation calculated for 1952-2001 observations comprises 865 mm.

Based on the average multi year evaporation value of 865 mm and taking into account that in case of 1896,32 m water level the surface of lake Sevan is equal to about 1240 km<sup>2</sup>, the evaporation size will comprise 1240 mln m<sup>2</sup> x 0,865 m = 1073 mln m<sup>3</sup>:

In Table 1 the annual sizes of evaporation for different levels of lake Sevan are shown in case of 865 mm evaporation value.

So, we came to the conclusion that the difference in case of the further (1903,5 m) and the previous natural (1915,57 m) indicators of evaporation from lake Sevan will totally comprise only 95 mln m<sup>3</sup>.

In the first case, accepting the miracle of evaporation indicator as 10%, the annual evaporation size in 1915,57 m indicator we will get 1348 mln m<sup>3</sup> or the difference in case of the further (1903,5 m) and the previous natural (1915,57 m) indicators of evaporation from lake Sevan will totally comprise only 218 mln m<sup>3</sup>. This almost coincides with the indicator of 1430 mln m<sup>3</sup> brought in [11 and 14] in case of the worst scenario of development.

**Table 1**

**Annual sizes of evaporation calculated for different levels of lake Sevan**

Lake level, m	Surface , km <sup>2</sup>	Vaporization , mln m <sup>3</sup>
1896,32	1240	1073
1900,20	1275	1103
1903,50	1306	1130
1915,57	1416	1225

**The ways of rising the lake stage till 1915,57 m:** is the rising of lake stage of the Sevan till 1915,57 m realistic and what will it give to the Republic of Armenia?

The answers to these two questions are affirmative:

- The solution of the problem is realistic,
- It will give the country additional political importance, will solve the social problems of the population, will provide stable progress for the development of the economy.

Let us justify our words: according to the example in 2000 of [7] the sum of the components of water balance of inflow to lake Sevan is 1222,7 mln m<sup>3</sup> which has the following components.

- Rivers flowing into the lake comprise 740,5 mln m<sup>3</sup>,
- Precipitations on the lake surface comprise 388 mln m<sup>3</sup>,
- Underground flow comprises 94,2 mln m<sup>3</sup>.

The above mentioned indicators in case of temperature rise 2<sup>0</sup> and water level of 1915,57 m the river water amount will reduce to 702 mln m<sup>3</sup>, and the precipitations on the lake to 352,7 mln m<sup>3</sup> [11]. As a result the sum of natural components in the content of inflow of water balance of lake Sevan, in case of the worst scenario and water level of 1915,57 m will be 1148,9 mln m<sup>3</sup>.

The sum of natural components in the runoff of water balance of the lake comprises 1555,3 mln m<sup>3</sup> in the example of 2000.

- According to [7], along the Hrazdan the maximum runoff is 170 mln m<sup>3</sup>,
- Evaporation from lake surface is 1370,9 mln m<sup>3</sup>,
- Underground flow is 14,4 mln m<sup>3</sup>.

The above mentioned indicators in the worst scenario and water level of 1915,57 m will make the evaporation from lake surface be 1430 mln m<sup>3</sup> [11] and the underground flow will be 98 mln m<sup>3</sup> [12, 13].

At the same time the runoff of lake Sevan which passes through the Hrazdan will come to its initial size which is 50 m<sup>3</sup>. As a result, the sum of natural components in the content of runoff of water balance of the lake in the case of the worst scenario and in 1915,57 m indicator will comprise 1578 mln m<sup>3</sup>.

The annual balance of lake Sevan in the worst scenario in the water level indicator of 1915,57 m will be -429,1 mln m<sup>3</sup>.

The rise of the indicator of Arpa – Sevan tunnel terminal will enable to transfer 554 mln m<sup>3</sup> water to lake Sevan through the tunnel.

The annual water balance for 1915,57 m and in case of the realization of the above mentioned activities and in the worst scenario will be affirmative as 125 mln m<sup>3</sup>.

So, in the worst scenario it will be possible to rise the lake stage at least for 10 cm.

For the purpose of irrigation the water intake from lake Sevan will be compensated due to the exploitation of Yeghvard reservoir for 90 mln m<sup>3</sup>, from Marmarik reservoir 23 mln m<sup>3</sup>, in case of Vedi reservoir 20 mln m<sup>3</sup> also. The construction of other reservoirs should also be foreseen.

### **Conclusions.**

In case of rising the water level of lake Sevan to 1915,57 m the solution of the following tasks will be possible:

1. The water quality of the lake will be restored being correspondent to drinking water demands. It should be taken into account that to solve the task set for construction of Yeghvard reservoir about 90 mln US \$ will be spent, for Vedi reservoir 60 mln US \$, for the new tunnel of 26 km length in Yeghegis - Sevan section about 400 mln US \$ and for reconstruction of coastal infrastructures 500 mln US \$ will be needed and the same amount of money for water transfer system, in the end we will have 1,5 billion US \$ expences. Taking into account that in world market the drinking water (bottled) is 370 US \$/m<sup>3</sup> and the trade discounts, it can be priced as the 29,6 US \$/m<sup>3</sup>. If we admit that as a raw material the water will be sold by 1,0% of its bottled price minimum, we will get 2,96 US \$/m<sup>3</sup>. The exchange price of drinking water of 125 mln m<sup>3</sup> annually will comprise 370 mln US \$. If we consider that in near future we expect a sharp price rise of drinking water (by 15-50 times), then in rising the water level of lake Sevan to 1915,57 m such conditions will be created for the Republic of Armenia before the realization of the mentioned activities as the oil and gas for our neighbor countries.

2. As a result of increasing the water pressure in the lake

a) in the lowlands with lower elevations the springs of drinking water will abruptly increase which will be used to solve the drinking water problem in Yerevan and other cities

b) water supplies will be more

c) seismic risk will not become more as lake Sevan has natural origin and the increase of about 1,5 atmospheric pressure will not endanger the situation.

3. Additional 20 billion cubic meter water will be accumulated. To accumulate such amount of water for the construction of reservoirs about 70 billion US \$ will be needed.

### **Suggestions**

The presented program can be realized during at least 35 years. In case of the worst scenario this period can be prolonged for several times. But it is necessary to start the program in close terms as possible. As the first step it is suggested

1. To prevent the lake pollution, firstly the sewage waste water flow into the lake.

2. To forbid the engineering activities in elevations below 1920 m.
3. To clean the lake bed from the sunk tree roots .
4. To start the development of alternative project of the area Yeghegis-Sevan of Arpa –Sevan tunnel with the purpose of the outcome indicator of the tunnel to rise to 1917 m.
5. To review the exploitation regime of Arpa - Sevan tunnel. To start certain activities immediately to transfer the water from Spandaryan reservoir to lake Sevan.

### References

1. Աբրահամյան Հ.Ա., Սիմոնյան Ա.Վ., Թոքմաջյան Հ.Վ., Սարգսյան Վ.Հ. Ջրային ռեսուրսների օգտագործման հեռանկարները Հայաստանի Հանրապետությունում //Երևան, ԵՃՇՊՀ, 2012, 204 էջ:
2. Մարկոսյան Ա.Խ., Մկրտումյան Մ.Մ., Թոքմաջյան Հ.Վ., Ջրային ռեսուրսների և ջրային համակարգերի կառավարումը, Եր.: Երևանի ճարտարապետության և շինարարության պետական համալսարանի հրատ., 2011թ., Հատոր I, 700 էջ:
3. Մարկոսյան Ա.Խ., Մկրտումյան Մ.Մ., Թոքմաջյան Հ.Վ.Ջրային ռեսուրսների և ջրային համակարգերի կառավարումը, ԵՃՇՊՀ – Եր.: Երևանի ճարտարապետության և շինարարության պետական համալսարանի հրատ., 2011թ. հատոր II – 488 էջ:
4. ՀՀ օրենք “Սևանա լճի մասին” //Երևան: Ընդունված է 15.05.2001, ՀՀ Պ.Տ. N 19(151), 2001:
5. Սևանա լճի հիմնահարցերի հանձնաժողով ստեղծելու մասին //Հայաստանի Հանրապետության նախագահի կարգադրություն, Երևան, 25.12.2008, N ՆԿ-234-Ն:
6. Չիլինգարյան Լ.Ա., Մնացականյան Բ.Պ., Աղաբաբյան Կ.Ա., Թոքմաջյան Հ.Վ. Հայաստանի գետերի ու լճերի ջրագրությունը //Երևան, “Ագրոպրես”, ԶՀՀԻ, 2002, 49 էջ:
7. ՀՀ օրենք “Սևանա լճի էկոհամակարգի վերականգնման, պահպանման, վերարտադրման, և օգտագործման միջոցառումների տարեկան ու համալիր ծրագրերը հաստատելու մասին” //Երևան: Ընդունված է 14.12.2001, ՀՕ-276:
8. Սևանա լիճ //http://www.encyclopedia.am/pages.php?bld=1&hld=723:
9. ՀՀ կառավարության 14 հուլիսի 2011 թվականի ”Հայաստանի Հանրապետության նախագահին առընթեր Սևանա լճի հիմնահարցերի հանձնաժողովի կողմից մշակված Սևանա լճի էկոհամակարգի և ջրաբանական մոնիթորինգի իրականացման միջոցառումների ծրագիրը հաստատելու մասին” N 987 - Ն որոշումը:
10. Վարդանյան Լ.Ռ., Նիկողոսյան Հ.Թ., Թոքմաջյան Լ.Վ., Մարտիրոսյան Տ.Ս. Սևանա լճից գոլորշիացման մասին //Երևանի ճարտարապետության և շինարարության պետական համալսարանի տեղեկագիր. Երևան, 2012. N6. էջ 32-35:
11. Վարդանյան Լ.Ռ. Սևանա լիճ թափվող գետային հոսքի փոփոխության, կանխատեսման և խոցելիության գնահատման խնդիրներ //Երևանի ճարտարապետության և շինարարության պետական համալսարանի տեղեկագիր, Եր., 2013, N 2 (34), էջ. 76-87:
12. Վարդանյան Լ.Ռ., Նիկողոսյան Հ.Թ., Թոքմաջյան Լ.Վ., Մարտիրոսյան Տ.Ս. Սևանա լճից գոլորշիացման մասին //Երևանի ճարտարապետության և շինարարության պետական համալսարանի տեղեկագիր, Եր., 2012, N6 (32), էջ 32-35:

13. Վարդանյան Լ.Ռ., Նիկողոսյան Հ.Թ., Մելքոնյան Հ.Ա., Մարտիրոսյան Տ.Ս. Սևանա լճի գոլորշիացման խոցելիության գնահատումը կապված կլիմայի փոփոխության հետ: Երևանի ճարտարապետության և շինարարության պետական համալսարանի տեղեկագիր, Եր. , 2013. N1 (33), էջ 49-55:
14. Շրջակա միջավայրի տեղեկատվական միասնական համակարգ Սևանա լճի համար //Պիլոտային ծրագրի ամփոփիչ հաշվետվություն և առաջարկություններ, Եր., 11.2014-02. 2015թթ. , <https://docslide.us/documents/towards-a-shared-environmental-information-system-in-the-european-.html>

### References

1. Abrahamyan H.A., Simonyan A. V., Tokmajyan H.V., Sargsayn V. H., The perspectives of utilization of water resources of the Republic of Armenia //Yerevan, YSUAE, 2012, p. 204.
2. Markosyan A.Kh., Mkrtumyan M.M., Tokmajyan H.V., Water resource and water system management, Yerevan, publishing of Yerevan State University of Architecture and Engineering, 2011, Volume I, p. 700.
3. Markosyan A.Kh., Mkrtumyan M.M., Tokmajyan H.V., Water resource and water system management, Yerevan, publishing of Yerevan State University of Architecture and Engineering, 2011, Volume I, p. 488.
4. RA law “About lake Sevan” //Yeravan. Turned into law in 15.05.2001, RA P.T N 19(151), 2001:
5. On creating a committee of lake Sevan issues //the Order of the president of the Republic of Armenia , Yerevan, 25.12.2008, N IO-234-N.
6. Chilingaryan L.A., Mnatsakanyan B. P., Aghababyan K.A., Tokmajyan H. V., The hydrography of the rivers of Armenia //Yerevan, “Agropress”, IWPH, 2002, p.49.
7. RA Law “To reestablish the ecosystem of lake Sevan, its protection, reproduction and confirmation of annual and complex programs of utilization activities” //Yerevan, admitted in 14.12.2001, RL-276.
8. Lake Sevan //http://www.encyclopedia.am/pages.php?bId=1&hId=723:
9. “To confirm the program of the activities to realize the monitoring of ecosystem and hydrography of lake Sevan by the Committee of the Issues of lake Sevan by the President of the Republic of Armenia” N 987 – N decision of the RA Government in 14 July, 2011.
10. Vardanyan L.R., Nikoghosyan H.T., Tokmajyan L.V., Martirosyan T.S., About the evaporation from lake Sevan //Bulletin of Yerevan State University of Architecture and Engineering, Yerevan, 2012, N6. p.32-35.
11. Vardanyan L.R., The issues of the flow change of the rivers flowing into lake Sevan, its prediction and vulnerability // Bulletin of Yerevan State University of Architecture and Engineering, Yerevan, 2013, N 2 (34), p. 76-87.
12. Vardanyan L.R., Nikoghosyan H.T., Tokmajyan L.V., Martirosyan S.T., About the evaporation from lake Sevan, Bulletin of Yerevan State University of Architecture and Engineering, Yerevan, 2012, N6 (32), p. 32-35.
13. Vardanyan L.R., Nikoghosyan H.T., Melqonyan H.A., Martirosyan S.T., The estimation of the vulnerability of the evaporation of lake Sevan connected with the climate

change. Bulletin of Yerevan State University of Architecture and Engineering, Yerevan, 2013. N1 (33), p. 49-55.

14. Unified system of the environment for lake Sevan, // Pilot program final report and suggestions, Yerevan, 11.2014-02. 2015, <https://docslide.us/documents/towards-a-shared-environmental-information-system-in-the-european-.ht>

## ՍԵՎԱՆԱ ԼՃԻ ՀԻՄՆԱԽՆԴՐԻ ԼՈՒԾՄԱՆ ՌԱԶՄԱՎԱՐԱԿԱՆ ՈՒՂՂՈՒԹՅՈՒՆԸ

Հ.Վ.Թորմաջյան<sup>1</sup>, Տ.Ս.Մարտիրոսյան<sup>2</sup>

<sup>1</sup>Շուշիի տեխնոլոգիական համալսարան

<sup>2</sup>Ճարտարապետության և շինարարության Հայաստանի ազգային համալսարան

Սևանը քաղցրահամ, բարձրադիր լիճ է: Լիճն արևմուտքում լծորդվում է Գեղամա, հարավ-արևմուտքում՝ Վարդենիսի, հյուսիս-արևելքում՝ Արեգունու, Սևանի և Արևելյան Սևանի լեռնաշղթաներին: Սևանը կազմված է Մեծ ու Փոքր Սևաններից, որոնք միմյանցից բաժանվում են Արտանիշի և Նորատուսի հրվանդաններով ու դրանք միացնող ստորջրյա թմբով: Նախքան լճի մակարդակի արհեստական իջեցումը նրա երկարությունը 75 կմ էր, միջին լայնությունը՝ 19 կմ (առավելագույնը՝ 32 կմ), միջին խորությունը՝ 41,3 մ, ամենախոր մասի՝ Փոքր Սևանի խորությունը՝ 98,7 մ: Այդ պայմաններում լճի ընդհանուր ծավալը կազմում էր 58,5 մլրդ մ<sup>3</sup>, ջրի մակարդակի արհեստական իջեցումից հետո՝ նվազագույնը՝ շուրջ 33 մլրդ մ<sup>3</sup>: Սևանա լիճ են թափվում 28 գետ՝ Ձկնագետը, Գավառագետը, Արգիճին, Վարդենիսը, և այլն: Սևանը սնվում է նաև ստորգետնյա աղբյուրներով ու մթնոլորտային տեղումներով: Սևանա լճից սկիզբ է առնում միայն Հրազդան գետը: Սևանը տարածաշրջանի խմելու ջրի միակ խոշոր բնական ջրամբարն է: Սակայն վերջին տասնամյակներում անթրոպոգեն ազդեցության հետևանքով խախտվել է լճի էկոհամակարգը՝ առաջացնելով ճահճացման պրոցեսներ, որոնք ամենամոտ ապագայում կարող են անշրջելի դառնալ: Սույն աշխատանքում, որպես հիմնախնդրի լուծում, առաջարկվում է Սևանա լճում ջրի մակարդակը բարձրացնել մինչև 1915,57 մ նիշը, բերվում է դրա իրականացման տեխնիկական հնարավորությունների հիմնավորումը:

**Բանալի բառեր.** ջուր, աղբյուր, գոլորշիացում, ջրի մակարդակ, ջրամբար, Արփա-Սևան թունել, էկոհամակարգ:

## СТРАТЕГИЧЕСКОЕ НАПРАВЛЕНИЕ РЕШЕНИЯ ПРОБЛЕМЫ ОЗЕРА СЕВАН

Օ.Վ.Токмаджян<sup>1</sup>, Т.С.Мартиросян<sup>2</sup>

<sup>1</sup> Шушинский технологический университет

<sup>2</sup> Армянский национальный университет архитектуры и строительства

Севан высокогорное озеро с пресной водой. Озеро сопрягается с хребтом - Гегама (с западной стороны), Варденис (с юго-западной стороны), Арегани, Севан и Восточный Севан (с северо-восточной стороны). Озеро Севан состоит из Большого и Маленького Севана. До понижения уровня воды, длина озера Севан составила 75 км, средняя ширина – 19 км (максимальная ширина – 32 км), средняя глубина – 41,3 м (максимальная глубина – 98,7 м). Общий объем озера тогда составлял 58,5 млрд м<sup>3</sup>. После понижения уровня воды

минимальный объем составил 33 млрд м<sup>3</sup>. В озеро Севан впадают 28 рек. Севан питается также подводными родниками и атмосферными осадками. С озера берет начало только одна река – Раздан. Севан является единственным большим хранилищем питьевой воды в регионе. Однако, в последние десятилетия вследствие антропогенных воздействий экосистема озера нарушена, начался процесс заблочивания, который в ближайшее время может стать необратимым. В настоящей работе как решение проблемы предлагается поднять уровень воды озера до отметки 1915,57 м. Приводится техническое обоснование реализации этого проекта.

**Ключевые слова:** вода, родник, испарение, уровень воды, водохранилище, тоннель Арпа-Севан, экосистема.

Ներկայացվել է՝ 19.09.2018թ.

Գրախոսման է ուղարկվել՝ 20.09.2018թ.

Երաշխավորվել է տպագրման՝ 27.11.2018թ.

## WATER RESOURCES OF THE REPUBLIC OF ARMENIA AND THE EXPORTING OPPORTUNITIES OF POTABLE WATER

A.Kh. Markosyan<sup>1</sup>, E.N. Matevosyan<sup>2</sup>, K.A. Nersisyan<sup>1</sup>, L.V.Tokmajyan<sup>3</sup>

<sup>1</sup> Shushi University of Technology

<sup>2</sup> Yerevan State University

<sup>3</sup> National Polytechnic University of Armenia

---

*In addition to production factors which contribute to the socio-economic development, it is also important to include natural resources (including water) in economic turnover and to create conditions connected with it which will contribute to the efficient use and management of natural resources. Another important issue is the utilization of water resources in Armenia based on the economic interests of the country.*

*The country's main path is to increase the production factors both in economic progress and in improving the living standards of the population that depends on the increasing of export volumes and the comparative advantages of such country like Armenia which has an open and small economy.*

*The research done by the authors shows that comparative advantages of Armenia are drinking water resources that are increasingly appreciated on the global market day by day. This circumstance creates new opportunities for Armenia in terms of exporting drinking water to the world market and increasing export incomes.*

**Key words:** *national wealth, water resources, intake, water utilization, loss of water resources, drinking water, bottled water, export, comparative advantage.*

### Introduction

Among the factors which the social and economic development of any country is conditioned by, such as employment, capital and entrepreneurial experience and skills, significant importance is given to both natural resources and conditions and their processes of being included in economic turnover and the effective management and organization of these processes.

Moreover, it is possible to achieve the improvement of such important indicators which characterise the level of development of the country as national wealth is, which is one of the main macroeconomic indicators and in fact characterizes the level of capitalization of the country. It is currently characterized by four components: produced, natural, human capitalized and the value of net foreign assets. It is noteworthy that the national wealth of the population per capita estimated by the experts of World Bank comprised 52,884 mln dollars, including the produced capital of 15,451, natural capital 12,702, human capital 27,329 and net foreign assets 2588 mln dollars [1:226-233]. The country's main path is to increase production factors both in the economic progress and improving the living standards of the population, especially in such countries with open and small economies as the Republic of Armenia is, depending on the increase in the export amount and the disclosure and use of comparative advantages of the country. Among the natural resources of the Republic is the drinking water which has its unique place and by means of its large-scale export it is possible to significantly increase the monetary income of the country and thus improve the balance of payments.

### Conflict settings

The negative value of trade assets was typical for all the years of the third Republic of Armenia. Thus, the RA export comprised 270.9 mln US dollars in 1995, the import comprised 673.9 mln US dollars, the negative balance of foreign trade comprised 403.0 mln US dollars. Those indicators correspondently comprised the export - 300.5 mln US dollars in 2000, the

import - 884.7 mln US dollars and the negative balance - 584.2 mln US dollars. In 2005 they comprised correspondently 973.9, 1801.7 and 827.8, in 2010 – 1041.1, 3748.9 and -2707.8 mln US dollars, in 2015 - 1485.3, 3239.2 and 1753.9 mln US dollars, in 2016 - 1791.7, 3273.5 and 1481.8 mln US dollars, and in 2017 the export comprised 2242.9 mln US dollars, the import - 4182.7 mln US dollars and the negative balance -1939.8 mln US dollars [2].

The negative balance of foreign trade has led to the negative balance of payments of the country, which has resulted in an increase in the country's external state debt (about \$ 7 billion), the further increase of which is related to the emergence of serious socio-economic and political problems. In this regard, it should be noted that according to the 2019 state budget project, a considerable amount of state budget expenditures of RA will be spent on foreign state debt service in the coming years.

Based on the above mentioned, the revelation and use of increasing sources of income of the Republic are currently signified, among which, in our opinion, the water resources are of great importance. And if we notice that the considerable part of these reserves are not used in the territory of the republic and they flow to neighboring countries, it will become clear that one of the world's most expensive natural resources which is the water is “exported” from the republic at zero cost. If the consuming value of certain product lies mainly (not exceptionally) in the basis of exchange value of any product, the water is that unique irreplaceable product (unlike oil which can be replaced by many other alternative means). So the former UN Secretary-in-Chief Ban Ki-Moon's words are not accidental while answering the question what the reason for the Third World War would be: "I think it will be because of the liquid, but it will not be oil." Obviously, this concerns the drinking water.

### **Research results**

#### **The brief description of the water supplies of the Republic of Armenia**

The water supplies of Armenia are mainly formed as a result of atmospheric precipitations falling on its territory and the part of watercourses of the boundary rivers of the Araqs and the Akhuryan. Though the most part of the researchers has unanimous opinion about the source of emerging water supplies, during the estimation of the capacities of those resources very different values are presented [3, 4:45, 5:27, 34, 6, 7, 8:84, 278, 9, 10:63-67, 11]: Even for such dimension that is surface current long time dimension, which is considerably constant dimension (it is determined on the average data of 75-80 years), the conclusions are very different. Basic differences are noticed among the indicators of underground water characteristics, particularly, in terms of the supply capacities of usage «exploitation»<sup>1</sup>. So, the water supplies (surface and underground) are estimated from 11,7<sup>3</sup> km till 9,0 and even 7 km<sup>3</sup> [12:59].

In 1961-1990 the average annual amount of precipitations in RA comprised 592 mm and in 2017 481.0 mm (the deviation of precipitation of 2017 comprised -111 mm in 1961-1990) [13:118].

More than 80% of the total river runoff is formed in the territory of the republic (excluding the basin of Lake Sevan). The remaining part of surface current comprises the transit flow of boundary rivers of the Araqs and the Akhuryan [14:5]. The inflow of boundary rivers is estimated equally at 0.9 billion cubic meters per year. The difference between the underground inflow and outflow is positive, about 0.1 billion cubic meters per year. The annual evaporation comprises 11.5 billion cubic meters, and the moving lower flow comprises 6.3 billion cubic meters. The renewing water supplies of surface waters comprise 7.2 billion cubic meters per year. About 2.3 billion cubic meters of these waters are in use now (in the past 4 billion cubic meters), 2 billion cubic meters of which (up to 3 billion cubic meters in the past) is used for irrigation and support for other spheres and 430.0 million cubic meters

---

<sup>1</sup> Though the expression of the exploitation of water resources has deep meaning in theory and in practice as well, in our opinion this word has been politicized, it has been given the meaning of «class» and it is time for it be replaced by accepted and applicable word «use» in Armenian.

(in the past 550 million cubic meters) is used for drinking and household application [15:5-6].

The most significant of natural water bodies is Lake Sevan with 1278.74 sq.km total surface and 38.21 cubic km capacity, level index is 1900.52 meters [16:9]. According to Table 1, the level of Lake Sevan has risen by 32 centimeters in 2013-2017. It should also be noted that in recent years both technical and economic studies on water resources have been increased according to their significance and importance [17].

**Table 1**

**The passes from Lake Sevan by years and its level fluctuations by months in 2013-2017**

	Water passes mln cubic meters	Lake level and monthly fluctuations														Water level index in the end of the year, m	Water level fluctuations comparing with the beginning of the year, sm
		Water level index meters	Monthly fluctuations comparing with the previous month, sm														
			January	February	March	April	May	June	July	August	September	October	November	December			
2013	169.95	1 900.10	-1	+4	+5	+12	+20	+9	-6	-15	-8	-8	-3	-3	1 900.16	+6	
2014	269.63	1 900.16	-	+4	+4	+11	+15	-	-5	-16	-6	-7	-2	-1	1 900.13	-3	
2015	167.74	1 900.13	-1	+1	+4	+16	+19	+4	-10	-12	-8	-1	-2	-4	1 900.19	+6	
2016	167.13	1 900.19	+3	+6	+5	+12	+22	+10	-5	-8	-8	-5	-2	-3	1 900.46	+27	
2017	266.76	1 900.46	-1	+2	+5	+17	+19	-	-10	-13	-12	-5	-3	-3	1900.42	-4	

Source from «The Social-economic condition of Armenia in January 2018», Yerevan, RA National statistical committee, 2018, p. 120

### **The current condition of water supply utilization of the Republic of Armenia**

Table 2 presents the intake and utilization of sweet water in the Republic of Armenia in 2011-2017 according to the classification of economic activities, which shows that an increase of intake has increased by 17.5% in comparison with the data in 2011 (from 2438.3 million cubic meters in 2011 to 2865.4 million cubic meters in 2017). In the same period, the largest amount of water intake was registered in 2015 as 3271.7 million cubic meters. The same indicators for water utilization was 17.4%, 2533.1 million cubic meters respectively. According to the classification of economic activity, the largest water intake implementer was the water supply, sewerage, waste management and recycling sector, whose share in total intake decreased from 65.8% in 2011 to 61.0% in 2017, and the water utilization indicators of this type of activity comprised 9.5% and 6.5% respectively. Agriculture, forestry and fishing sector occupy the first place in terms of water utilization, the share of which reached 85.9% in 2017 from 78.7% in 2011. Thus, in agriculture, forestry and fishing water intake if the irrigation section comprised 5.2% in 2011, then 20.5% was in fishing /fish industry/, or, in other words, the share of the latter was four times higher. In the same year the shares of water utilization were 49.9%, 28.7% and 57.5% respectively. In 2017, the water intake of agriculture, forestry and fishing industry increased by 33.6%, water use - 85.9%, irrigation rates - 15.6% and 60.6% respectively and fisheries (fish breeding) 18.0% and 25.2% respectively.

The dimension of water utilization index depends on technological, anthropogenic and other factors of certain types of economic activity as well. Table 3 shows the utilization of water by the RA GDP for 1,000 drams in 2013-2016, according to the main types of economic activities utilizing water. According to the data, the water utilization rates for 1000 drams of GDP in Armenia in 2013-2016 are significantly different from each other. Thus, if the highest indicator for water supply, sewerage, waste management and processing in the sector was registered in 2014 (10.5), then in some types of activities (process efficiency, construction) this index was close to 0.0. In general, the water consumption of the RA GDP for 1000 drams was 0.46 cubic meters in 2013 and it increased slightly in 2016 (making 0.49) and the average for these years was 0.47 degrees cubic meters.

Table 2

Water intake and utilization of sweet waters in the RA in 2011-2017 according to the classification of the types of economic activities

	2011		2012		2013		2014		2015		2016		2017	
	Intake	Utilization												
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>Total RA</b>	<b>2438.3</b>	<b>1738.1</b>	<b>2941.2</b>	<b>2187.2</b>	<b>2955.1</b>	<b>2089.1</b>	<b>2860.5</b>	<b>2112.8</b>	<b>3271.7</b>	<b>2533.1</b>	<b>3181.9</b>	<b>2470.0</b>	<b>2865.4</b>	<b>2040.0</b>
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Agriculture, forestry and fishing	627.5	1367.7	790.9	1793.2	1362.8	1845.9	921.3	1748.1	1097.7	2269.9	896.6	2191.6	961.4	1751.6
	25.7	78.7	26.9	82.0	46.1	88.4	32.2	82.7	33.6	89.6	28.2	88.7	33.6	85.9
Irrigation	127.5	867.7	178.7	1181.1	561.1	1044.5	224.9	1051.7	357.6	1519.1	227.3	1522.3	446.3	1236.6
	5.2	49.9	6.1	54.0	19.0	50.0	7.9	49.8	10.9	60.0	7.1	61.6	15.6	60.6
Forestry	0.3	0.2	0.4	0.4	0.6	0.5	0.5	0.5	0.0	0.7	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fishing / Fish industry	499.7	499.7	611.8	611.7	801.1	800.9	695.9	695.9	740.1	750.1	669.3	669.3	515.1	515.0
	20.5	28.7	20.8	28.0	27.1	38.3	24.3	32.9	22.6	29.6	21.0	27.1	18.0	25.2
Mining industry and open mine exploitation	54.9	54.9	152.3	152.2	58.4	58.3	101.9	133.8	44.0	88.1	81.6	81.5	83.9	83.9
	2.3	3.2	5.2	7.0	2.0	2.8	3.6	6.3	1.3	3.5	2.6	3.3	2.9	4.1
Processing industry	93.6	9.4	45.9	4.5	41.7	4.1	38.0	4.2	41.1	4.2	5.9	6.0	7.7	7.7
	3.8	0.5	1.6	0.2	1.4	0.2	1.3	0.2	1.3	0.2	0.2	0.2	0.3	0.4
Electricity, gas, vapour and good quality air support	40.9	38.3	33.5	32.1	23.1	22.2	27.9	27.8	24.2	24.2	21.6	21.4	27.2	27.2
	1.7	2.2	1.1	1.5	0.8	1.1	1.0	1.3	0.7	1.0	0.7	0.9	0.9	1.3

Continuing Table 2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Water supply, sewage , waste managemet and processing	1603.2	165.4	1902.3	147.6	1456.8	113.1	1744.2	147.8	2060.7	119.1	2166.0	123.2	1747.7	132.1
	65.8	9.5	64.7	6.7	49.3	5.4	61.0	7.0	63.0	4.7	68.1	5.0	61.0	6.5
Water supply (water drainage, processing and distribution)	1602.0	164.3	1902.2	147.4	1444.9	111.2	1743.8	147.5	2050.7	97.2	2165.7	122.7	1744.4	128.8
	65.7	9.5	64.7	6.7	48.9	5.3	61.0	7.0	62.7	3.8	68.1	5.0	60.9	6.3
Engineering	0.7	0.7	0.5	0.5	0.2	0.2	4.7	4.7	0.1	0.1	0.1	0.1	3.6	3.6
	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.1	0.2
Other types of economic activity	17.4	101.7	15.8	57.1	12.2	45.3	22.5	46.4	3.2	27.5	10.1	46.5	33.9	33.9
	0.7	5.9	0.5	2.6	0.4	2.2	0.8	2.2	0.1	1.1	0.3	1.9	1.2	1.7
GDP, mln USD (2011 purchase equivalent)	-	<b>20192.6</b>	-	<b>21646.5</b>	-	<b>22360.8</b>	-	<b>23165.8</b>	-	<b>23907.1</b>	-	<b>23954.9</b>	-	<b>25751.6</b>
Water utilization of GDP of 1000 dollars (2011 purchase equivalent), cubic meter / 1000 USD	-	<b>86.1</b>	-	<b>101.0</b>	-	<b>93.4</b>	-	<b>91.2</b>	-	<b>106.0</b>	-	<b>103.1</b>	-	<b>79.2</b>

Numerator is mln cubic meter, denominator by % to the total

Source formed and calculated on the basis of the data given by RA statistical committee bases of the department of «Water resources»

Referemce <http://armstatbank.am/pxweb/hy/ArmStatBank/?rxid=002cc9e9-1bc8-4ae6-aaa3-40c0e377450a>

Table 3

Water utilization of the RA GDP for 1000 drams in 2013-2016 according to the main economic activities which utilize water

	GDP, mln AMD				Water utilization, mln cubic meter				Water utilization of GDP for 1000 drams (with current prices), cubic meter /1000 AMD				
	2013	2014	2015	2016	2013	2014	2015	2016	2013	2014	2015	2016	Average 2013-2016
Agriculture, forestry and fishing	839,821.1	872,631.1	868,671.0	809,723.4	1845.9	1748.1	2269.9	2191.6	2.20	2.00	2.61	2.71	2.38
Mining industry and open mine exploitation	102,686.8	102,553.2	107,717.5	132,416.1	58.3	133.8	88.1	81.5	0.57	1.30	0.82	0.62	0.83
Processing industry	441,103.1	466,754.6	464,325.5	466,608.4	4.1	4.2	4.2	6.0	0.01	0.01	0.01	0.01	0.01
Electricity, gas, vapor and good quality air supply	183,232.0	188,032.3	231,279.0	228,425.7	22.2	27.8	24.2	21.4	0.12	0.15	0.10	0.09	0.12
Water supply, sewage, waste management and processing	13,181.7	14,106.9	19,223.5	22,481.0	113.1	147.8	119.1	123.2	8.58	10.48	6.20	5.48	7.68
Engineering	476,564.0	448,772.6	474,107.0	406,201.3	0.2	4.7	0.1	0.1	0.00	0.01	0.00	0.00	0.00
Other types of economic activities	2,499,049.5	2,735,775.6	2,878,309.7	3,014,008.7	45.3	46.4	27.5	46.2	0.02	0.02	0.01	0.02	0.01
<b>Total (gross domestic production or water utilization)</b>	<b>4,555,638.2</b>	<b>4,828,626.3</b>	<b>5,043,633.2</b>	<b>5,079,864.6</b>	<b>2089.1</b>	<b>2112.8</b>	<b>2533.1</b>	<b>2470.0</b>	<b>0.46</b>	<b>0.44</b>	<b>0.50</b>	<b>0.49</b>	<b>0.47</b>

Source formed and calculated on the basis of the data given by RA statistical committee bases of the department of «Water resources»  
 Referemce <http://armstatbank.am/pxweb/hy/ArmStatBank/?rxid=002cc9e9-1bc8-4ae6-aaa3-40c0e377450a>

### Water resource losses

The study of statistical data shows that water resources losses are still high in the Republic of Armenia (Table 4). It should be noted that the losses of water resources in 2011-2017 have not been reduced, but they were increased reaching from 700.1 million cubic meters in 2011 to 825.4 million cubic meters in 2017. In other words, if the loss of water resources was only 28.7% of water intake (2438.3 million cubic meters) in 2011, in 2017 it comprised 28.8%. At the same time, the biggest loss of water resources was observed in water supply, sewerage, waste management and recycling, the share of loss in total losses was 99.6% in 2011, then in 2017 it reached 100%. If we estimate the water resource utility coefficient (the ratio of water utilization and water intake) in Armenia, we find it proper to consider it at two levels. a) the final water use indicator in water intake; and (b) the final water use indicator within the water resources (we accept at 10 cubic km per year or 10 billion cubic meters per year) in the territory of the RA. In this case we will have the following picture: in 2011 the water resource utility coefficient was: a) 71.3% for the case, the loss of water resources comprised 1738.1 mln cubic meter, b) 17.4% for the case, and the loss of water resources - 8261.9 million cubic meters, respectively in 2017: a) for the case - 71.2%, water use - 2040.0 million cubic meters, and b) 20.4% for the case, and the loss of water resources - 7960.0 million cubic meters. In other words, for every 4.8 years (38.21 cubic km / 7.96 cubic km), the Republic of Armenia "loses" one Lake Sevan. Thus, it turns out that the most expensive resource "exported" from the Republic of Armenia, the fresh drinking water, is "exported" to the neighboring country at zero cost. It follows that radical reforms are needed in the republic to improve the water utilization and to increase the efficiency of water resources utilization.

**Table 4**

#### Water losses according to the types of economic activities in 2011-2017 mln cubic meter

	2011	2012	2013	2014	2015	2016	2017
<b>Total Ra</b>	<b>700.1</b>	<b>754.0</b>	<b>866.0</b>	<b>747.4</b>	<b>738.6</b>	<b>711.9</b>	<b>825.4</b>
Agriculture, forestry and fishing	0.1	0.1	0.2	0.2	0.0	0.0	0.0
Irrigation	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Forestry	0.1	0.0	0.1	0.1	0.0	0.0	0.0
Fishing/fish industry	0.0	0.1	0.1	0.0	0.0	0.0	0.0
Mining industry and open mine exploitation	0.0	0.1	0.1	0.1	0.0	0.1	0.0
Processing industry	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Electricity, gas, vapour and good quality air supply	2.5	1.4	0.9	0.0	0.0	0.2	0.0
Water supply, sewage, waste management and processing	697.5	752.4	864.8	747.1	738.6	711.7	825.4
Water supply (water drainage, processing and distribution)	697.5	752.4	854.8	747.1	738.5	711.7	825.4
Engineering	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other types of economy activities	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source formed and calculated on the basis of the data given by RA statistical committee bases of the department of «Water resources»

Referemce <http://armstatbank.am/pxweb/hy/ArmStatBank/?rxid=002cc9e9-1bc8-4ae6-aaa3-40c0e377450a>

Here we should also point out that the potable waters of Armenia are noted by high quality, and one part of them, being «formed» in earth entrails, contains the necessary mineral waters for humans (see table 5).

Table 5

**Water intake of sweet waters (surface and underground), by indexes and by years mln cubic meter**

	1990	2000	2005	2010	2015	2016	2017
1. Water intake (total 2+3),mln cubic meter	3942.0	1871.2	2770.6	2126.4	3271.7	3181.9	2865.4
2. Water intake from surface springs, mln cubic meter	2616.6	1338.2	1967.6	1250.6	1967.3	2045.6	1710.9
3. Water intake from underground springs, mln cubic meter	1325.4	533.0	803.0	875.8	1304.4	1136.3	1154.5
4. Regenerating water resources, mln cubic meter, year	6810.0	2873.0	8457.0	8681.0	6441.0	6882.0	-
5. The co-number of water resource exploitation (CWRE), %	57.9	65.1	32.8	24.5	50.8	46.2	-

Source formed and calculated on the basis of the data given by RA statistical committee bases of the department of «Water resources»

Reference <http://armstatbank.am/pxweb/hy/ArmStatBank/?rxid=002cc9e9-1bc8-4ae6-aaa3-40c0e377450a>

Table 6

**The indexes of exporting and importing of natural or mineral waters and drinks in 2005-2017**

Products	Year	Export (tonne)	Export (1000 USD)	Import (tonne)	Import (1000 USD)
1. Waters, natural or artificial mineral water and drink (sugar free)	2017	16905.3	7333.3	1022.4	652.5
	2016	15039.8	6055.7	345.9	186.7
	2015	14702.6	5997.6	543.2	184.3
	2010	12771.1	5341.1	288.5	197.5
	2005	6342.2	1661.6	50.3	30.6
2. Mineral water and drink (with sugar)	2017	4353.4	2980.0	18191.1	11555.1
	2016	5638.4	3661.9	70162.9	9305.3
	2015	3844.9	2848.3	14832.8	9105.6
	2010	2006.1	2025.9	20494.9	14639.4
	2005	1384.3	805.8	7526.5	3964.5
Total	2017	21258.7	10313.3	19213.5	12207.6
	2016	20678.2	9717.7	70508.8	9492.0
	2015	18547.6	8845.9	15375.9	9289.8
	2010	14777.2	7367.0	20783.4	14836.9
	2005	7726.5	2467.4	7576.9	3995.1

Information source formed and calculated according to the data of «Foreign trade data base according to goods list 4 numbered classification» of RA Committee of statistics

Reference <https://www.armstat.am/am/?nid=148>

### **The indexes of exporting and importing natural or artificial mineral waters or drinks**

It follows from the data of Table 6 that the amounts of exporting and importing of natural and artificial mineral waters and drinks are poor dimensions which do not correspond to RA water resource potential and opportunities. Urgent necessity emerges to increase abruptly the export sizes of above mentioned goods.

#### **Potable water as an international trade item**

The study of the world market of separate products and services shows that in the last 20-30 years deep and overall changes have taken place in that area. Depending on the demand, new products have emerged, and on the contrary, part of them gradually "leave" the market due to the lack of demand.

One of the most important products of the world market in recent years is potable water which gradually increases the amount and segmentation of product circulation of export and import of different countries. We can also surely say that the capacities of drinking water will increase significantly in the near future. It is obvious that the satisfaction of the needs of potable water of the population is very problematic in some countries and these countries are looking for a variety of ways to solve this problem. For example, in the 1970s, the icebergs of the Northern Pole were mentioned in the ways of gauging the demands of Arabic countries of potable water which were pulled to the Arab Peninsula and were bottled for the population. On the other hand, those countries that are rich in potable water resources can benefit from the situation in the global market and receive foreign exchange inflows from them which is necessary to reduce the negative foreign trade balance of the republic.

From the point of view of expanding the export opportunities of drinking water from the RA, it is important to present the developments in its global marketplace and along with it to discuss the dynamics of bottled water consumption. Along with global urbanization and ecological pollution, the issue of drinking water is becoming more and more urgent all over the world as a result of which the bottled water becomes a demanded product and its production a profitable and promising branch of business respectively. Drinking water is one of the rare resources that our country is rich with. The production of drinking water, particularly that of bottled water, starts to acquire new scales and qualities in our country. Recently, this sector of the market has been aggravated by competition, new competitors are emerging, which leads to the increase of fitted market level. Nevertheless, we still have an unsettled problem of presenting bottled water in the global market which is especially important in the context of rapid change of situation in the global market. In recent years, the consumption of bottled water has risen by more than 2.4 times in the world from 90 billion liters (1999) to 215 billion liters (2009), and the market volume in terms of money has grown at a much higher rate than in the same period from \$ 22 billion 80 billion dollars, that is, more than 3.6 times. This means that there is a significant price rate increase of drinking water. Accordingly, if in 1999 one liter of bottled water cost \$ 0.25 in average, then 10 years later it was \$ 0.37. By the way, AMD/USD average exchange rate was AMD 135 or USD 0.34 in 2009. In Armenia, the cost of one liter varies between 80 to 240 drams for various containers and for different brands, and the containers of 0.5 liter water are mostly consumed with a value of 100-150 drams (one liter of 200-300 drams or current US dollar (483 AMD/1 USD) 0.41-0.62 USD). It means the price of bottled water in the international markets is almost 1.5-2 times cheaper than the existing prices in the Armenian market. This means that water is sold more expensively in Armenia, a so called "country of waters" from the "international price criteria". Thus, one person in the world consumes 32 liters of bottled water annually in average thus spending money equivalent to \$ 12. In some countries, more than 230 liters of bottled water is shared per capita. Experts estimate that in the coming years the demand for bottled water will continue to grow, as the drinking water problem is exacerbated all over the world and governments are simply unable to overcome these problems.

According to Beverage Marketing Corporation, the largest bottled water market in the world is the United States with a share of about 16%. Generally, North America accounts for 30.3% of global sales. The second largest part is Europe with a share of 28.9%, with 27.1% share in Asia and only 13.7% in the remained parts of the world. Although the developed countries have traditionally been the dictators in the

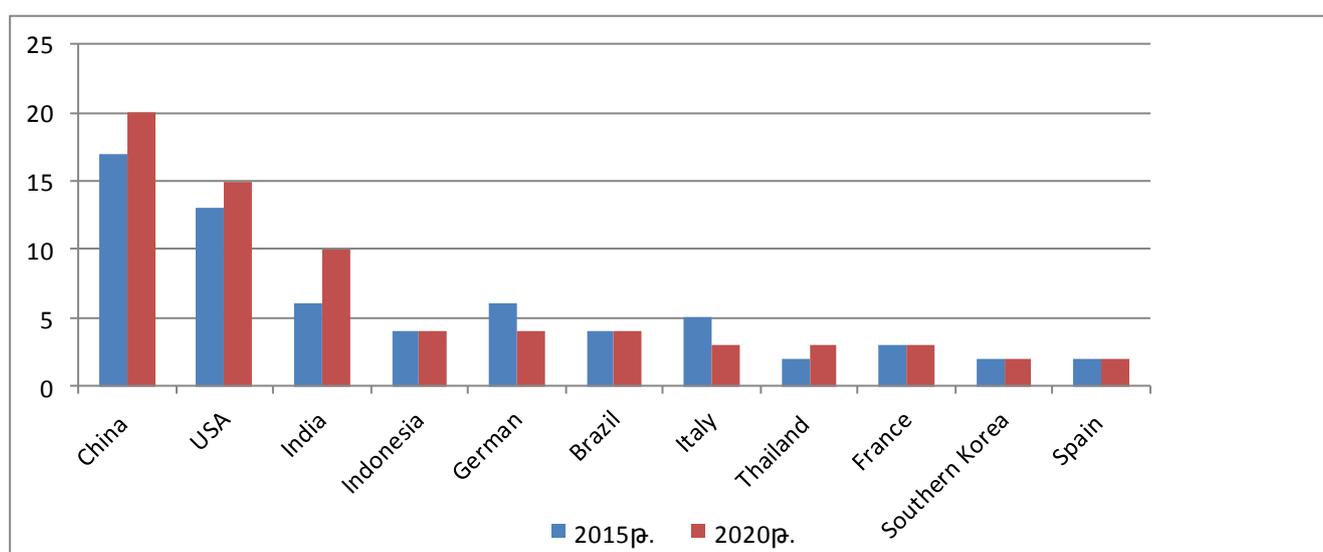
bottled water market, however, the developing countries have begun to say their word over the last decade. Only in 2005-2008 China's demand for this product increased more than twice, the demand of Indonesia grew 1.6 times and that of Mexico 1.5 times over the same period. By the way, the latter is considered to be the world's leader by bottled water consumption in the world, and according to statistical data, the index was more than 230 liters in this country in 2009. Among the leading countries with this rate of the world are the countries of Western Europe - Italy, Belgium, Germany, France and Spain. Bottled water is also consumed much in the Middle East, UAE, Lebanon, Qatar, Saudi Arabia and so on.

Generally speaking, four of the world's six leading countries are the developing countries in the world market share. The surprising fact is Mexico's being in the second place and China's being as "serious ambitious".

And despite the fact that the world's bottled water market changes its geography very quickly, depriving European countries of the "main markets" label, however, 13 of 20 countries which consume the most bottled water per capita in the world are still located here.

The growing interest towards bottled water in the world is shown by the sizes of consumption of bottled water as compared to other drinks. Particularly, according to statistics, in the last decade the consumption of this product was in the second place among the drinks in the largest bottled water market, which is the US, while only ten years ago it was the fifth. Over the years, bottled water has risen over beer, coffee and milk, and now it gives way to only carbonated soft drinks. So, in the US 57 billion liters of carbonated soft drink were consumed in 2000 which made up 28% of all the drinks, and this is in the case when it was only 9% or 18 billion liters. By 2008, consumption of carbonated soft drinks reduced to 53 billion liters, and the consumption of bottled water reached 33 billion liters (about 15 percent of total consumption of beverages). The world's bottled water markets have clearly shaped giants such as Nestle, Danone, Coca-Cola and Pepsi Cola. The latter share over 35% of global turnover together. The leader is Nestle, 12%, the second is Danone with 8.5%. According to expert estimations over the next five years, these multiprofile companies being specialized in food technologies will focus their attention on the issues of water production, which, in its turn, will contribute to the increase of the role and market concentration of these companies in the global market. Totally eight out of ten world's leading brands with their realization capacities are owned by the "Big Quarter", Danone and Nestle owned by 3 each and Coca-Cola and Pepsi Cola owned by 2 each. The top five leading brands which have the largest realization in the world are Aqua (Danone), Pure, Lile (Nestle), Wahaha (Danone) and Aquafina (Pepsi Cola).

Chart 1 shows the countries with the largest sales of bottled water in 2015 and the expected sales of these countries in 2020. According to the data, China will remain the world's leading bottled water sellers by the quantity of the sale which in 2015 provided 17% share of it.

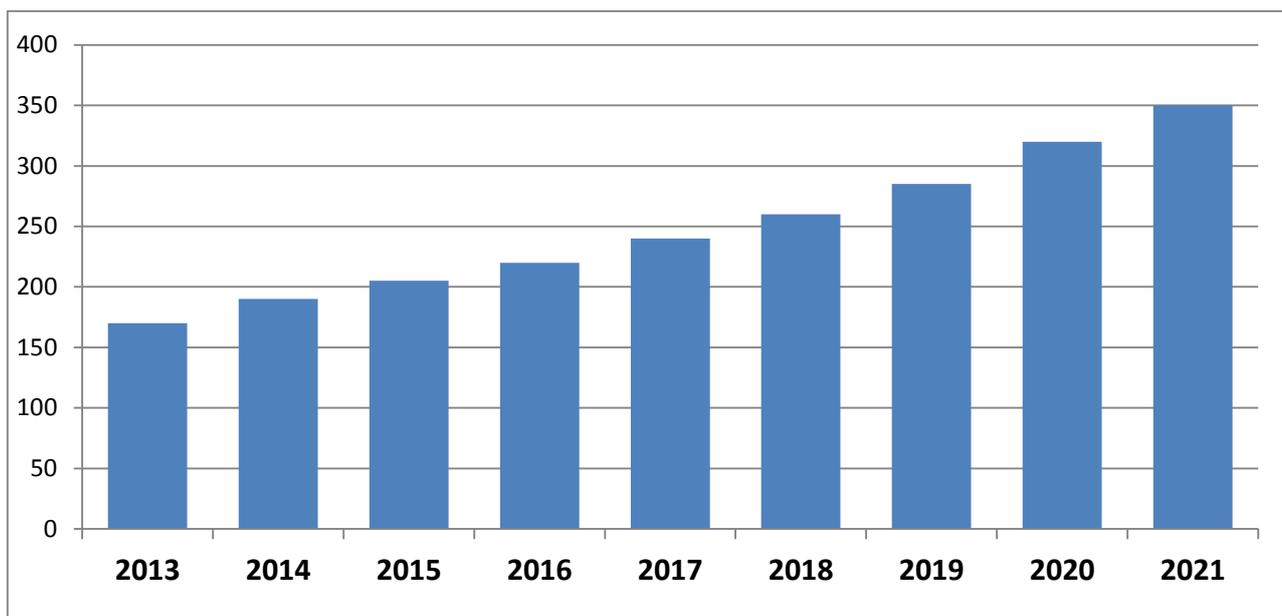


**Chart 1. The countries with the greatest sizes of bottled water sale in 2015 and predictions for 2020 (%)**

Source by <https://www.statista.com/statistics/252208/global-bottled-water-volume-share-by-region/>

According to the results of the study by the Business Research company, in the period of 2014 – 2017 due to the concern which occurred as a result of the threat of consuming the contaminated water the world market of bottled water grew for more than 200 billion USD thus providing 9% increase per year. Besides the concerns connected with the health threats the factor of directed incomes of the population of Asian and Pacific region significantly influenced the increase of the sizes of water consumption as the most bottled water consumers.

The market of bottled water increased in its size by 100 billion liters, and the predictions of the increase for the coming years are greater. Due to the cost of bottled water it is predicted that in 2021 the market will be enlarged up to 350 billion USD (chart 2) which means providing 10% grow per year. Indeed, the grow in size will be a little lower - 9.3% per year. The world consumption of bottled water will also increase reaching in average 45.3 USD in 2021 per capita compared with 32.3 USD in 2017.



**Chart 2. The sizes of world market of bottled water in 2013-2021, billion USD**

Reference <https://blog.marketresearch.com/the-global-bottled-water-market-expert-insights-statistics>

The consumption of bottled water was the largest in Asian and Pacific region in 2017 which comprised 42% of world consumption. This region is the most densely populated where public infrastructures are weakly developed and the availability of pure drinking water is limited. These conditions particularly trouble the consumers and become the reason to find clean drinking water and carry a healthy lifestyle.

The American continent occupies the second by the size of bottled water consumption. The average high price of drinking water sale per liter lead to the region to occupy the first place in the world by the water price.

The world market of bottled water is strictly segmented because of the presence of numerous local producers (bottlers) in the countries. Taking into account the presence of many competitors the companies started to change the outward and design to provide their place and role in market. The purpose of the producers of these brands is to confirm their label and symbol differentiation in bottled water market.

To rise the attraction of the product innovative packaging is used both for processed and raw materials, transparent elegant bottles and paints for designing are used which have a unique visual impact on the consumers. The leading companies in the world market producing bottled waters which are presented in different countries are the following: Danone, Nestle, Coca-Cola and Pepsi-Cola<sup>2</sup>.

<sup>2</sup> See <https://blog.marketresearch.com/the-global-bottled-water-market-expert-insights-statistics>

By the way, by saying «bottled water» we mean both the spring (non carbonated) and mineral (carbonated) waters. Carbonated bottled water has rather small density in general, i.e. only 10% of bottled water is carbonated all over the world. Totally, this ratio is reserved with certain deviations all over the world. However, there are countries where the mineral water is consumed more than world average, the reason of which is the habit of using mineral water during dinner or the low level of water utilization. Such countries are Argentina, Chili, Uruguay, the Netherlands, Germany and Armenia as well [18:382-402].

If we accept that one liter of drinking water exported from the Republic of Armenia can be sold in world market by 0.37 USD (mind that the cost of one liter of drinking water in world market is equal to the cost of one liter of oil which has recently increased significantly and by 2018 October 22 it has comprised 0,5 USD)<sup>3</sup>, then it is easy to notice that the money income (benefit) from the export of one mln liter drinking water (1000 cubic meter) will comprise 370 thousand USD. In case of exporting one mln cubic meter drinking water it is possible to get 370 mln USD, 10 mln cubic meter – 3.7 billion USD which exceeds the exporting size of the RA in 2017 for more than three times. Such amount of water can be taken from Lake Sevan and be exported through pipeline till the Persian Gulf. It is also important to notice that the water amount can be reached the nearby countries by its gravity taking into consideration that the Republic of Armenia has 700 meters higher elevation above sea level according to its geographical position than the countries of the Persian Gulf which will significantly reduce the expences of water transportation. By the way, to realize the mentioned programme it is purposeful to create a consortium on the means of those countries which would like to use the potable waters of the RA as they did in the neighboring country, in Azerbaijan during the export of oil and gas.

It is evident from above mentioned that to manage efficiently the water resources of the RA it is necessary to elaborate a long term purposed project for complex utilization.

Yet in 2000 the demand and the offer of potable water were equalized in world scale and now by progressive demand the disbalance is growing year by year. All these show the importance of water as irreplaceable natural resource. The demand of water increases as time passes and in some territories of the world the collisions between the countries became frequent because of water.

One of the relative and most important advantages of the Republic of Armenia and the region are underground and surface waters. It is enough to mention that 7.5 billion cubic meters water is emerged in the territory of the RA annually (without underground supplies) from which only 2,5 billion is used. The remained amount of that strategic resource, in fact, “is exported” to the neighboring countries with zero cost. All these dictate to have a program for water resources utilization and management in the Republic of Armenia where the activities will be determined and the realization of which makes it possible to reach the effective utilization of water resources.

The expanding of exporting amounts of drinking water from the RA gets special importance in the sphere of water utilization. The drinking water has become one of the important strategic products in abroad (one liter is sold for 0,37 USD at retail price), and the demand is growing on worldwide. It is predicted that in 2011-2012 the world amount of bottled water will reach 440 billion liter or it will increase by 170%.

The effect of water utilization is evident by the following example of economic multiplication as in case of 10 billion liters export we will have 3,7 mln USD income. It will exceed the total income of total amount of 2012 RA export for more than 2,5 times. If the export amount of drinking water from the RA reaches 10 billion liters, then it will comprise from 3,3% to 2,3% of drinking water of world market (in case of demand in 2021). The rapid increase in the amounts of potable waters exported from the RA and among different issues to reach those aims are the inventory of the potential of Armenian drinking water, the exploring of markets, demand marketing, the segmentation of consuming groups and served drinking water type (carbonated or not) and the choice of cartoning size, the signing of long term agreements with trade organizations for drinking

---

<sup>3</sup> See <https://news.yandex.ru/quotes/1006.html>

water sale, the segmentation of market according to shelf life, choice of transportation means (by transport or by pipeline), making arrangements with drinking water bottling companies etc.

While discussing the issues of expanding the export of potable water of Armenia and the ways of stimulating the export the following can be regarded:

- Export according to currently working conditions and projects.
- Export by isothermic – isobar tank wagons. This practice worked during previous Soviet Union period when Armenian mineral waters were transported from Armenia by isothermic – isobar tank wagons (60 tonnes capacities) and were bottled in Mitishchi soft drinks factory. We should notice as well that in European part of Russia there are no drinking mineral waters, so Armenian mineral waters will have great demand in Russian Federation especially in large metallurgic organizations where the workers lose the minerals out of their organisms.
- To extract the minerals from the mineral waters and export. The technology of extracting the minerals was used in neighboring Georgia according to which the mineral water drops on a disk rolling with great speed from above and from the «meeting» of the water drop and the disk the water drops are «spread» into thousands of particles, and in high temperature the water evaporates, the minerals existing in the water «stay» on the floor of the instrument like dust. The obtained dust can be solved in the water in the places of consumption or utilization and can be used for drinking or for medical bathing. The extracting of minerals is noted by its high efficiency as from 0,5 liters of mineral water we obtain 3-5 grams minerals. Besides, to transfer the mineral waters with glass bottles the trains are needed, and it is not economically profitable for more than 660 km distance.
- Armenian drinking waters can be reached to consumption market through pipelines. By this means the transported waters from the RA to Arabic countries can reach the consumers with more quantity thus organizing its bottling at site. In every case the choice of this or that way of exporting should be justified by appropriate professional calculations.

The amounts of sweet waters of Lake Sevan guarantee that the RA is able to provide large amount of exported waters making the water one of the utmost products of export and an important way of solving RA social economic issues.

### Conclusion

The study done shows that the resources of drinking water are one of the comparative advantages of the Republic of Armenia having vital importance even now and their importance will be enhanced further on both in terms of satisfying the vital needs of the population of Armenia and from exporting perspectives. It is also evident that the demand for drinking water is increasing in the global market day by day raising its value. This circumstance makes it possible for Armenia to export its drinking water to the world market, and the money profit from it can exceed the amount of funds received from the export of Armenia nowadays. For that purpose it is proposed to elaborate a complex water resource utilization program of the Republic of Armenia which will lead to the increase of the efficient utilization of existing water resources and strengthen of the Republic.

### References

1. The Changing Wealth of Nations 2018. Building a Sustainable Future.  
<https://openknowledge.worldbank.org/handle/10986/29001>
2. ՀՀ Ազգային վիճակագրական կոմիտեի պաշտոնական՝ [www.armstat.am](http://www.armstat.am) կայքում վիճակագրական ցուցանիշների ժամանակագրական շարքեր. <https://www.armstat.am/am/?nid=12>
3. Оганян К.О. Реки и озера Армянской ССР, Ереван, 1961, 160 с.
4. Советский Союз. Географическое описание в 22 томах, т. Армения, М., 1966, 342 с.
5. Баграмян Г.А., Повышение эффективности комплексного использования водных ресурсов Армянской ССР, Ереван, 1973, 214 с.

6. Подземные воды СССР, обзор подземных вод Армянской ССР, т. 1, 1980, 160 с.
7. Экономические вопросы использования водных ресурсов Армянской ССР (материалы научно-технического совещания), Ереван, 1975, 280 с.
8. Комплексная программа НТП СССР на 1986-2005гг., М., 1983, 1820 с.
9. Ресурсы поверхностных и подземных вод, их использование и качество, Л., 1986, 488 с.
10. Армянская советская энциклопедия, т. Советакан Айастан, Ереван, 1987, 752 с.
11. Аветисян В.А., Давтян Д.Е., Животворные подземные воды, Ереван, 1987, 220 с.
12. Մովսիսյան Վ. «Հայաստանի Հանրապետության ջրային պաշարների կանխատեսումը, գնահատումը և համալիր կառավարումը», Եր., «Գիտություն» հրատարակչություն, 2003թ., 206 էջ:
13. «Հայաստանի Հանրապետության սոցիալ-տնտեսական վիճակը 2018 թվականի հունվարին», Եր., ՀՀ վիճակագրական կոմիտե, 2018թ., [www.armstat.am](http://www.armstat.am)
14. Չիլինգարյան Լ.Ա., Մնացականյան Բ.Պ., Աղաբաբյան Կ.Ա., Թոքմաջյան Հ.Վ. «Հայաստանի գետերի ու լճերի ջրագրությունը», Ջրային հիմնահարցերի և հիդրոտեխնիկայի ինստիտուտ, Ագրոպրես ՊՓԲԸ, Երևան, 2002թ., 47 էջ:
15. «Հայաստանի Հանրապետության ջրային տնտեսության համակարգի բարեփոխումների ու զարգացման մասին ՀՀ կառավարության որոշումներ և ծրագրեր», Երևան, մայիս 2001թ.:
16. Հայաստանի վիճակագրական տարեգիրք», Եր., ՀՀ ԱՎԾ, 2017թ., [www.armstat.am](http://www.armstat.am)
17. Մարկոսյան Ա., Մկրտումյան Մ., Թոքմաջյան Հ. «Ջրային ռեսուրսների և ջրային համակարգերի կառավարումը», Եր., ԵրՃՇՊԸ, 2011թ., հատոր I (700 էջ), հատոր II (488 էջ):
18. Սարգսյան Հ., Մարկոսյան Ա. «Հայաստանի տնտեսության վերափոխումները և վերելքի հեռանկարները», Եր., «Ջանգակ» հրատ., 2014թ., 552 էջ:

### References

1. The Changing Wealth of Nations 2018. Building a Sustainable Future. <https://openknowledge.worldbank.org/handle/10986/29001>
2. Chronological lines of statistical indexes in the official [www.armstat.am](http://www.armstat.am) website of the National Statistical committee of the RA . <https://www.armstat.am/am/?nid=12>
3. Ohanyan K.O., The rivers and lakes of the Armenian SSR, Yerevan, 1961, 160 p.
4. Soviet Union. The Geographic description in 22 volumes, vol. Armenia, Moscow, 1966, 342 p.
5. Baghranyan G.A., Enhancing the efficiency of complex utilization of water resources of the Armenian SSR, Yerevan, 1973, 214 p.
6. Underground waters of the USSR, observation of underground waters of Armenian SSR, vol. 1, 1980, 160 p.
7. The economic issues of utilization of water resources of Armenian SSR (materials of scientific-technical meeting), Yerevan, 1975, 280 p.
8. Complex program of STP USSR of 1986-2005, M., 1983, 1820 p.
9. Resources of underground and surface waters, their utilization and quality, L., 1986, 488 p.
10. Armenian Soviet encyclopedia, vol. Sovetakan Hayastan, Yerevan, 1987, 752 p.
11. Avetisyan V.A., Davtyan D.E., Lively underground waters, Yerevan, 1987, 220 p.
12. Movsisyan V., «The prediction, estimation and complex management of water resources of the Republic of Armenia», Yerevan, «Science» publishing house, 2003, p. 206.
13. «The social - economic situation of the Republic of Armenia in January, 2018», Yerevan, the Statistical committee of the RA, 2018, [www.armstat.am](http://www.armstat.am)
14. Chilingaryan L.A., Mnatsakanyan B.P., Aghababyan K.A., Tokmajyan H.V., «The hydrography of

the rivers and lakes of Armenia», the Institute of water issues and hydrotechnics, Agropress SCSJC, Yerevan, 2002, 47 p.

15. «RA Government Decisions and programs on the development and reforms of water economy system of the Republic of Armenia», Yerevan, May, 2001.

16. «The statistical annual of Armenia», Yerevan, RA NSS, 2017, [www.armstat.am](http://www.armstat.am)

17. Markosyan A., Mkrtumyan M., Tokmajyan H., «Water resource and water systems management», Yerevan, YSUAC, 2011, vol. I (p. 700), vol. II (p. 488).

18. Sargsyan H., Markosyan A., «The reforms of economy of Armenia and the perspectives of its development», Yerevan, «Zangak» publishing house, 2014, p. 552.

## **ՀԱՅԱՍՏԱՆԻ ՀԱՆՐԱՊԵՏՈՒԹՅԱՆ ՋՐԱՅԻՆ ՌԵՍՈՒՐՍՆԵՐԸ ԵՎ ԽՄԵԼՈՒ ՋՐԻ ԱՐՏԱՀԱՆՄԱՆ ՀՆԱՐԱՎՈՐՈՒԹՅՈՒՆՆԵՐԸ**

**Ա.Խ. Մարկոսյան<sup>1</sup>, Է.Ն. Մաթևոսյան<sup>2</sup>, Կ.Ա. Ներսիսյան<sup>1</sup>, Լ.Վ.Թոքմաձյան<sup>3</sup>**

<sup>1</sup> Շուշինի տեխնոլոգիական համալսարան

<sup>2</sup> Երևանի պետական համալսարան

<sup>3</sup> Հայաստանի ազգային պոլիտեխնիկական համալսարան

Սոցիալ-տնտեսական զարգացմանը նպաստող արտադրության գործոններից բացի, կարևոր է նաև տնտեսական շրջանառության մեջ ընդգրկել բնական պաշարները (այդ թվում՝ ջրային) և այդ նպատակով ստեղծել պայմաններ, որոնք կնպաստեն բնական ռեսուրսների արդյունավետ օգտագործմանն ու կառավարմանը: Եվս մեկ կարևոր խնդիր է ՀՀ ջրային ռեսուրսների օգտագործումը կազմակերպել ելնելով երկրի տնտեսական շահերից:

Ինչպես տնտեսական առաջընթացի, այնպես էլ բնակչության կենսամակարդակի բարձրացման գործում երկրի հիմնական ուղին արտադրության գործոնների ավելացումն է, որը Հայաստանի Հանրապետության նման բաց և փոքր տնտեսություն ունեցող երկրում զգալիորեն կախված է արտահանման ծավալների ավելացումից ու երկրի համեմատական առավելությունների օգտագործումից:

Հեղինակների կողմից կատարված ուսումնասիրությունը վկայում է, որ ՀՀ համեմատական առավելություններից են խմելու ջրի պաշարները, որոնք համաշխարհային շուկայում օրեցօր ավելի են արժևորվում: Այս հանգամանքը նոր հնարավորություններ է ստեղծում ՀՀ համար՝ խմելու ջուրը համաշխարհային շուկա արտահանելու և արտահանումից ստացվող միջոցներն ավելացնելու տեսանկյունից:

**Բանալի բառեր.** ազգային հարստություն, ջրային ռեսուրսներ, ջրառ, ջրօգտագործում, ջրային ռեսուրսների կորուստներ, խմելու ջուր, շալցված ջուր, արտահանում, համեմատական առավելություն:

## **ВОДНЫЕ РЕСУРСЫ РЕСПУБЛИКИ АРМЕНИЯ И ВОЗМОЖНОСТИ ЭКСПОРТИРОВАНИЯ ПИТЬЕВОЙ ВОДЫ**

**А.Х. Маркосян<sup>1</sup>, Э.Н. Матевосян<sup>2</sup>, К.А. Нерсисян<sup>1</sup>, Л.В.Токмаджян<sup>3</sup>**

<sup>1</sup> Шушинский технологический университет

<sup>2</sup> Ереванский государственный университет

<sup>3</sup> Армянский национальный политехнический университет

Помимо факторов производства, способствующих социально-экономическому развитию, очень важно также включать в экономический оборот природные ресурсы (в том числе - водные) и создавать

условия, которые будут способствовать эффективному использованию и управлению природными ресурсами. Еще одна важная проблема - использование водных ресурсов в Армении с учетом экономических интересов страны.

Эффективное использование производственных факторов способствует экономическому росту и повышению уровня жизни населения, однако очень важным направлением является увеличение объемов экспорта и использование сравнительных преимуществ страны, в частности такой страны, которая обладает открытой и малой экономикой.

Исследование авторов статьи показывает, что ресурсы питьевой воды являются сравнительным преимуществом Армении, а питьевая вода с каждым днём все больше ценится на мировом рынке. Это обстоятельство создает новые возможности для Армении в плане экспорта питьевой воды на мировой рынок, увеличения объемов экспорта и доходов, получаемых от экспорта питьевой воды.

**Ключевые слова:** национальное богатство, водные ресурсы, водозабор, водопользование, потери водных ресурсов, питьевая вода, бутилированная вода, экспорт, сравнительные преимущества.

Ներկայացվել է՝ 22.08.2018թ.

Գրախոսման է ուղարկվել՝ 30.08.2018թ.

Երաշխավորվել է տպագրման՝ 22.11.2018թ.

## GROUNDWATER DEPLETION OF THE ARARAT ARTESIAN BASIN

**G. A. Torosyan**

*Ministry of Energy Infrastructures and Natural Resources of the Republic of Armenia*

---

*Underground waters along with the surface waters form the main water resources of Armenia. At the same time, the underground waters with their characteristics of formation, origin, transportation, dumping and accumulation greatly differ from surface waters. Today the supply of underground waters for water utilization doesn't differ much by its character from surface water providing. Providing of too much underground water utilization in Ararat artesian basin without estimation of water resources and permissible recession and water intake determination led to the exhaustion of underground water supplies, the fountaining zone reduction, decrease of spring cost and drainage. To solve the problem it is supposed to reduce the permissions for water utilization, to reduce and regulate water intake and to restimate the utilization resources.*

**Key words:** *Ararat artesian basin, groundwater, depletion, resource*

### **Introduction**

Since the beginning of 2000 the centralized and massive utilization of Ararat artesian underground waters had started especially with their fountaining component through providing water utilization permits. It was realized without the estimation of underground resources and water intake measurements. It seemed that the water is allowed to be utilized not from the entrails but from an open reservoir. It means you can take as much as you want.

Such situation was created due to the ignoring the scientifically and legally justified circumstance of underground water as useful mineral and that their production is not regarded as exploitation of underground water mines which is fixed in RA Law of entrails and professional literature.

### **Conflict setting**

Groundwaters together with surface waters form the main water resources of our country. At the same time the underground waters with their characteristics of formation, origin, transportation, dumping and accumulation greatly differ from surface waters. Today the providing of underground waters for water use doesn't differ much from the use of surface water by its character. In both cases, the same prerequisites are applied and the unique status of groundwater which is its being a mineral is never taken into account.

At present, water use issues of groundwater resources are regulated only by the RA Water Code. Under the same law, their location (mine site) before providing them with groundwater resources (mine) is not considered as mine and does not address geological exploration and inventory issues. Their implementation is a compulsory legislative requirement [1].

At present the issues of providing water utilization of groundwater resources are regulated by only the RA Water Code. By this Code the site of underground water resources (minerals) is not considered as mine (the place of entrail) before they are provided for water utilization and the issues on geological research and water supply estimation are not regulated. Doing these tasks is a legislative inquiry [1].

The current tragic situation of Ararat artesian reservoir occurred since the realization of massive water utilization permits (easily available water) on the basis of the Water Code of the RA thus ignoring the legal acts of the RA. On the basis of the latter the permitted water intake was realized which exceeded the reasonable limits (much water). The fountaining of the water (easily pumping water), low temperature 13-14 C<sup>0</sup> (good water) and the low cost of its natural use (cheap water) which

is currently 0,5 drams for 1 cubic meter but before it was cheaper for 5 lumas were the reasons of reducing the level of pressure waters and gradual reduction and drainage of all the previous intake constructions (springs, wells). These facts evidently witness that the runoff components in groundwater balance of Ararat artesian basin (expences and intake) began to exceed the income components (feeding), i.e. the natural resources. In this case not only the renewable resources but also the static supplies are being used. The actual capacity excess takes place over the permitted water intake and there is exhaustion of water horizons. The latest circumstance led to the reduction of national water supply capacity which is legally forbidden.

### Research results

The exploitative sweet groundwater resources of Ararat artesian water basin (up to 1 g/l mineralization) were last estimated and confirmed in 1984 (Protocol N 9475 ΓK3 CCCP since 25 april 1984) [2] and comprised 70 m<sup>3</sup>/sec (2,2 billion m<sup>3</sup>/year) from which 22 m<sup>3</sup>/sec (0,7 billion m<sup>3</sup>/year) was used for water intake of spring groups and 48 m<sup>3</sup>/sec (1,5 billion m<sup>3</sup>/year) for well water intake. The exploitative supplies were estimated for limitless period of time and by working 1455 exploitative wells. At the same time the drilling of each well will reduce its water resources and it will be necessary to realize reestimation of the resources which is pointed out in the 2.8 point of the above mentioned protocole.

According to the admitted viewpoint (literature, regulations, instructions), the exploitative supplies of groundwater are the supplies, which, accounting the ecological needs, can be taken from the mine site in the case of accepted regime of exploitation with technically and economically estimated pumping structures thus preserving water quantity and quality during all the period of water utilization calculations. If we follow the logics of this concept, then it was not to be a depletion of Ararat artesian basin water resources by exporting 1,5 billion cubic meters water with 1455 water well holes keeping at the same time the expences of natural springs.

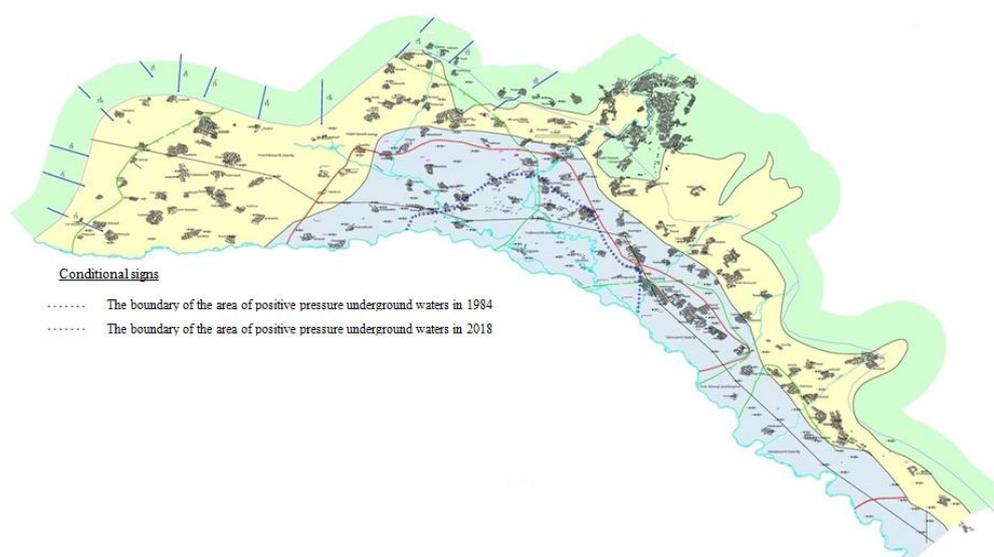
However, new well holes began to be opened with new operation since 1990 and especially 2000 and in 2016 [3] about 1795 well holes were operating for the purpose of exploitation with 64 m<sup>3</sup>/sec or 2 billion m<sup>3</sup> total capacity. The production of water for more than 500 million cubic meter annually from the exploitative supplies confirmed for well holes led to current tragic situation.

As a result the fountaining zone in Ararat artesian basin reduced up to three times and almost all springs were dried the constant expense of which comprised about 30 m<sup>3</sup>/sec, after which the water levels of underground waters began to reduce gradually, the pressure horizons began to exshaut and the expences of the rivers fed by springs decreased. The surface area of underground waters which have positive pressure reduced by three times reaching from 32760 hectare to 10706, Fig.1 [4]. In 1983 44 communities were situated in the fountaining zone and 60 percent of them fully or partially lost their irrigation or potable household underground water which was received from fountaining well holes [4].

As a result of pressure water level reduction currently a number of springs of Kulibeklu, Aknalich and Taronik groups of the river mouths of the Metsamor have disappeared. From the mentioned spring groups no water flow is noticed in all seasons of the year. If the springs with centralized outcome are dried (example, Taronik, Metsamor museum, Kulibeklu), then in the central parts of previously surface dumping rivers small lakes of 4-5 m depth are noticed currently which serve as natural well holes. With the help of water pumps the waters of these lakes are used for irrigation and technical purposes of water supply with the following quantity: Aknalich - 0.4 m<sup>3</sup>/sec, Armenian nuclear power station of Taronik group springs (ANPST) – 0,8 m<sup>3</sup>/sec [3]. In many areas which previously had had positive level of pressure waters currently 0,2-0,5 m below sea level is noticed for them (villages Aratashen, Apaga etc) [4]. In some sections the pressure had dropped to 9 m in the well holes. For example, in the well holes near the village Aknashen in 1971 the height of water fountain comprised 8,3 m, and in 2018 the water level was under the ground of 0,6 meters.

This catastrophic state of Ararat Artesian Basin is the consequence of the massive use of water for fish breeding. In general, Armenian experience is unique in world practice when groundwater is used for industrial fish breeding. Usually groundwaters are used massively for irrigation purposes. However, in all cases, it has resulted in the consumption or decline of water, drainage of groundwater wells and their sources. The examples are numerous: the USA, India, Australia, Saudi Arabia and others [5]. The water horizon of Ohallala of the USA (submarine waterfall horizon of highlands) is a water line stretching from South Dakota to the southern borders of Texas. As a result of irregular irrigation during 60 years the watercourse has completely dried up. Saudi Arabia was a major wheat exporter in the world in the 1980s and 1990s due to the use of groundwater. Today these water courses are completely empty in Saudi Arabia. The US NASA experts have discovered that, due to the short term exploitation, 21 of 37 major US aquifers have reached the critical point of exhaustion.

A typical classical example of the depletion of groundwater resources is the precedent of groundwater depletion and drainage of carbonated waters and cavern springs in Ras Al Ain in the Syrian Khabur River basin. Here groundwater production has taken place without taking into consideration the requirements necessary for their study, reasonable exploitation and maintenance.



**Figure 1. The map of fountaining zone of Ararat artesian groundwater**

There were more than 300 springs till 2000s, among them were 17 powerful voccules and the cost of each fluctuated within 3-7 m<sup>3</sup>/sec. The summative cost of the springs reached up to 45 m<sup>3</sup>/sec - 100 m<sup>3</sup>/sec.

The costs of these springs were constant till 1980 and it was possible to consider them as renewable and natural resources. The lands of Hasake and Der Eir Zore in Syria were irrigated with spring waters. Underground waters has begun to be produced from ten thousand (from about 40 thousand) well holes from the same basin with uncontrollable irrigation purpose. The result was catastrophic and during 20 years the flow of all these drinking springs stopped and they turned into drainless lakes. Afterwords during five years all the lake-springs completely dried up till the bed. Currently the process of underground water depletion is going on and the underground water level recesses for 0,5 m annually.

All the pemiissions for water utilization has been given without hydrological researches and confirming underground waters in Ararat artesian basin since 2000. The principle of scientifically proved and practically applied method and methodology was roughly violated. The sources of feeding and renewing of underground waters, the radiuses of feeding of water intake well holes and their

influences, the interrelated influence among neighboring water intakes, the boundary and edge conditions of pressure water courses, the coefficients of water conductivity and level conductivity and filtration parameters were not determined. It is known that during the exploitation the inflow of non condensing waters happens from neighboring water courses which makes the qualitative characteristics of waters worse. The predictions on water quality changes were not realized. The interactions of different water courses, water intake well holes and also underground and surface waters were not estimated. The exploitation was being done by inefficient schemes of well holes as a result of unfair water utilization.

Important characteristics for underground waters are 1) water amount in water courses 2) water amount which inflows into the water course in natural conditions 3) water amount which can be produced by efficient water intake constructions from the water courses from the technical and economical viewpoint.

So, if for perspective estimation of utilization of other useful minerals, oil and gas only one concept as «useful mineral resource» is enough, then the latter can not completely characterize the opportunities of efficient exploitation of underground waters. That is why in hydrogeology, except for the notion of «underground water supply», the term of «underground water resource» is also used which determines the feeding of water courses. Underground water supplies and resources are subdivided into 1) natural, 2) artificial, 3) inclusive and 4) exploitative.

Under natural (dimensional) resources we understand the gravitation water amount condensed in cracks and pores of watercourse rocks. In no pressure water courses the water amount of fluctuation zone and gravitation water amount situated under the natural level fluctuations are divided which is called regulated supply. The elastic resources are also considered to be the natural resources of pressure courses. By the latter we understand the amount of those waters which is possible to produce during the level reduction on the basis of the elastic properties of rocks and water courses. Natural resources have capacity measurements.

Natural resources (or static resources) - water course which is the water amount occurred as a result of seepage from atmospheric precipitations, water courses above and below the rivers and from the nearby territories in natural conditions. Natural resources are equal to the sum of inflow components of the given water course. They are expressed by cost units.

Artificial resources – the water amount formed as a result of seepage from irrigation in the water course and dams of artificial feeding.

Artificial resources – water amount occurred as a result of filtration losses from irrigated fields, canals, reservoirs and also as a result of artificial feeding.

Inclusive resources – water amount inflowing the water course from neighboring courses and other water bodies.

The estimation of exploitative water resources has the primary significance for installing water intake holes.

The exploitative supplies of underground waters are generally connected with other resources and supplies with the following balance [6]

$$Q_{ex} = \alpha_1 Q_b + \alpha_2 \frac{V_b}{t} + \alpha_3 Q_a + \alpha_4 \frac{V_a}{t} + Q_g$$

where  $Q_{ex}$  – the exploitative resources  $m^3$ /daily,  $Q_n$  and  $Q_a$  – natural and artificial resources correspondingly  $m^3$ /daily,  $V_n$  and  $V_a$  – natural and artificial resources correspondingly  $m^3$ ,  $Q_l$  – inclusive resources,  $m^3$ /daily,  $t$  – time during which the exploitative resources are intended to be,  $\alpha_1, \alpha_2, \alpha_3, \alpha_4$  – the coefficients of correspondingly natural resources, natural supplies, artificial resources and artificial supplies.

Experts have different opinions about the concept of groundwater depletion. This issue is not discussed here, but, in my opinion, it is necessary to distinguish two notions: (1) underground water depletion and (2) the depletion of the exploitative underground waters.

By saying underground water depletion all the cases connected with the reduction of natural and/or artificial resources should be understood which are connected with the exceeding of water costs to feeding. The reason for groundwater depletion can become the change of feeding conditions and groundwater exploitation.

By saying the depletion of exploitative underground water resources the case should be understood when the production exceeds the estimated exploitative resources.

The indicator of groundwater depletion is a continuous level reduction process that leads to a reduction in natural resources (gravitation - non-pressure horizons and elastic-pressure horizons). An important role in groundwater depletion is devoted to the intake and drainage structures.

Until now we have no response to the question what resources the groundwater supplies that are extracted in Ararat artesian basin are provided by. If we follow the structure of the formula, we will assume that the exploitative resources of fountaining zone are formed according to the elastic resources. The latter are not classified as resources and do not have the ability to recover. In the water course horizons the elastic regime of groundwaters is formed according to water and rock compression. Its dynamics is very complex and depends on many factors. In case of exploitation of elastic supplies by unlimited time it will definitely be exhausted.

In Ararat artesian basin only the fountaining component (which is economically profitable) is exploited from the elastic resources. In this case if  $t \dots \neq \infty$ , then the second member of the balance formula will become zero and thereby the fountain waters will be consumed.

When this unlimited time will come it is still unknown. However, it is already clear that we have entered a time period that leads to the consumption of fountaining water resources. The vivid evidence of this is the fact that the fountaining has stopped in one third of the well hole fountaining area. Still it is not clear what time period is needed to obtain a certain elastic regime in a particular water horizon. For example, theoretically how much time will be needed after dewatering Ararat artesian basin to renew or restart the undisturbed regime with all its criteria.

At the beginning of 1980s studies to determine the age of groundwater circulation were conducted in Sevan basin in Armenia [7]. The method of isotope exposure (hydrogen isotope -D, oxygen isotope -  $O^{18}$ , carbon isotope -  $C^{14}$  and helium) has been applied. The Artesian basin of Sarukhan is situated in the basin of Lake Sevan which is very similar to Ararat artesian basin with its hydrogeological structure, origin and chemical composition of waters. By the results of isotopic research the age of groundwater circulation in Sarukhan's artesian basin pressure horizons has been estimated for about 500 years. This means that water pressure in the pressure horizons occurs during 500 years. Sweet water of 14000 years has also been encountered in Sarukhan basin.

Comparing Sarukhan and Ararat artesian basins, it can be stated that the recovery of undisturbed water regime of Ararat artesian basin will take at least 500 years.

The water course rocks of Ararat artesian basin (intermountain fields) have high water conductivity and involvement of dumping water to the depression zone during the exploitation of water intake structures. The depression funnel is about 530 square kilometers only in Armenia [3].

Generally, for estimation the exploitative resources of artesian basins the value of the module of groundwater exploitative resources is an important criterion<sup>\*1</sup>. This criterion also serves as a

---

<sup>1</sup> By the module of the exploitative water resources we understand water cost l/sec which is possible to get out from 1 sq/m water surfac  
bulletin.am

specific indicator. That is to say, its dimension if reaches a certain unacceptable, disturbing limit during operation will be disconnected between the hydraulic capacity and exploitation of the water.

According to these conclusions, let's see how Ararat artesian groundwater exploitation was changed from 1980 to 2018. In 1980 it was 40 l/sec km<sup>2</sup> [6] and in 2000-2010 it was 60 l/sec. km<sup>2</sup> reaching 1000 l/sec. km<sup>2</sup> at some territories. This means that groundwater extraction has increased from 1.5 to 50 times in 35 years. Since the increase was only due to natural (elastic) resources of fountain waters, it is evident that only natural resources are involved in the formation of exploitation supplies. In this case, the depletion of exploitation resources is taking place.

### Conclusions

1. The renewing natural (dynamic) resources of Ararat artesian basin are consumed. It does not manage to renew. It is not known how long the undisturbed regime will continue. It is a complicated task still unsolved. It can take hundreds and thousands years.

2. The water intake is realized due to natural (static) resources from Ararat artesian basin which is constantly decreasing. Because of complicated geological structure no researcher and research group could manage to estimate correctly the size of the supply of the exploitative resources of Ararat artesian basin.

3. The depletion of water courses of Ararat artesian basin takes place.

4. The permission of any new water intake by geometric progression order will fasten the process of depletion of water courses and decrease of water supplies.

5. The groundwater supplies of Ararat artesian basin were last estimated in 1983. 40 years have passed. According to the Soviet Period rules and regulations the supplies were confirmed for 25 years term [8]. Afterwards it was necessary to reestimate those supplies: the same is required by RA Government 2012 November 22 №1480-N decision. According to the last decision the supplies should be reestimated in case if there is a change in hydrological and ecological situation (all the springs were dried up and the fountaining zones and waters had been reduced).

6. All the data concerning the water supplies of Ararat artesian basin are outdated and their citing is professionally wrong. Now the Ararat artesian basin is not the same that has been 40 years before, all the hydrological and ecological parameters have been distorted.

7. It is confirmed in all the previous and current regulations that new water intake is not permitted if it is already being done. The water supply reestimation should newly be done.

8. For the purpose of fishing industry or irrigation in the case of new well holes and new water intake the expences of water supply well holes for many settlements and objects will decrease or they will dry up. By this stage the depletion process of not fountaining pressure water courses will start. The new, unsecured water intake on the bank of the Metsamor (Sev Jur) will lead to the drying of the Metsamor which has natural flow.

9. The current capacity of underground water supplies of Ararat artesian basin is obvious. Now there is not so much water to provide the operation of those well holes.

10. It is necessary to stop the permissions of new water intake and to regulate the current water intake if we don't want to lose the remaining water resources in Ararat artesian basin. After it will be late. Our next generation will say – They seemed to think about only fish eating.

### References

1. ՀՀ Ընդերքի մասին օրենսգիրք: ՀՀ կառավարության 2012 թվականի նոյեմբերի 22-ի №1480-Ն որոշում: <http://www.arlis.am/>

2. Отчет по переоценке эксплуатационных запасов подземных пресных вод араратского артезианского бассейна Армянской ССР по состоянию на 30.09.1983г. С. Паноян и др. Книга 1.( ի ս վ .N 01532)

[https://www.geo\\_fund.am/hy/?year\\_from=&year\\_to=&inventory\\_number=01532&author=&query=#reports](https://www.geo_fund.am/hy/?year_from=&year_to=&inventory_number=01532&author=&query=#reports)

3. Արարատյան դաշտի հորատանցքերի, բնական աղբյուրների և ձկնային տնտեսությունների գույքագրման և հաշվառման վերջնական հաշվետվություն: (USAID, 2016 թ.) Գիտական առաջադեմ տեխնոլոգիաների օգտագործում և համագործակցություն հանուն ռեսուրսների համալիր պահպանության ծրագիր <http://www.aspired.wadi-mea.com/hy/?mdocs-cat=mdocs-cat-3>

4. «Մաքուր էներգիա և ջուր» ծրագիր շրջանակներում իրականացված «Արարատյան դաշտի ստորերկրյա ջրային ռեսուրսների գնահատում» ուսումնասիրության վերջնական հաշվետվություն, USAID, 2013 թ. <http://www.aspired.wadi-mea.com/hy/?mdocs-cat=mdocs-cat-3>

5. Աղինյան Ա. Երևանի և մերձակա բնակավայրերի խմելու ջրամատակարարման հիմնախնդիրները: Կիրառական երկրաբանության և աշխարհագրության արդի հիմնահարցերը: ԵՊՀ ժողովածու: Երևան – 2011. Էջ 41-43)

6. Истощение запасов подземных вод подвергает риску большинство крупнейших водоносных горизонтов мира. Брет Уалтон. <http://www.cawater-info.net/news/world-water-news/groundwater-depletion.htm>

7. Гидрогеологические основы охраны подземных вод. Том 1. Глава 3. Охрана подземных вод от истощения. Москва - 1984. Стр. 126 -158.

8. .Отчет о региональной оценке эксплуатационных ресурсов пресных вод бассейна озера Севан по состоянию на 1.07. 1985.г. Б. Боровский, В. Поляков и др. Том 1. Книга 3 ( Ի Ա Վ .N 4457) [https://www.geo-fund.am/hy?year\\_from=&year\\_to=&inventory\\_number=4457&author=&query=#reports](https://www.geo-fund.am/hy?year_from=&year_to=&inventory_number=4457&author=&query=#reports)

9. Инструкция по применению классификации эксплуатационных запасов подземных вод к месторождениям пресных подземных вод (утв. ГКЗ СССР 03.09.1976), М.: 1978г.

## References

1. Code of RA Entrails. RA Government 2012 November 22 №1480-N decision. <http://www.arlis.am/>

2. Report on restimation of exploitative resources of underground drinking waters of Ararat artesian basin of the Armenian SSR by 30.09.1983. S. Panosyan and others, Book 1 (inv. N 01532). [https://www.geo\\_fund.am/hy/?year\\_from=&year\\_to=&inventory\\_number=01532&author=&query=#reports](https://www.geo_fund.am/hy/?year_from=&year_to=&inventory_number=01532&author=&query=#reports)

3. The final report and inventory of well holes, natural springs and fish industry of Ararat valley (USAID). Application of the advanced scientific technologies and the cooperation of complex reservation programme of resources. <http://www.aspired.wadi-mea.com/hy/?mdocs-cat=mdocs-cat-3>

4. The final report on the research of «Estimation of underground water resources of Ararat valley» within the framework of the programe «Clean water and energy», USAID, 2013. <http://www.aspired.wadi-mea.com/hy/?mdocs-cat=mdocs-cat-3>

5. Aghinyan A. The issues of drinking water supply of Yerevan and nearby settlements. The current issues of applied geology and geography. Bulletin of YSU. Yerevan, 2011, p. 41 - 43.

6. The depletion of underground water resources puts most of the water courses of the world at risk. Bret Walton. <http://www.cawater-info.net/news/world-water-news/groundwater-depletion.htm>

7. Hydrological bases of underground waters preservation. Vol. 1. Chapter 3. Preservation of underground waters from depletion. Moscow, 1985, p. 126-158.

8. Report on regional estimation of exploitative resources of drinking waters of Sevan basin on 1.07. 1985. B. Borevskiy, V. Polyakov and others, Vol. 1, Book 3 (inv. N 4457). [https://www.geofund.am/hy?year\\_from=&year\\_to=&inventory\\_number=4457&author=&query=#reports](https://www.geofund.am/hy?year_from=&year_to=&inventory_number=4457&author=&query=#reports)

9. Instructions on the classification of exploitative resources of underground waters with the origin of drinking underground waters (conf. ГК3 СССР 03.09.1976), M., 1978.

## ԱՐԱՐԱՏՅԱՆ ԱՐՏԵԶՅԱՆ ԱՎԱԶԱՆԻ ԱՏՈՐԵՐԿՐՅԱ ՋՐԵՐԻ ՀՅՈՒԹՈՒՄԸ

### Գ.Ա. Թորոսյան

*ՀՀ էներգետիկ ենթակառուցվածքների և բնական պաշարների նախարարություն*

Ստորերկրյա ջրերը, մակերևույթային ջրերի հետ միասին ձևավորում են Հայաստանի հիմնական ջրային ռեսուրսները: Միաժամանակ ստորերկրյա ջրերը իրենց ձևավորման, առաջացման, տեղափոխման, բեռնաթափման և կուտակման առանձնահատկություններով խիստ տարբերվում են մակերևույթային ջրերից: Այսօր ջրօգտագործման համար ստորերկրյա ջրային ռեսուրսների տրամադրումը օգտագործման իր բնույթով չի տարբերվում մակերևույթային ջրերի տրամադրումից: Արարատյան արտեզյան ավազանում ստորերկրյա ջրերի ջրօգտագործման չափազանց շատ թույլտվությունների տրամադրումն, առանց ստորերկրյա ջրերի պաշարների գնահատման և թույլատրելի իջեցման ու ջրառի չափի որոշման հանգեցրել է ստորերկրյա ջրերի պաշարների հյուծմանը, շատրվանող գոտու փոքրացմանը, աղբյուրների ծախսի նվազմանը և չորացմանը: Հարցի լուծման համար առաջարկվում է կրճատել ջրօգտագործման թույլտվությունների տրամադրումը, կրճատել և կանոնակարգել ջրառը, իրականացնել շահագործական պաշարների վերագնահատում:

**Բանալի բառեր.** Արարատյան արտեզյան ավազան, ստորերկրյա ջուր, հյուծում, պաշար:

## ИСТОЩЕНИЕ ПОДЗЕМНЫХ ВОД АРАРАТСКОГО АРТЕЗИАНСКОГО БАСЕЙНА

### Г.А. Торосян

*Министерство энергетических инфраструктур и природных ресурсов РА*

Вместе с поверхностными водами подземные воды составляют основные водные ресурсы Армении. Одновременно, подземные воды со своим формированием, образованием, транзитом, разгрузкой и аккумуляцией строго различаются с поверхностными водами. Сегодня процесс выдачи разрешений на водопользование для подземных вод по своему характеру не различается от выдачи разрешений на пользование поверхностных вод. Предоставление чрезмерно много разрешений водопользования подземных вод Араратского артезианского бассейна, без подсчета запасов и определений допустимых норм водозабора и понижения, привели к

истощению запасов подземных вод, уменьшению фонтанирующей зоны, понижению расходов родников и засухению. Для разрешения проблемы предлагается уменьшить предоставления разрешения на водопользование, сократить и регулировать водозабор, осуществить переоценку эксплуатационных вод.

**Ключевые слова:** Араратский артезианский бассейн, подземная вода, стошение, ресурсы.

Ներկայացվել է՝ 04.09.2018թ.

Գրախոսման է ուղարկվել՝ 12.09.2018թ.

Երաշխավորվել է տպագրման՝ 15.11.2018թ.

## CHANGE IN THE REPUBLIC OF ARMENIA WATER RESOURCES DUE TO GLOBAL CLIMATE CHANGE

**V. H. Tokmajyan<sup>1</sup>, V.A. Aleksanyan<sup>1</sup>, G.S. Gabayan<sup>2</sup>, S. Sh. Nurijanyan<sup>2</sup>**

<sup>1</sup> *Shushi University of Technolog*

<sup>2</sup> *«Hydroenergetica» LTD*

*The impact of global climate change on the planet is already noticeable today. In recent years, many disasters occurring in different regions are one of his evidence. Climate change will primarily affect water resources. This article assesses the key elements of water balance that depend on global climate change in the Republic of Armenia. According to prognoses, it is expected that in the near perspective, already by 2030, the precipitation in Armenia will decrease by 2.6%; evaporation will increase by 0.95%; flow will decrease by 3.1%; and the country's water resources will decrease by 0.6 billion m<sup>3</sup>, i.e. 8.5%.*

**Key words:** *water resource; global change; water balance; natural flow; trend.*

### **Introduction**

The Republic of Armenia with its area of 30 thousand km<sup>2</sup> occupies the southern part of South Caucasus. Although the country's area is in the north of the subtropical zone, however, due to the mountainous landscape, it is influenced by the air masses from the temperate climatic zone where the western masses are predominating.

The average altitude in Armenia is 1830m above sea level. Although the rivers are short and not deep, however because of the high slopes they have a great hydro-energy potential, a considerable part of which is now already used. The dynamic resources of the river flow being formed in the country, according to the "RA National Water Program", make approximately 6.8 billion m<sup>3</sup> [1].

While the river network in the Republic of Armenia consists of approximately 9,500 small and medium rivers, only 379 of them are 10 and more km long. For a country with such a large number of rivers, Armenia is at the same time a arid country, with annual precipitation of only 620mm.

In the most densely populated sector – Ararat Valley, which has an altitude of 800m-1,000m – the annual total precipitation is around 220mm, while in high mountainous areas it can reach to 1,000mm and higher. A considerable part of rainfall occurs during April and May (about 37% of annual precipitation), while the share of December-February is only 17%, and that of July and August is less than 10%.

### **Impact of global climate change on hydrometeorological factors in the Republic of Armenia.**

Around 47% of the river flow in Armenia is formed from surface waters and 53% from underground waters [4]. River waters are largely used in different industries, especially in agriculture, where 76% of the total water withdrawal is used for irrigation purposes only [3].

Water resources are used also for utility-household and industrial supply, hydraulic energy, fishery and recreation.

Although Armenia has a very small impact on global greenhouse gas emission, however the living standards of the population, economic productivity, and the future economic development are in danger. It is a scientifically well grounded fact that climate change takes place and will take place as long as the volume of the greenhouse gases available in the air is larger than the processing capacity of the earth's natural cycles [2,3].

Studies conducted in Armenia over the recent years indicate [5] that, like other regions of the earth, a certain climate change is observed also in Armenia and is expressed by changes in air

temperature and precipitation, which in turn have their impact especially on river flow and its yearly distribution.

### Conflict setting

These hydro-meteorological changes will be more obvious during the 21<sup>st</sup> century. As the studies conducted in the country have shown, according to the high greenhouse gas emission scenario, with only a few exceptions, most dry areas in Armenia will lose a considerable part of their precipitation due to the climate change, while the annual precipitation will increase to some extent in the rainiest areas.

### Research results

Lower precipitation level and higher temperatures will increase evaporation rates and decrease the snow cover and therefore the flood flow and its surface component in particular. According to the mentioned forecasts, the minimum river flow in Armenia, even though it can increase in some river basins, however will decrease in Armenian rivers in general.

In the Figure, the average annual flow of Gomur river as well as the annual average temperature fluctuation tendencies in the Hrazdan meteorological station located in the Gomur river basin are brought in.

We suggest to use the obtained trend line equations for forecasting the perspective values of these two factors.

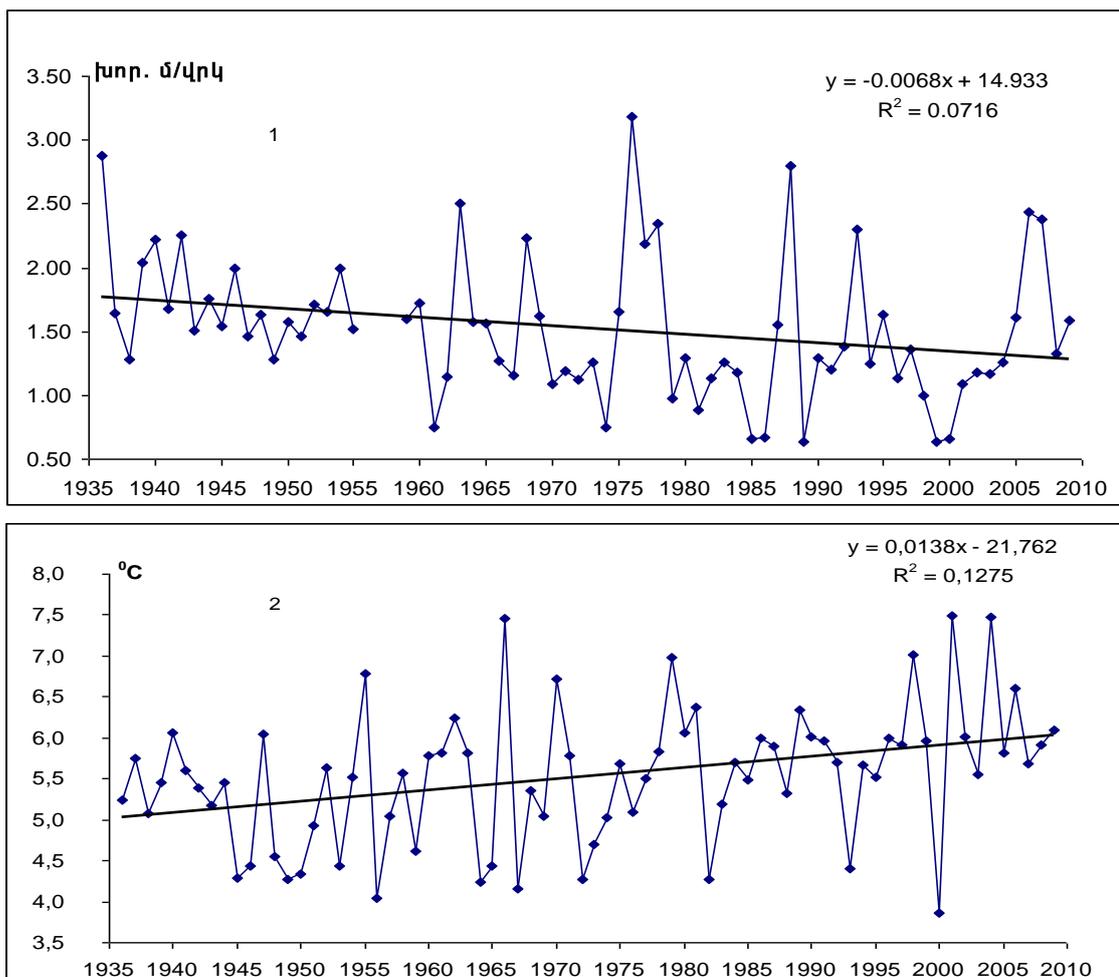


Fig.: Trends of annual flow in Meghradzor water inspection point on Gomur river (1) and Hrazdan meteorological station (2)

In the near future, most probably, the local climatic conditions will change: a warmer heat regime and strong winds are expected which in turn will contribute to the intensification of the evaporation process.

Given that the main feeding source for most of the annual flows of Armenian rivers are thaw and rain waters (for example, 35%-40% of the annual flow of rivers Akhuryan, Arpa, Azat, Hrazdan, and Kasakh is formed from thaw waters), and the forecasts say due to decrease in the winter precipitations and higher temperatures, lower snow cover and consequently decrease in water resource in snow is expected [3], therefore the average annual flow of the above mentioned rivers will decrease.

To assess the trends in the seasonal flow change, particularly in the spring flooding stage and summer-fall water shortage stage (when excess irrigation water is observed in the first case and a deficiency in the second case is observed), as a base we selected a number of small tributaries that have high balanced altitudes. Given that there is water withdrawal from these rivers or only insignificant part of their water is used by industries, then we can admit that the actual flow of those rivers is very close to the natural one and change in their regimes depends mainly the global climate change.

Comparative results of seasonal flow of certain rivers are brought in Table 1.

**Table 1**

**Seasonal flow of a number of rivers with natural flow, %**

River-Inspection point	Watershed		Average seasonal flow before 1980,%		Average seasonal flow during 1981-2010, %		Difference,%	
	Surface, Km <sup>2</sup>	Average altitude, m	III-VI	VII-XI	III-VI	VII-XI	III-VI	VII-XI
Dzoraget- Dzorakert	25.5	2220	66.7	22.6	72.9	20.2	6.2	-2.4
Marmarik-Hankavan	93.5	2430	77.5	16.1	79.7	14.6	2.2	-1.5
Gomur-Meghradzor	101	2430	79.1	16.4	80.6	13.1	1.5	-3.3
Dzknaget-Tsovagyugh	85.0	2220	81.6	13.9	82.1	13.1	0.5	-0.8
Arpa-Jermuk	180	2790	64.6	24.9	61.3	26.2	-3.3	2.0
Meghriget-Lichk	21.0	2950	53.5	41.2	63.3	34.1	9.8	-7.1
Voghji-Kajaran	120	2840	60.2	35.8	61.9	33.8	1.9	-2.0
Dzoraget-Katnarat	140	2320	60.3	30.9	58.0	32.8	-2.3	1.7

The Table shows that the flow of some of the rivers under study has increased in 1981-2010 versus the flow before 1980 during spring floods (III-VI), while during summer-fall shortage stages (VII-XI) it has decreased. In some rivers, given the overall growth in spring flood flow, even further decrease is observed in summer-fall water shortage flow.

**1. Assessment of RA water balance components according to IPCC scenes.**

According to the climate change scenarios suggested by IPCC and base period base period (1961-1990) we have carried out forecasts of the main elements for the water resource balance of Armenia for 2030, 2070 and 2100. The results calculated and obtained through these scenarios indicate that, compared with the base values, the water resources of the country will decrease by 0.6 billion m<sup>3</sup> by 2030, i.e. by 8.5%; by 1,2 billion m<sup>3</sup> by 2070, which will make 18,9% of the total; and by 1,8 billion m<sup>3</sup> by 2100, i.e. 25.4%.

The values of precipitation, evaporation, surface flows and undercurrent in the country according to different climatic scenarios are brought in Table 2.

**Table 2**

**Forecast of the water balance elements in RA by climate change scenarios for 2030, 2070 and 2100**

Climate change scenarios	Precipitation		Evaporation		Surface flow		Undercurrent	
	billion m <sup>3</sup>	mm	billion m <sup>3</sup>	mm	billion m <sup>3</sup>	Mm	billion m <sup>3</sup>	Mm
2030 (air temperature increases by 1.1° C, precipitation P decreases by 3.1 % )								
Base, 1961 - 1990	17.6	592	10.5	352	6.4	215	0.7	22
t + 1.1 °C; P	17.1	575	10.6	357	6.2	208	0.3	10
2070. (air temperature increases by 2.7° C, precipitation P decreases by 5.9 % )								
t + 2.7 °C; P	16.6	558	10.7	360	5.8	195	0.1	3
2100. (air temperature increases by 4.4° C, precipitation P decreases by 8.7 % )								
t + 4.4 °C; P	16.1	540	10.8	362	5.3	178	0	0

- By 2030, evaporation will increase by 0.1 billion m<sup>3</sup>: 0.95%, while precipitation will decrease by 0.5 billion m<sup>3</sup>: 2.84%.
- By 2070, evaporation will increase by 0.2 billion m<sup>3</sup>: 1.91%, while precipitation will decrease by 1.0 billion m<sup>3</sup>: 5.68%.
- By 2100, evaporation will increase by 0.3 billion m<sup>3</sup>: 0.86%, while precipitation will decrease by 1.5 billion m<sup>3</sup>: 8.52%.

Given that, according to forecasts, decrease in precipitation, and, on the opposite, increase in the air temperature meaning also increase in evaporation, is expected in most river basins, it is already necessary to develop measures that will make it possible to mitigate to some extent the expected water deficit in the country.

Studies show that in certain locations of the country the natural conditions will become unfavorable for growing a number of crops caused by increased river flow in spring and decreased flow in summer. In countries like Armenia, where agriculture has a large share in the GDP (with direct agricultural produce making 20% and the food processing industry making 10% of the GDP). Since agriculture largely depends on the irrigation water coming from rivers, therefore the climate change can seriously impact on agriculture as well as on other industries [3].

### Conclusions

Currently, water supply in 40% of Armenia's irrigated land areas is carried out by pump stations, which pump water with the help of electricity up to 500m high. 9% of electricity use is the share of pumping stations pumping water for water management and household use. Given that currently only less than half of lands needing irrigation is irrigated, it is already necessary to develop adaptability measures.

The most profitable of these, in our opinion, is first of all accumulation of excess water in high mountainous regions by establishing new small reservoirs to accumulate excess spring water, which will enable to mitigate to a certain extent the current as well as expected water deficiency through gravity irrigation in summer time.

The suggested reservoir system, together with existing reservoirs, will enable to regulate up to 3.0-3.5 billion m<sup>3</sup> of the river flow formed in the country, which makes 45% of the annual river flow. This can resolve a number of strategic problems: expansion of irrigated land areas up to 450 thousand hectares; substitution of most of the mechanical irrigation systems with gravity system; additional new capacities for energy system; protection against flooding of coastal areas; establishment of nature protection and recreation zones, etc.

### References

1. ՀՀ օրենքը «Ջրի ազգային ծրագրի մասին», Երևան, 2006թ., ՀՕ-232-Ն.
2. Second National Statement on Climate Change; based on UN Framework Convention on Climate Change, Yerevan 2010, 112 p.
3. Socioeconomic Impact of Climate Change in Armenia, Yerevan, 2009, 157 p.
4. Մնացականյան Բ.Պ. Հայաստանի ջրային հաշվեկշիռը //Եր., “Զանգակ-97”, 2005, 194 էջ:
5. Саргсян В.О. Воды Армении //Ер., 2008, 208с.

### References

1. RA law “On National Water Program”, Yerevan, 2006., HO-232-N.
2. Second National Statement on Climate Change; based on UN Framework Convention on Climate Change, Yerevan 2010, 112 p.
3. Socioeconomic Impact of Climate Change in Armenia, Yerevan, 2009, 157 p.
4. Mnatsakanyan, B.P. Water Balance in Armenia // Yerevan, “Zangak-97”, 2005, 194 p.
5. Sargsyan, V.H., Waters of Armenia, Yerevan, 2008, 208p.

## ԿԼԻՄԱՅԻ ԳԼՈՐԱԼ ՓՈՓՈԽՈՒԹՅԱՆ ՊԱՅՄԱՆՆԵՐՈՒՄ ՀԱՅԱՍՏԱՆԻ ՀԱՆՐԱՊԵՏՈՒԹՅՈՒՆՈՒՄ ԶՐԱՅԻՆ ՌԵՍՈՒՐՍՆԵՐԻ ՓՈՓՈԽՈՒԹՅՈՒՆԸ

**Վ.Հ. Թորմաջյան<sup>1</sup>, Վ.Ա.Ալեքսանյան<sup>1</sup>, Գ.Ս. Գաբայան<sup>2</sup>, Ա.Շ. Նուրիջանյան<sup>2</sup>,**

<sup>1</sup> Շուշիի տեխնոլոգիական համալսարան

<sup>2</sup> «Հիդրոէներգետիկա» ՍՊԸ

Կլիմայի գլոբալ փոփոխության ազդեցությունը երկրագնդի վրա նկատվում է արդեն այսօր: Վերջին տարիներին տարբեր տարածաշրջաններում տեղի ունեցող բազմաթիվ կատակլիզմները դրա ապացույցներից է: Կլիմայի փոփոխությունը, առաջին հերթին, իր ազդեցությունը կունենա ջրային ռեսուրսների վրա: Սույն աշխատանքում գնահատվել են ջրային հաշվեկշռի հիմնական տարրերը, որոնք կախված են Հայաստանի Հանրապետությունում կլիմայի գլոբալ փոփոխության հետ: Կանխատեսումների համաձայն ակնկալվում է, որ արդեն 2030 թ., Հայաստանում տեղումների քանակը

կկրճատվի 2,6% -ով, գոլորշիացումը կավելանա 0,95% -ով, հոսքը կկրճատվի 3,1% -ով, իսկ երկրի ջրային ռեսուրսները կկրճատվեն 0,6 մլրդ խ.մ.-ով, այսինքն՝ 8,5% -ով:

**Բանալի բառեր:** ջրային ռեսուրսներ, կլիմայի գլոբալ փոփոխություն, ջրային հաշվեկշիռ, բնական հոսք:

## ИЗМЕНЕНИЕ ВОДНЫХ РЕСУРСОВ РЕСПУБЛИКИ АРМЕНИЯ В УСЛОВИЯХ ИЗМЕНЕНИЯ КЛИМАТА

**В.О. Токмаджян<sup>1</sup>, В.А.Александрян<sup>1</sup>, Г.С. Габаян<sup>2</sup>, С.Ш. Нуридджанян<sup>2</sup>**

<sup>1</sup> *Шушинский технологический университет*

<sup>2</sup> *ООО «Гидроэнергетика»*

Влияние глобального изменения климата на планету заметно уже сегодня. Доказательством этому - многочисленные катаклизмы происходящие в последние годы в разных регионах. Изменение климата в первую очередь повлияет на водны ресурсы. В данной работе оценены основные элементы водного баланса Республики Армения в условиях глобального изменения климата. По прогнозам, ожидается, что к 2030 году количество осадков в Армении уменьшится на 2,6%, испарение увеличится на 0,95%, сток уменьшится на 3,1%, а водные ресурсы страны уменьшатся на 0,6 млрд кубометров. то есть на 8,5%.

**Ключевые слова:** водные ресурсы; глобальные изменения климата; водный баланс; естественный сток.

Ներկայացվել է՝ 05.10.2018թ.

Գրախոսման է ուղարկվել՝ 09. 10.2018թ.

Երաշխավորվել է տպագրման՝ 22.11.2018թ.

## TRENDS AND PECULIARITIES OF INTERACTION OF TOURISM AND MUSEUMS IN ARMENIA. EFFECT OF SYNERGY

**E.E. Vardapetova**

*National Museum-Institute of Architecture after Alexander Tamanyan*

---

*Over the past quarter century of the history of independence of Armenia, after the collapse of the Soviet Union, the interaction patterns and the ideological environment have changed. Armenia is in a transitional state of the formation of market relation and these realities force us to form new technological links between the tourism industry and the cultural environment in which museums have a special place. And the question not only and not so much is that each individual museum has to “survive” in the harsh market conditions, but that the museum can and must find its strategic decisive place. Developing itself, the museum, as a catalyst for the tourism industry, plays a significant role in the social and economic development of the region. The tendencies of development of museum tourism in Armenia, the problems of regional museums of Armenia and their characteristic features are considered and a matrix model of interaction of museums and travel agencies, the evidence of synergy effect for Armenia in the interaction of two spheres of tourism and museum business are presented here as a single system. Examples of successful projects implemented in Armenia which have synergetic effect (an example of creation) are also given. The concept of a museum as a Center of gathering information in the coordinate system of travel agency-tourist-museum is given here. The museum is considered as not only a place of storage of exhibits, data archiving and a research center, but as the main link in which the cultural, geographical and historical information of a separate territorial area is concentrated. The museum is a generator of the formation of profits in the technological chain consisting of the tour organization-tourist-cultural layer.*

**Key words:** *Armenia, museum, brand, tourism, synergy, cooperation, model of interaction, guide, excursion guide, the center of gathering information.*

### **Introduction**

Using the cultural heritage of the Armenian people collected over thousands of years the branches of the tourism industry (Intourist and Sputnik) operated in Armenia in the Soviet period which in this or that way solved the issue of integrating tourism and culture and promoted awareness and development of these two spheres. But after the collapse of the Soviet Union, like many other large structures, these giants were practically destroyed, and, accordingly, all the relations between tourism and the cultural environment were stopped and particularly, the relations between museums as one of the carriers of the cultural environment were broken. Not only the ideological environment, accents and personnel, but also the interests of the user have been changed. With today's market realities, both representatives of the tourism business and museum organizations have to find new solutions and ways to restore and establish these lost connections.

In Armenia, the tourism is a unique opportunity for an ordinary traveler to visit not just unfamiliar places, but those places where few people have been but it is not for a researcher - specialist. The historical, educational, purposeful, museum and other types of tourism are not presented here in a "pure" form, but as if at the junction of forms.

Leaving the house, any tourist and traveler schedules a route for himself. It means that the purpose and objectives of the trip may not be very clear for him, but the traveler decides for himself where to go beforehand. Using what criteria does he do it? How and on what basis is a “new” country chosen for visiting? Arriving in the country as an ordinary tourist, he somehow gets into its museums. And then the question arises: is the museum claimed to create an image of the country for the visitor? to form a certain point of view on its homeland, to make you look at the country from a certain angle?

Can a museum take any “preventive measures” in order to attract foreign tourists, gain their trust and enlist the future support of their “compatriots” in promoting the museum brand?

There are many examples of how a museum becomes the “face” of its country as a brand. It becomes not only recognizable and significant in the global cultural space, but also represents the image of the country for foreigners and the image of the motherland for compatriots.

Well-known examples of museums of this kind are: the Metropolitan Museum in the United States, the Louvre in France, the Hermitage and the Tretyakov Gallery in Russia, the Solomon Guggenheim Museum in the United States or Bilbao, etc.

“If yesterday the project of museum was primarily about creating an “interior” and the exposition as a unique work of art, the success of which was the talent of the scriptwriter and the artist, today it is a complex product integrated into long-term social and economic development programs which is the result of consolidated efforts and every time a unique fusion of symbolic, social, cultural and investment capital”.<sup>1</sup>

### **Conflict setting**

What are the perspectives for the development of tourism and museums in Armenia in terms of the stated topic? What are the “national” peculiarities of this cooperation? Tourism and museums - what is the synergetic effect? How can this path be shortened from a traveler-tourist to a museum, and how to integrate provincial museums into the tourist business?

What is the reason that many cultural and historical sites in our country are not visited by tourists and are not included in the registry of travel agencies? These undoubtedly noteworthy representatives of the national culture have been left out of the attention of not only the tourists, but also domestic state structures (organizations) obliged to decide how and where to realize this unrelated image resource of the territory.

“Entering into the market of cultural technologies, the museum produces samples of new activities. These are modern multimedia expositions, outdoor exhibitions, “live” ethnographic expositions where the village lives as if “behind the glass” and the visitor passes by simply watching. You can add historical reconstructions and historical modeling to the list of new museum practices which imply the cognition of the past through modeling it in the present”.<sup>2</sup>

There is no need (and means also) for the national or folk “imitations” in Armenia which are very widespread in the world. Armenian architecture, which is of interest from the point of view of museum or historical tourism, is quite authentic in itself. Architectural monuments exist in such a variety of quality and quantity which makes all imitation projects unnecessary in advance.

### **Research results**

Many cultural and historical sites of the national heritage of the country are concentrated in a relatively small area and not all of them exist as a museum (collection). Sometimes it's just a detached object (for example, a temple, a fortress, ruins etc). Often they are in places hard to reach and in poor condition. The underdevelopment of tourism infrastructure and the lack of programs and methods of interaction with museums is the main reason for the poor attendance of both museums and some unique historical sites or even regions. After all, independent of the scale of the activities of tourist organizations, their routes are almost identical and geographically limited. It means all tourists travel in the same type of areas, regardless of the chosen method of traveling, the sum of money, degree of

<sup>1</sup> Museum projecting / Editor in chief A.A. Sherbakov, composed by A.V. Lebedev, M., 2009, p. 7-8// Laboratory of museum projecting, Russian institute of culture, 2009

<sup>2</sup> Samples and figures of modern museum structure. This lecture of expertise was figured by V. Yu. Dukelskiy, Candidate of Historical Sciences, a leading scientific worker of the laboratory of museum projecting RHC during the seminar for the museum workers – the author of project and the winner of grant competition <<Changing museum in the changing world>> in 2010.

preparedness and the chosen type of tourism. Naturally, it inhibits the development of each specific unit of the participant of the process separately and does not give the desired effect when combining the efforts.

How to solve this problem? How can a museum interest a travel agency and vice versa? How can it become attractive in terms of investment? How can it convince travel companies in the mutually beneficial cooperation?

In our country there is no separation of spheres of influence of tourism and museums. There are some "independent fields" in museums and travel agencies. Each has its own corporate features and individual coexisting in parallel tasks, which, however, do not interfere with the development of each region separately. And this factor can in no way serve as an obstacle to the positive and obvious synergy effect from their cooperation.

Small museums in small towns undoubtedly have a perspective of development in Armenia. Often, the funds and collections of such museums are so unique and significant for world culture, they represent the uniqueness and value of the culture of their country so accurately and vividly that they create its image in a certain extent. It is characteristic that most of the museums in Armenia in exception of some of the museums having status (the Parajanov Museum, the Genocide Museum, the Komitas Museum etc.) can rightly be considered as ethnographic or geological museums.

The peculiarity of museum tourism in Armenia is that this process seems to be self-organized in a natural way. And although over the years, such spontaneous, poorly organized and often not planned by either of the parties the interaction of travel companies and museums develops into an equal partnership and nevertheless, they do not have a clear plan of cooperation. A significant ratio of major investment in any Armenian museum is brought at the expense of visitors - tourists traveling with a travel company who "pass" near the museum and drive along "as if on the way." As time and circumstances go, museum tourism has already become part of the structure of the work of many museums in the country. And today's partnership of museum organizations and the tourism industry is a new, promising and highly successful line of business for both spheres of the direction of activity.

At present, the situation is so that the tourism industry in Armenia is more developed and well organized, the investment influence of foreign capital and financing from state structures are much more significant in it than in the field of museum business. Nevertheless, there is no clear management structure and patterns of interaction between travel companies in the tourism industry. Major travel agencies in Armenia, as a rule, cooperate with small ones one-sidedly from the position of "elder brother".

Concerning the museums, large and status museums in Armenia which are obviously well visited and included in tourist routes, as a rule, do not have developed strategies for embedding regional museums in their structure. Currently, the only kind of interaction (cooperation) of small and large museums can be called touring exhibitions. The common thing is that in Armenia in both these areas (tourism and museums) the process of intra-corporate integration takes the first steps.

A large percentage (over 70%) of tourists visiting our country are Armenians by origin and they consider today's Armenia as their homeland. It is a sort of original type of target tourism with a very popular motivation of "visit the house of the grandfather". Such a tourist - Armenian arrives in his historic homeland. He has already formed the emotional image of the country according to the stories of grandparents, intellectually (being well-informed) he is more or less prepared. He wants to receive a visual confirmation of everything he has heard and read. The motivation to visit the country and its museums is the desire to reach his roots, to deepen into the atmosphere of his homeland and to enjoy it. This unusually grateful, interested category of tourists is a huge target audience for some small local museum.

Naturally, the travel agency collaborating with a specific museum (s) and making the route is set to "lead" such a tourist to the museum, and the museum - to "meet" his expectations. And if a

foreigner is seen in small (especially ethno) museums as a dear guest, then the Armenian visitor is accepted as a native one.

“In a contemporary culture saturated with images and sounds where a person experiences the strongest informational and emotional pressure every second, such a conservative museum environment often becomes a truly exclusive meeting for the tourist and a special experience”.<sup>3</sup>

Some small (there are many of them in Armenia) museums not having a strategy of development and introduction into the world cultural community as a market unit, got into the modern trend in a natural way. In other words, the chosen way of communication with visitors and all the activities of the museum as well, in principle suddenly turned out to be creative and true as a product of a certain tourist interest. And, in its turn, if previously only people who had set before themselves such a goal reached deep in the country, and only specialists and researchers got into the little-known regional museums, now almost any tourist has the opportunity to get to almost every corner of the world, of the country, its regions and museums.

“The practice of preserving and tourist programs should represent high quality information to support the visitor to recognize the sense of heritage and the need to protect it. These programs also must support the best visit of the tourist”.<sup>4</sup>

Very often such museums are concentrated on some unique samples. And all the exposition and the background are set round these samples. This does not compel informational and emotional over crowdedness. Such kind of excursions are remembered by the tourists for long time and are later told with pleasure to their compatriots. If to take into account the fact that more museum workers in such “province” little museums are the fans of their work, they are sincerely devoted to their job and consider the museum their home, then the best figure of the country can not be dreamt about.

There is one more characteristic, perhaps, for many countries with numerous little-known museums. The staff there is very small and the experience and level of work is very high. Many of the employees perform several functions simultaneously, occupy more than one and even more than two positions on the staff and know more than one foreign language. Such a guide - researcher can easily serve as a guide in any travel company. I know from my own experience that many travel agencies in Armenia use museum employees as “invited specialists”. This independent process of transferring guides from the museum to travel agencies is quite common for Armenia and it is high time to organize and legitimize it.

So, the narrating guide in the museum sends visitors (as a continuation of the tour) for example to a nearby temple complex. Or vice versa, a tourist guide from the temple brings his group to a local museum to fully immerse into the cultural environment wishing to cover a whole period of history and completes it in a nearby village with preserved samples of an ethnic group or some other landmarks of the region.

One of the most common areas of the capitalization of the museum is the increasing the awareness among the people and the formation of a particular brand. But the formation of a brand not for any museum is a necessary condition for its development. In Armenia the specificity of the territory is so that a well-known brand resource can be found next to the museum which has become a catalyst for tourist interest in the region thus increasing the museum attendance by several times.

The example of such correctly chosen way of development can serve the monastery of Tatev (the Armenian monastery complex of Tatev, (IX-X centuries), Syunig region). Tatev Monastery is a

---

<sup>3</sup> Lyashko A.V., Museum tourism in Russia. The evolution of the format// The bulletin of the University of Saint Petersburg, Series 6, 3<sup>rd</sup> edition, Publishing of Saint Petersburg University, 2012, p.21-27.

<sup>4</sup> INTERNATIONAL CHARTER ON CULTURAL TOURISM. Principle 3 (tourism management in the sites of heritage, 1999). Stated by ICOMOC in the 12<sup>th</sup> Top Summit in Mexico, October

well known and an ancient world brand which has many decades to enter the compulsory route of any tour agency working in the territory of Armenia.

In 2008 the project of “Tatev Revival” as a beneficiary initiative was launched by the government. In 2010 the aerial railway of “Tatev Wings” was opened (length 5,7 km) stretching over the Vorotan Gorge. The opened unique by its length aerial railway is recorded in the Guinness Book of Records and became a world brand itself raising the interest towards the temple complex and local museum.

Nowadays the Tatev monastery, the aerial railway “Tatev Wings”, the bridge “Satani Kamurj”, the cave, Tatev University, museum and other many sights of this region are known as big tourist “Tatev Gates”. The complex becoming the most popular route of purposeful, historic, cognitive and even extreme tourism is the example of successful cooperation in the sphere of tourism which is the synergetic effect of interaction. The reconstruction of the ancient temple, monastery, university, museum and the ways to the museum-recreation cluster took to the flow of new capital which in its turn let distinguish the means for the reconstruction of the museum and the temple, for the development of the local museum and the development of all region in total.

In Armenia, in one way or another, it is worth making a bid on visitors - the tourists. Indeed, often, the local population does not constitute a significant percentage of museum visitors. This is a global trend when many (if not all), even very famous museums work for tourists. And if earlier the private task of the museum was to “register” in the travel agency routes and this was the only point of contact, now many museums work as a travel agency and museum in parallel.

Travel company has the goal of making a profit and attracting new customers. Why not to correlate these goals with the tasks of a particular museum? How do they differ in these goals and objectives? If a tourist organization attracts a tourist and is an organizer and an accompanying person, then the museum in this context is also its seller.

The tourism industry offers, represents and sells museum product to its audience. And at the same time, the audience, wishing to become museum lover, uses the services of a tour industry. It means, in fact, that they are links of one chain of profit formation. Thus, they are not competitors but complementary players of the same team cooperating with one another. There can be no talk about the division beforehand of spheres of influence and luring away the target audience. The interests of travel agencies do not go against the interests of museums. After all, all tourists in Armenia are potential museum visitors.

The synergy effect in this context is primarily a one way effect of joint action, a vivid example of combining the interests and tasks of two parallel coexisting structures. But, when building up the interaction schemes between the tour industry and the museum responsible for the “cultural load”, each link of this chain must take its own priority. The number of visitors to museums –the citizens of our country is very limited in number. And its composition does not change over the years. This is our national specificity.

“The programs on preserving, interpretation and development of tourism must be based on all sided understanding of direct, but often on difficult and contradictory aspects of the meaning of different types of heritage. The continuation of research and consultation has an important meaning for interaction of understanding the evolution and estimation of this sense”.<sup>5</sup>

Namely in the museum (local historic museum, ethnographic and others) all the information on the local cultural-geographical and historical layout of the territory is concentrated. Here not only unique samples are collected and exhibited, but also all the “history” of the country is archived and

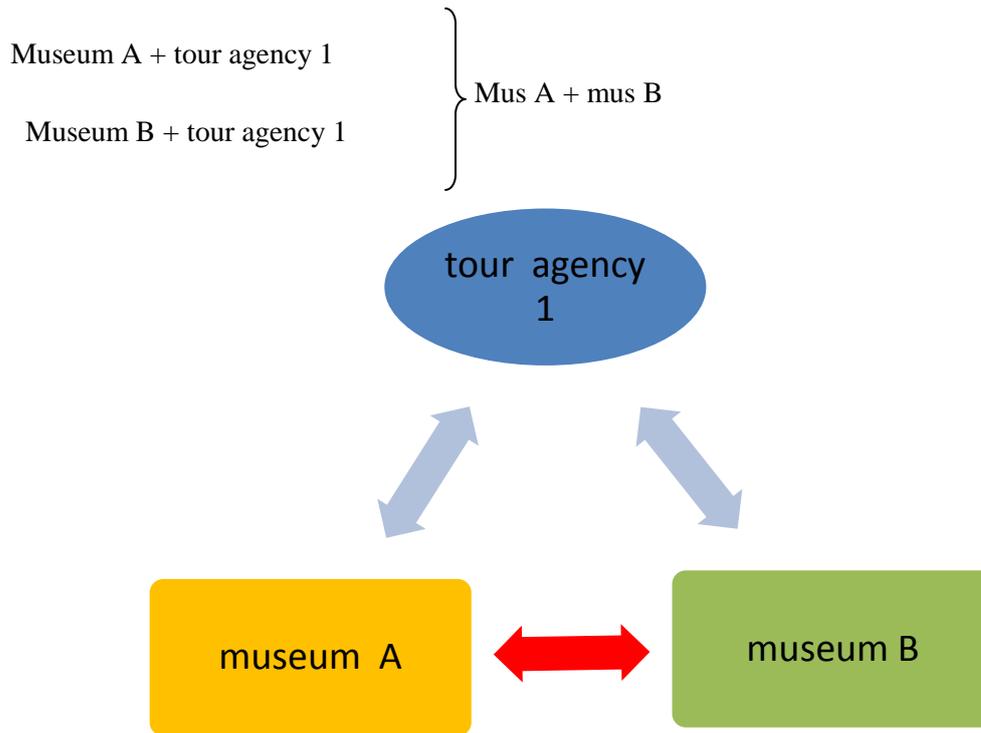
---

<sup>5</sup> *The principle 2 INTERNATIONAL CHARTER ON CULTURAL TOURISM (management tourism in the sites of heritage, 1999.) Stated by ICOMOC in the 12<sup>th</sup> Top Summit in Mexico, October 1999.*

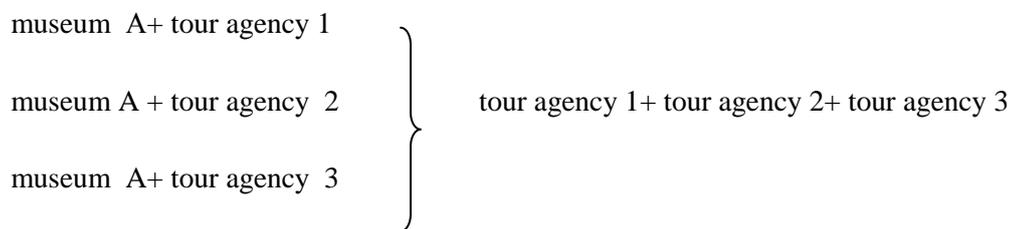
that's why the local museum can be considered the Centre of gathering the information of the target "cultural" territory. And no other separately taken sight (monument, architectural complex and others) can fulfill this function.

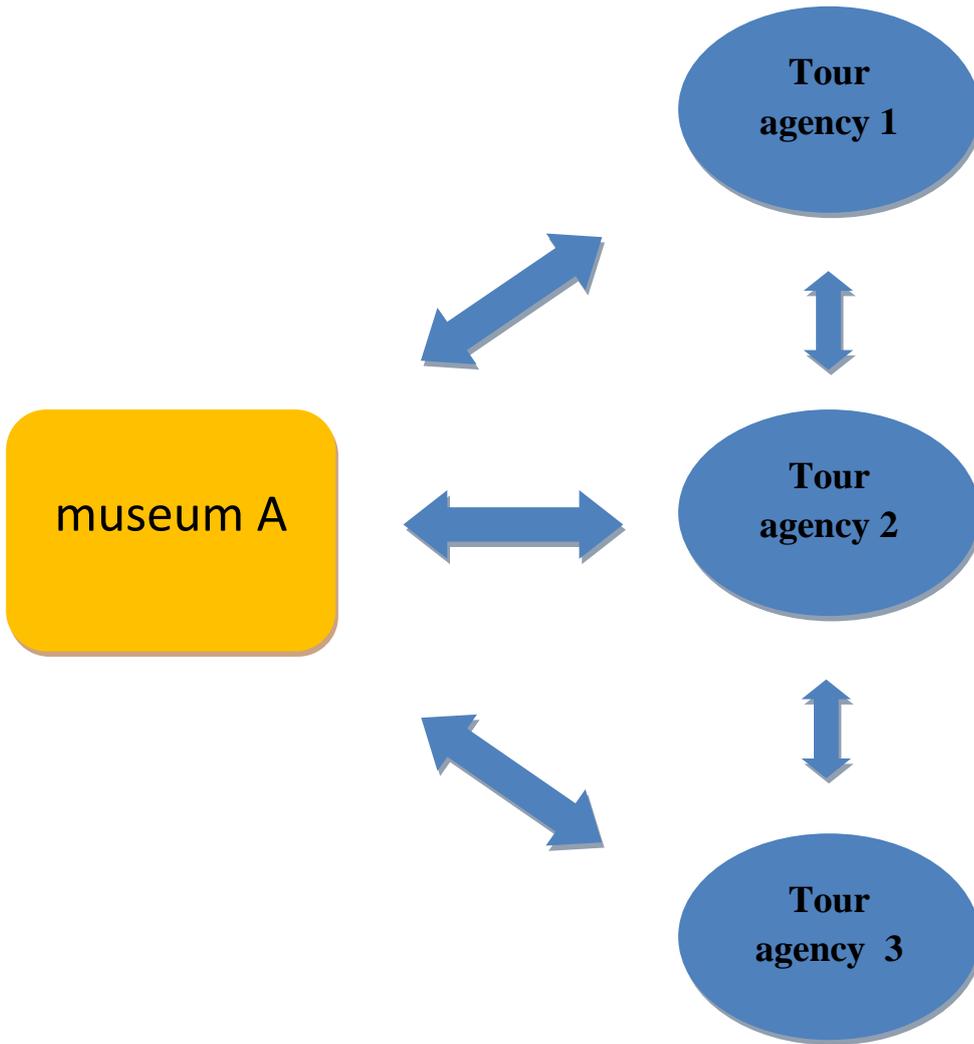
The algorithms given below are the models of interaction of tourist agencies and museums between themselves and with each other.

**The first model:** visually shows how the tour agency can function in the role of connecting link between territorial and jurisdictionally separated museums. When two different museums not having any points of joining and cooperating with one and the same tour agencies are cooperated for joint activity.



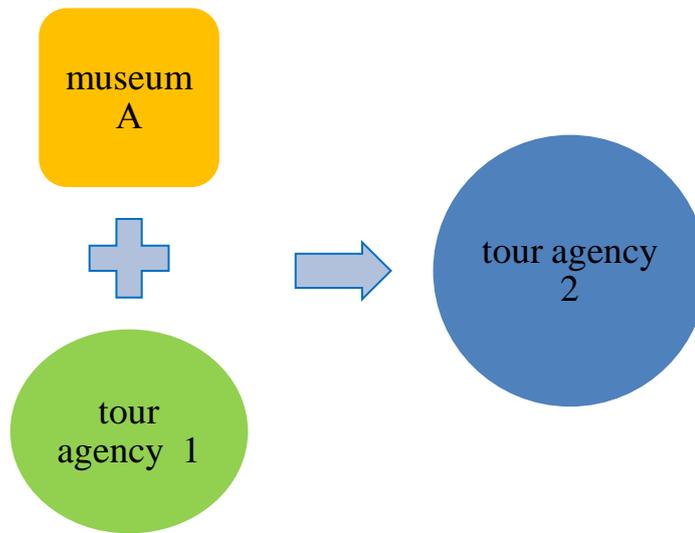
**Or vice versa:** the second model showing how one museum can be "reason" for cooperation (and not for competition) of various tour agencies starting from the biggest to the little-known museums.



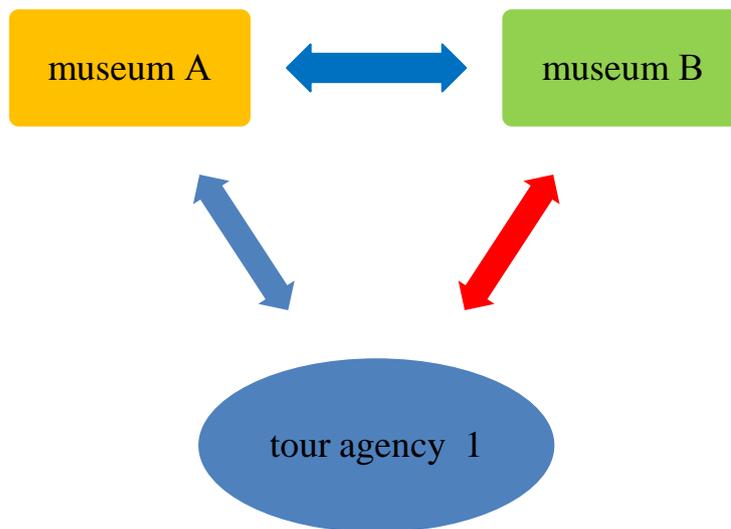
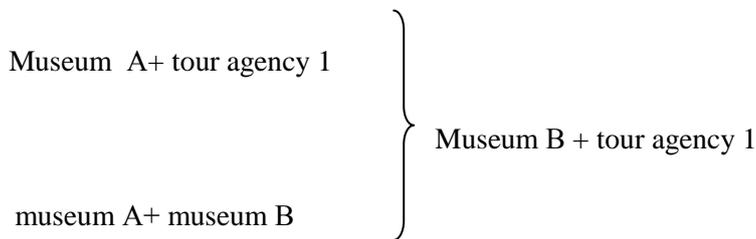


**The third model:** when the museum begins to cooperate with one of the small tour agencies (representative of big company) – it emerges (registers) into the net of tour agencies whose field of activity is a little wider than its native town or region.

Museum A+ tour agency 1  
 museum A+ tour agency 2  
 tour agency 1+ tour agency 2



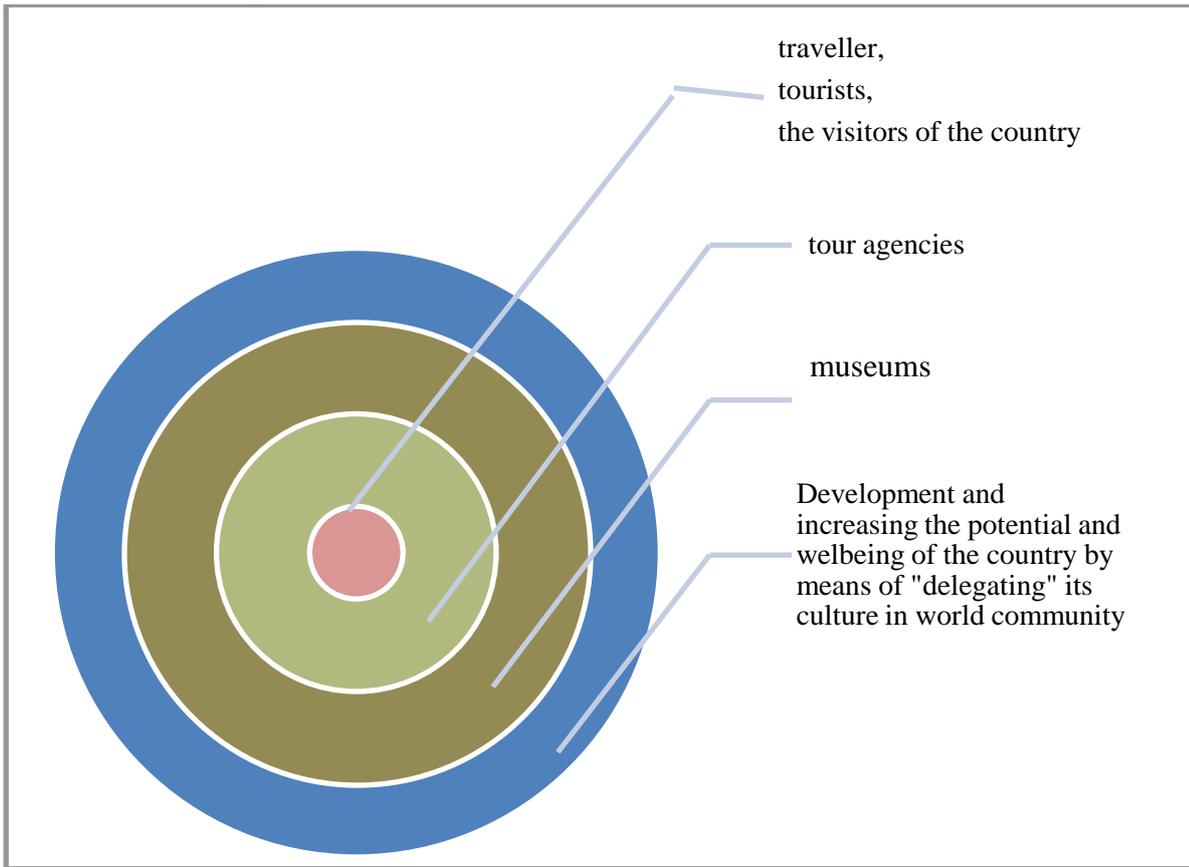
The example of the fourth model of cooperation when the cooperation of two museums lead to that the museum not being involved into the programs of tour agency, became its full righted (constant) participant.



So, it is evident that the models of interaction (cooperation) given above on the example of museums and tour agencies are the illustration of one of the equivalent definitions of synergy when the income from the assimilation of the efforts of two companies can exceed the sum of the incomes from these companies till their union.

The combined effect of several factors in such complex systems as museums and tourism differs from simple arithmetic sum of separate effects. In this particular case, it differs in that the expected synergy opens up unexpected horizons. The development of tourism and culture (in this case we are talking about museums) in the case of joint work on jointly developed corporate or state programs will increase the financial inflows by several times. The potential created in the process of

joint work can serve today for the benefit of the country in the most visible way and become a tangible source of income (Fig. 1).



**Figure 1. The scheme of getting synergetic effect**

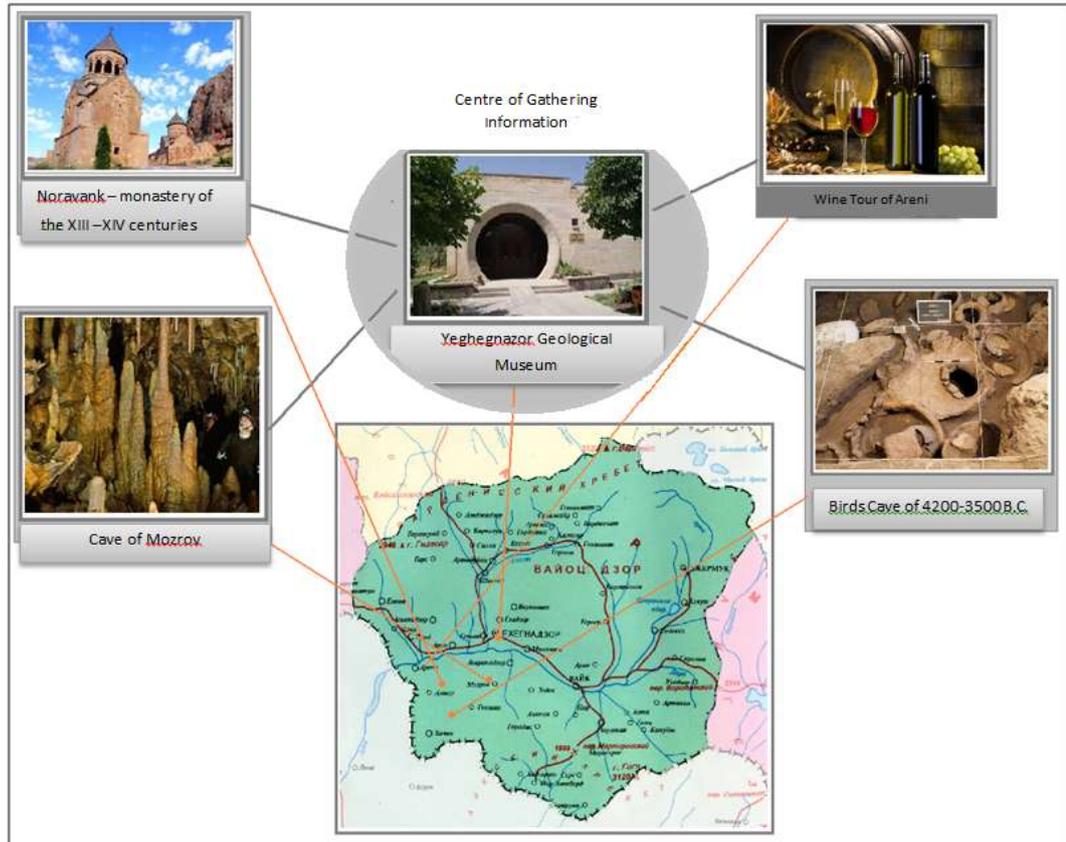
The module scheme of cooperation given below, museum +tour agency on the example of the region Vayots Dzor (Fig. 2).

Town Yeghegnadzor is the administrative center of Vayots Dzor region of Armenia. This more populated region of Armenia more or less has such rich territorial image resources that is constantly included into all the routes of tour agency. Besides unusual natural superiority (highlands, picturesque caves, passages, magic gorges etc.) the area is simply “dirty” by huge amount of architectural, historical and archeological monuments (fortresses, temples, monasteries, caves, cross stones, sanctuaries etc.). Visiting the caves, the monastery complex Noravank (XIII-XIV centuries), passing over the national park, seeing the ruins of ancient settlements of Yeghis (V-VIII centuries) and MSH ( II millennium BC - XV century AD), the fortresses of Berdaqar (V) and Kechut (X-XIV centuries) and also numerous temples on way (may be Gladzor University (1282), the travellers constantly visit the local historic museum in Yeghegnadzor.

It is shown on the example of Vayots Dzor region how the local history museum becomes the Information Gathering Center in Armenia, which is a representative of the entire cultural and historical part of the region and a link between travelers- tourists, tourist organizations and local sights in Armenia. “Today, the work of the museum extends far beyond the original functions of preserving, exploring and promoting the cultural and natural heritage. The museum becomes a space for dialogue between different communities contributing to social cohesion and creating a comfortable cultural environment. In the context of the social mission, the museum creates programs that are focused on improving the quality of life of socially vulnerable groups.

The growing role of the museum as a driver of economic development which forms the brand of the territory and strengthens cultural and educational tourism and creative industries is also

important”.<sup>6</sup> Indeed, about the same concept included in the program of territorial development of the regions of Armenia where tourism and sights along with the museums are used as a tool for increasing the social and economic potential of the region.



**Figure 2. Module scheme of cooperation of museum & tour agency on the example of Vayots Dzor region**

**Conclusion**

Modern tendencies in the development of museum business in Armenia dictate the need of the integration of the fields of museums and tourism into a single coordinate system as equal partners. Tourist guides and museum excursion guides should work as agents of travel agencies and museums in the direct meaning of the word, to represent the interests of each other and act on jointly developed common schemes. Thus, there is an increase in museum revenue and tourist organizations as a result of the coordinated work of a single technological chain which results in a multiplicative effect. Certainly, cooperation and complementarity of the tourism industry and the museum organization will lead to a synergic effect as a source of increasing the capitalization of the parties under the conditions of in case of keeping certain priorities in the system of tourist organization-tourist-museum (CGI) - cultural resource.

**References**

1. Богдановский Д.Л., Эффект синергии применительно к особым экономическим зонам//Российское предпринимательство, 2008. № 6-2

<sup>6</sup> The V Saint Petersburg cultural forum. Round table “The specialist in modern museum: New ambitions –new horizons”, 2016

2. **Гнедовский М.Б.**, Музейная коммуникация и музейный сценарий // Музей и современность. - М.,1986 (Сб.науч.тр. НИИ культуры)
3. **Гнедовский М.Б., Дукельский В.Ю.**, Музейная коммуникация как предмет музееведческого исследования // Музейное дело: Музей - культура - общество. М.,1992, (Сб.науч.тр./Музей революции).
4. **Дукельский, В.Ю.** Музейный туризм – панацея или соблазн? // Музей и туризм, Петрозаводск, 2002.
5. **Йохан Идема** .Как ходить в музей. Советы о том, как сделать посещение по настоящему запоминающимся //АД Маргинем, 2016,- пер.Йохансон Г.Д.
6. **Ляшко А.В.** Музейный туризм в России. Эволюция формата// Вестник Санкт-Петербургского университета. Серия 6. Вып.3. — СПб.: Изд. Санкт-Петербургского университета, 2012.
7. **Мастеница Е.Н.** Корпоративная культура музея, Санкт-Петербургский государственный университет культуры и искусств. 191186 Россия, Санкт-Петербург,2011
8. **Романчук А.В.** Институт “Открытое общество”( Фонд Сороса). Межрегиональный конкурс проектов. Музейный туризм.2.Музейный туризм в процессе межкультурной коммуникации 2.2.Малые музеи в системе культурного туризма. 2011
9. **Стронг Р.** Музей и коммуникация // Museum. 1983. № 138.
10. **Четверякова Д.П.** Имиджевые ресурсы территории: географический аспект, Р.Ф,г. Екатеринбург,Уральский государственный педагогический университет, аспирант
11. **Международная Хартия по культурному туризму** (Управление туризмом в местах наследия,1999)Утв. ИКОМОС на 12-й ГА в Мексике, октябрь 1999-  
<http://spbiiir.ru/ftpgetfile.php?id=2059>
12. **Գյուրջյան Գ.Մ.**Մշակութային ժառանգության պահպանության օրենսդրական հենքը Հայաստանում [Гюрджян Г.М., пр. орг.ИКОМОС Армения, директор Музея-заповедника **Эребуни**. Законодательная база по охране культурного наследия. Необходимость совершенствования]
13. **Региональное сотрудничество в целях развития культурного наследия.** Эл.ж. 2014, № 2  
<http://www.worldbank.org/en/news/loans-credits/2015/12/22/armenia-local-economy-and-infrastructure-development-project>
14. **Հովսեփյան Գ.**Հայկական մշակութային տուրիզմի կայացման ճանապարհը [Г.Овсебян. Становление культурного туризма в Армении ]-<http://kantegh.asj-oa.am/2110/1/179.pdf>
15. **Թովմաս Սամուէլեան** .Հայաստանի մշակութային ժառանգություն. Իրավական դաշտի ուսումնասիրություն[Т. Самуелян.Культурное наследие Армении],2001-  
[http://www.arak29.am/PDF\\_PPT/8-Culture/Cultural\\_Heritage.htm](http://www.arak29.am/PDF_PPT/8-Culture/Cultural_Heritage.htm)

**16. Официальный сайт туристической фирмы «Здравствуй Армения»**

[https://barevarmenia.ru/ru/armenia\\_tours/tour94](https://barevarmenia.ru/ru/armenia_tours/tour94)

**17. Официальный сайт Гильдии Гидов Армении- <http://www.armenian-guides.am/index.php?lang=ru>****18. Развитие туризма в современных условиях//официальный сайт Всемирной туристической организации - <https://www.wto.org/>****References**

1. **Bogdanovskiy D.L.** Synergy effect in relation to special economic zones // Russian Entrepreneurship.2008. № 6-2
2. **Gnedovskiy M.B.** The museum communication and museum script // Museum and modernity.
3. **Gnedovskiy M.B., Dukelskiy V.** The museum's communication as an object of museological studies // Museology Museum - Culture - Society. - M., 1992. - p.7. (Sb.nauch.tr. / Museum of the Revolution).
4. **Dukelski V.Y.** Museum Tourism - Panacea or temptation? // Museum and tourism. - Petrozavodsk ,2002.
5. **Yohan Idema.** How to go to the museum. Tips on how to make your visit truly memorable by // AD Marginem , 2016, - tr.Yohanson G.D.
6. **Lyashko A.V.**Museum tourism in Russia. Evolution format // Bulletin of St. Petersburg State University. 6. Series Vol.3. - SPb .: Publishing. St. Petersburg State University, 2012. - p. 21-27.
7. **Mastenica E.N.** Corporate Culture Museum, Saint Petersburg State University of Culture and Arts. 191186 Russia, St. Petersburg, 2011.
8. **Romanchuk A.V.** Institute "Open Society" (Soros Foundation). Interregional design competition. Museum tourism, 2 Museum tourism in the process of intercultural communication , 2.2. Small museums in the system of cultural tourism, 2011.
9. **Strong R.** Museum and Communication // Museum. 1983. № 138.
10. **Chetverikova D. P.** Image resources of territory: geographical aspect Russian Federation, Ekaterinburg, Ural State Pedagogical University, postgraduate.-p.4-5
11. **International Charter on Cultural Tourism** (tourism management at heritage sites, 1999) Adopted by ICOMOS at the 12th General Assembly in Mexico, October 1999
12. **Gagik Gyurjyan** The legal framework for the protection of cultural heritage. The need to improve.. President of ICOMOS Armenia, director of the Historical & Archeological Museum-Reserve Erebuni.
13. **Local Economy and Infrastructure Development Project (LEIDP) for Armenia** Regional Co-operation for Cultural Heritage Development // **E-Journal, 2014** № 2,
14. **Galust Hovsepian.**Tourism on the way to development
15. **Tovmas Samuelyan.**The cultural heritage of Armenia
16. « **Barev**» **Armenia** official website tour operator
17. **Armenian Gudes Guld** //official website
18. **Tourism development in modern conditions** // official website of the World Tourism Organization

## **ԶՐՈՍԱՇՐՋՈՒԹՅԱՆ ԵՎ ԹԱՆԳԱՐԱՆՆԵՐԻ ՓՈԽԱԶԴԵՑՈՒԹՅՈՒՆՆԵՐԻ ՄԻՏՈՒՄՆԵՐԸ ԵՎ ԱՌԱՆՁՆԱՀԱՏԿՈՒԹՅՈՒՆՆԵՐԸ ՀԱՅԱՍՏԱՆՈՒՄ: ՍԻՆԵՐԳԻԱՅԻ ԷՖԵԿՏ**

**Ե.Է. Վարդապետովա**

*Ալեքսանդր Թամանյանի անվան ճարտարապետության ազգային թանգարան-ինստիտուտ*

Հոդվածում դիտարկվում են Հայաստանում թանգարանային զբոսաշրջության զարգացման միտումները, տարածաշրջանային թանգարանների խնդիրները եւ դրանց բնորոշ առանձնահատկությունները, բերվում է թանգարանների և զբոսաշրջային գործակալությունների փոխազդեցությունների մատրիցային մոդել, երկու ոլորտների՝ զբոսաշրջության եւ թանգարանի փոխազդեցությունների որպես միասնական համակարգի ակնհայտ սիներգիկ էֆեկտը Հայաստանի համար: Շրջանառության մեջ է դրվում զբոսաշրջային գործակալություն-զբոսաշրջիկ-թանգարան կորորինատային համակարգում թանգարանը, որպես «ինֆորմացիայի համախմբման կենտրոն» եզրույթը: Թանգարանը դիտարկվում է ոչ միայն որպես ցուցանմուշների պահպանության, տեղեկությունների արխիվացման վայր և հետազոտական կենտրոն, այլև որպես առանձին տարածքային միավորի մշակութային, աշխարհագրական և պատմական տեղեկությունների կենտրոնացման հիմնական օղակ: Թանգարանը զբոսաշրջային գործակալություն-զբոսաշրջիկ-մշակութային շերտ տեխնոլոգիական շղթայում շահույթի ձևավորման գեներատոր է:

**Բանալի բառեր:** Հայաստան, թանգարան, ապրանքանիշ, զբոսաշրջություն, սիներգիա, համագործակցություն, փոխազդեցությունների մոդելներ, զբոսավար, էքսկուրսավար, ինֆորմացիայի համախմբման կենտրոն

## **ТЕНДЕНЦИИ И ОСОБЕННОСТИ ВЗАИМОДЕЙСТВИЯ ТУРИЗМА И МУЗЕЕВ В АРМЕНИИ. ЭФФЕКТ СИНЕРГИИ**

**Е.Э. Вардапетова**

*Национальный музей-институт архитектуры имени Александра Таманяна*

За последние четверть века истории независимости Армении, после распада Советского Союза, изменились схемы взаимодействия, изменилась идеологическая среда. Армения находится в переходном состоянии формирования рыночных отношений, и эти реалии заставляют формировать новые технологические связи между туриндустрией и культурной средой, в которой особое место имеют музеи. И вопрос не только и не столько в том, что каждому отдельно взятому музею приходится «выживать» в жестких условиях рынка, а в том, что музей может и должен найти свое стратегическое решающее место. Развиваясь сам, музей, как катализатор индустрии туризма играет весомую роль в социально-экономическом развитии региона. Рассматриваются тенденции развития музейного туризма в Армении, проблемы региональных музеев Армении и их характерные особенности, приводится матричная модель взаимодействия музеев и турфирм, очевидность эффекта синергии для

Армении при взаимодействии двух сфер туризма и музейного дела как единой системы. Приводятся примеры успешных проектов осуществленных на территории Армении давших синергетический эффект (пример создания). Вводится понятие музея, как Центра сосредоточения информации в системе координат турфирма-турист-музей. Музей рассматривается не только как место хранения экспонатов, архивации данных и исследовательский центр, но как основное звено сосредоточения культурно-географической и исторической информации отдельной территориальной единицы. Музей как генератор формирования прибыли в технологической цепи тур.организация-турист-культурный пласт.

**Ключевые слова:** Армения, музей, бренд, туризм, синергия, кооперация, модели взаимодействия, гид, экскурсовод, центр сосредоточения информации

*Ներկայացվել է՝ 03.10.2018թ.*

*Գրախոսման է ուղարկվել՝ 09. 10.2018թ.*

*Երաշխավորվել է տպագրման՝ 29.11.2018թ.*

## MONOPOLY AND THE PROBLEMS OF ITS REGULATION IN ARMENIA

**M.V. Miqaelyan<sup>1</sup>, A.Kh. Markosyan<sup>1,2</sup>, E.N. Matevosyan<sup>1</sup>, L.Yu. Yarmaloyan<sup>3</sup>**

<sup>1</sup> Yerevan State University

<sup>2</sup> Shushi University of Technology

<sup>3</sup> M.V. Lomonosov Moscow state university, Yerevan branch

---

*In the public perception the term "monopolist" has gone through certain stages of development. If at the beginning of the 20th century this term was used in a narrow sense as marketer's relationship with a single vendor and many buyers (or one buyer and many vendors), further along with the adoption of the legislation of competition protection and the state regulation of these relationships it has gained the application of economics and jurisprudence in its broadest sense in which the regulation settlement is based not on the fact that it is the only subject in the market but the degree of the economic authority of the market which will allow him to abuse that power.*

*The global experience of competition protection currently proves that in terms of competition and/or the interests of the consumers, it is not important whether the farmer is abusive- the monopolist or the market-dominated business runner (hereinafter referred to as M and MDBR). In both cases the economic consequences are the same, market entrance barriers are created and consumers' interests are violated. That is why their settings are not differentiated.*

*Such experience is also used in Armenia. Despite the fact that in the law on competition protection M and MDBR entities have been differentiated, the same levers and mechanisms are applied to both.*

*Studies show that the regulator does not always give an adequate assessment and show right attitude towards businessmen. In particular, at the beginning of 2018 the interpretation of the inflation related to some provisions of the Tax Code coming into force is disputable in the professional aspect conditioned by the actions of M and MDBR.*

**Key words:** *monopoly, monopolist, product market, dominating position, monopolistic activity, competition protection.*

### **Introduction**

#### **Monopoly as a social relationship**

The first experience of scientific analysis of monopolists was made by thinkers of the ancient world. Aristotle argues about the methods of gaining wealth in his essay of "Politics", advises politicians and statesmen to follow the examples of philosopher Tales of Miletus and a Sicilian who were able to monopolize according to their wisdom and timely orientation: the first in the sphere of selling the olive and the second in iron trade gaining large revenues by establishing a smaller margin in their usual price<sup>1</sup>.

If at the initial stage of the development of capitalism monopoly there was an exceptional phenomenon in the conditions of free competition, then it gradually gained considerable weigh in the markets of different branches of economy. It was not accidental that, in Adam Smith's opinion, the

---

<sup>1</sup> Aristotle, records in 4 volumes, vol.4, M., 1983, p. 396-398.

monopoly, given to a particular individual or commercial company, has the same effect as the secret in trade or in manufacturing industry. The monopolist, contributing to the constant deficit in the market and not reasonably satisfying the total demand, sells his product at an even more expensive price than the initial price and increases his revenues<sup>2</sup>.

And what is the monopoly (Monopoly, Monopsony)<sup>3</sup>. In the literature of economics the term "monopolist" is used to describe the market quantitatively and qualitatively. The term originates from the Greek words "Poleo" (I sell) and "Psoneo" (I buy) and "Monas" (one). It describes such market relationship when the seller (buyer) is one and the buyers (sellers) are numerous. In this regard, in the economic literature, the monopolist is often interpreted as a market-oriented structure with the supremacy of a single merchant or buyer in which there are no substitutes for that product<sup>4</sup>.

The term "monopolist" is often used to describe the size and power of enterprises. However, the concepts of "big firm" and "monopoly" do not always coincide. As C. R. McConnell and S.L. Brune have rightly pointed out, the firm can be large in its absolute sense but relatively small in relation to the whole market. For example, American television producer Zenith is big in terms of sales and employment. But compared to Sonny, it's relatively small<sup>5</sup>.

Monopolies have been manifested in the early Middle Ages in the product markets of Western Europe as an economic phenomenon during the formation and functioning of merchant associations (guilds). However, their rapid development took place in the late 19th and early 20th centuries due to the industrial revolution as a result of the concentration of the economy.

The nature of monopolists was also studied by new representatives of classical economics (A. Curnon, A. Marshall, J. Klark, A.Pigu, E. Chamberlin, J. Robinson, J. Schummaser, D.Ros and others) from the very beginning of their existence. Particularly, A. Marshall was one of the first to pay attention to the positive aspects of the monopolists.

He attempted to find a way to compare the relative size of public benefit and monopoly profit depending on the choice of this or that economic strategy<sup>6</sup>. He also observed the condition of gaining monopoly's maximum profit. Joes Schumpeter also touched upon the positive role of monopolies in the economy. According to him, scientific-technical progress is more rapid than monopoly besides price and non-price abuse<sup>7</sup>. Certainly, in some cases it is possible to agree with such an opinion. Monopolies have the potential to invest in great financial resources and new techniques and technology as well. However, as a rule, this feature is used primarily when there is a problem of

---

<sup>2</sup> A. Smith, Research about nature and the reasons of nations' prosperity, Pub.of social ec. Lit., M., 1962, p. 60.

<sup>3</sup> The terms of "monopoly" and "monopolist" are used in Armenian. To distinguish the only customer and the only seller and to characterize the market the terms of "monopoly" (as a synonym of Monopoly) and the "monopsonia" (as a synonym of Monopsony) are used respectively. During the researches if there is no need to distinguish these two terms, it is necessary to use the term "monopolist" instead of "monopoly" and "monopsonia".

<sup>4</sup> See I. M. Albegova, R. G. Yemtsov, A. V. Kholopov, The state economic politics, M., 1998, p. 254.

<sup>5</sup> See K.R. McConnel, S.L. Bryue, Economics, vol. 2, p. 220.

<sup>6</sup> See A. Marshall, The principles of economic sciences, in 3 volumes, tr. from English, M., "Progress", 1993, v.2, p. 182.

<sup>7</sup> See Schumpeter Y., A., Capitalism, socialism and democracy, M., Economics, 1995, p. 130-153.

market expansion or a "risk" of other entities to enter the market. Its striking example was the license of N60 for "ArmenTel" company for monopoly for 15 year in 9 telecommunication product markets under which conditions an artificial deficit was created in these markets and the company started investing in this sphere and to significantly lower tariffs when K-Telecom was allowed to enter the telecommunication markets in November 2004<sup>8</sup>.

The British economist Alfred Pigou, the predecessor of A. Marshal, observed the monopoly from the point of view of its settlement. He considered the state regulation to be extremely necessary. The period of his creation coincided with the period of flourishing and prosperity of monopolists. That is why his object of research is the tendency of monopolization in the economy which has slowed down the growth of public welfare. Taking it into account he was for the regulation of the activity of monopolists through active application of anti-trading legislation. He was the first to use the term "price discrimination" in the theory of economics<sup>9</sup>.

According to E. Chamberlin, the monopoly price is not necessary to be the highest. And the amount of excess profits depends on the availability of market entry barriers. He also discussed monopoly for differentiated goods<sup>10</sup>. The first question refers to the monopoly market and certain cases in practice including the presence of small barriers to market entry when the monopolist does not always set the maximum price in case of selling his goods. The second question is also justified and refers to both types of monopoly. However, it is disputable to speak of the existence of monopoly markets for differentiated goods. The problem is that in the modern methodology of product market analysis three borders are defined to characterize the commodity market: commodity, geographical and timely. For the first two borders the price setting parameter is important along with other factors. Due to this, consumer groups have different demand for different types of goods with the same consumer characteristics. Therefore, their commodity markets are also different. Thus, for example, the vodkas costing 10 thousand and 2 thousand drams with the same capacity of 0.5 liters have different consumers. So, even if their sellers are the same, these consumers will have different product markets. If the price of 10 thousand drams becomes 15 thousand drams, it will not affect the purchasing capacity of consumers demanding 2 thousand drams of vodka as they are in different commodity markets.

Another contemporary of E. M. Chamberlin, John Maynard Cain's student J. Robinson also discussed the monopoly from the point of view of the settlement. According to him, as a result of the monopolization of the markets, their concentration tendencies are stabilized, a limited number of companies emerge which concentrate the production in their hands. Due to this they regulate the demand by applying price discrimination<sup>11</sup>.

---

<sup>8</sup> More details in "The basic state regulation issues in the Republic of Armenia", Miqaelyan M., V., Yerevan, Nahapet, 2005, p. 119-122.

<sup>9</sup> See A. Pigou, *The economic theory of prosperity*, M., "Progress", 1985, vol. 1, chapter 16.

<sup>10</sup> See E. Chamberlin, *The theory of monopoly competition. Reorientation of price theory*, M., "Economics", 1996, p. 351.

<sup>11</sup> See J. Robinson, *The economic theory of incomplete competition*, M., "Progress", 1986, p. 117

### **Conflict settings**

In modern economic studies, monopoly is also discussed with different meaning. If earlier the monopoly and monopoly power were identified, now separate researchers are distinguishing these concepts, given the fact that monopoly is not mandatory to have absolute monopoly on the market. Thus, in the textbook of "Economics", S. Fischer, R. Dornbush and Schmallensy did not condition monopoly power by the existence of monopoly. According to them, the seller controls the monopoly power if the price of its product can be increased by reducing production volumes<sup>12</sup>. In our opinion, this approach represents monopoly (including monopolists) in a broad (not purely narrow) meaning that is important in terms of settlement. At least it is not essential for the society (consumers) that the infringer of their interests is a pure (with 100 percent share in the market) monopoly or a large market power (for instance, with 80 or 95 percent share).

### **Research results**

Monopoly is characterized by the following 4 criteria in the textbook of "Microeconomics" published by the general editorial of Doctor of Economics, Professor V.G. Galperin: 1) absence of perfect substitutes, 2) lack of market access, 3) large number of buyers opposed to one vendor, 4) perfect awareness (both sellers and buyers)<sup>13</sup>. Here just the monopolistic characteristics are presented. Together with this monopoly, this textbook also regards the term "monopoly power" and Chapter 10 is entitled "The Monopoly and Monopoly Power". In other words, the monopoly is viewed in 'narrow' and 'broad' senses in the textbook. The Economic Explanatory Dictionary (hereinafter, the Dictionary) interprets the term as a "bouquet" of the notion of "monopoly". Despite the similarity of the Russian and English terms (монополия, monopoly), the concepts of "monopolist" and "monopoly" are separated. The term "monopolist" has been used to describe a particular type of market or branch. "1) a market where the number of sellers is so small that each of them is capable of affecting the total amount of the proposal; 2) a large branch in which a small number of firms controls over the full or most part of production (private monopoly)"<sup>14</sup>.

The term "monopoly" is also described in a dual sense.

"1) The exclusive right granted to a state, enterprise, organization or a person to engage in any activity. In the market economy it is opposed to free competition. 2) Largest companies (firms, corporations) and/or their associations (cartels, trusts, concessions, corporations, conglomerates). Monopolists concentrate large part of the production or sales of goods and services in their hands allowing them to dominate the market and dictate their conditions to the consumer until the price of monopoly profits."<sup>15</sup>.

---

<sup>12</sup> See S. Fisher, R. Dornbush, R. Schmalensy, Economics, tr. from English, M., "Delo", 1998, p. 193.

<sup>13</sup> See V.M. Galperin, S.M. Ignatev, V.I. Morgunov, Microeconomics, "Economic school", 1999, vol. 2, p. 75-77.

<sup>14</sup> Kirakosyan G., Ghushchyan H., Tigranyan I., Economic Explanatory dictionary, Y., "Economist", 1999, p. 271.

<sup>15</sup> The same place, p. 281.

As we have seen, at the first sight the concepts of "monopolist" and "monopoly" have been given different contents in the dictionary. Although two terms are presented in a dual sense, they complement one another and both express the same meaning. The term "monopolist" was first partially identified with the oligopolistic market structure with the difference that a small number of vendors separately can not affect the overall supply. The second meaning of that term does not conform to the essence of the concept of "monopoly", therefore, as we have already mentioned, monopolism (as well as monopoly) is a typical market concept. Consequently, it is manifested only in the market and can not be neither a branch nor particularly a production.

The dual sense of the term of monopoly should also be considered respectively. The first meaning is to have the right to engage in economic activity that is opposed to free competition, the second is to have such a marketable, great position (dominating position) thanks to which big companies can dictate market conditions. In the first case, an economic subject can be considered monopolist in a broader sense and/or carry monopoly activities only in case of certain additional conditions. In the second case, the monopoly is presented in a broad sense. As we have already mentioned, "monopoly" reflects one aspect of the concept of "monopoly".

In the economic literature several types of monopoly are separated. E. Dolan and D. Lindsey distinguished between closed, natural and open types. According to them, the closed monopoly contravenes competition by other firms with legal restrictions such as copyright patent protection. In that sense it is close to the monopoly supported by the government. Natural monopoly can be characterized on the one hand as technological monopoly with state support and as a closed monopoly since the level of market protection is higher than the competitors' natural monopoly<sup>16</sup> on the other hand.

According to N. Lukyanichkova, the basis for the general classification of monopoly should be the initial (baseline) division into natural and artificial monopoly according to the following criteria: the role in national economy, the temporal character of monopoly power implementation, the characteristics of the monopoly market behavior, the reasons of occurring and the basics for functioning spheres and legislation<sup>17</sup>.

In this article monopoly (including monopolies) is being discussed from the perspective of regulation. Consequently, their classification interests us in the choice of monopoly regulation methods. In this case, we will limit the monopoly by distributing only into artificial and natural monopolies,<sup>18</sup> as, despite the diversity of the criteria of classification, the choice of the regulatory model is conditioned by this criterion itself. Simultaneously it should be noted that the attitude of both the economists and the individual countries is not the same towards monopolies. The latter is

---

<sup>16</sup> See E. Dolan, D. Lindsay, *Microeconomics*, tr. from English, 1994, p. 190.

<sup>17</sup> N., P., Lukyanichkova, *Natural monopolists. The issues of reforming in transit economics*. M., "Rosekonacad.", 1997, p. 24.

<sup>18</sup> More about the essence of natural monopoly and he peculiarities of its regulation, see Markosyan A., Mkrtumyan M., *The state regulation of natural monopolies*, Yerevan, 2002, p. 308.

conditioned by the level of development of the countries, their geographical location and historical period.

### **Monopoly as a subject of state regulation**

According to the theoretical analysis, monopoly is considered in economic literature in narrow sense (pure monopoly) taking into account the 100% share of the shareholder in the market and in broad sense where it is understood such market managerial authority (including 100% market share) when he can impose market conditions.

The worldwide experience of monopoly regulation suggests that artificial monopoly regulation mechanisms and methods apply to a group of economic subjects that have the power to dictate market conditions. Due to this, the concept of "dominating position" has been enshrined in the legislation in all countries with a system of economic competition protection. By dominating position the value of the market power of an economic entity is understood that will enable it to become a price maker and price leader in the market. At the same time, many countries have set aside the monopolistic activities as the regulation body in the competition protection legislation regarding the dominant positions and anti-competitive agreements in monopoly. In other words, the subject of regulation is not monopoly, but monopolistic activity. For example, it is stated in Article 10, paragraph 4 of the Federal Law "On economic competition" of Russian Federation that monopoly activity is the acts of abusive authority of the economic entity and the cooperative activity of group of persons, the acts and concerted actions prohibited by anti-monopolistic law and other actions and (inactivity) recognized as monopolistic activity in accordance with federal laws as well <sup>19</sup>:

The Business Code of the Republic of Kazakhstan also defines the essence and types of monopoly and the mechanisms of its control (Chapter 15, Articles 167-176) <sup>20</sup>.

The Law on the Protection of Competition of the Republic of Belarus is called "On counteraction to monopoly activity and development of competition" (hereinafter "the Law") where the content of monopoly activity is defined in the first point of Article 1.12. According to it, monopoly activity is the actions (inaction) of economic entities and state bodies that are contradictory to the law aimed at the prohibition, restriction or elimination of competition <sup>21</sup>. From the definition of this concept it is not immediately clear what actions or inactivity are interpreted as monopolism. However, Articles 5, 6, 12 and 15 of the Law reflect economic entities (dominant and participating in anti-competitive agreements) and state authorities as well. Certain actions by state bodies (which have

---

<sup>19</sup> See the Federal Law on Competition protection (with changes in July 29, 2017) of the Russian Federation since 26 July 2006, N 135-ФЗ.

<sup>20</sup> See Business Code of the Republic of Kazakhstan (with changes and additions on 28 December, 2016) since 29 October 2015, № 375-V ЗРК. Before this law came into force the RK Law on Competition was into action in 25 December, 2015 (see the Law of the Republic of Kazakhstan since 25 December 2008 № 112-IV «About Competition» (with changes and additions on 31 October, 2015 ))

<sup>21</sup> See the Law of the Republic of Belarus since 12 December, 2013, № 94-3 «About contradictory activities of monopolistic activity and the development of competition » (in publishing house since 12 December 2013).

negative impact on the competitive environment) have been seen as a constituent element of monopoly activity.<sup>22</sup>

The legislation of the Republic of Armenia also contains prohibitions and restrictions on monopoly and monopoly activity. Paragraph 2, Article 59 of the Constitution of the Republic of Armenia stipulates that restrictions on competition, possible types of monopoly and their permissible limits can be defined only by law for the protection of public interests. The third part of the same article prohibits monopoly or abuse of dominant position in the market, unfair competition and anti-competitive agreements.<sup>23</sup> That is to say the basic law of the country forbids the monopoly activity. The logic of the Basic Law suggests that we must eliminate all monopolies (monopoly) and at the same time do not allow the emergence of new monopolists or set them by law in case they occur. There will be no problem with natural monopolies (regulated public services as well). Such a prohibition is also set out in the RA Law on Protection of Economic Competition (hereinafter RA Law).<sup>24</sup> Although the law of the Republic of Armenia does not define the term "monopoly activity", its types and requirements and basic provisions are presented in articles 5, 7, 163 and 36. The problem is to fix artificial monopolies (and in general, monopolists) by law.

First of all, the experience shows that monopolies defined by law are not less dangerous for the society. The striking example of this was the licensure of "ArmenTel" company to operate alone in nine production markets for 15 years. As a result, during these years, no substantial capital investment in the telecommunications sector was carried out and the quality of services in these markets had decreased significantly, the artificial deficit of service provision was set up and monopoly tariffs of these services were high (unreasonably high tariffs). And only in 2004, due to the cessation of single license in November and the emergence of a new operator in these markets, notable investments had been set in this area, the tariffs for services had reduced sharply and service quality had risen up.

Second, in the case of artificial monopolies, the standards that are guided by the monopoly law in certain commodity markets remain unknown.

What is the guarantee that today's "celebrities" will not appear in the list of monopolies defined by law? (experience shows that a significant part of those who receive state aid are those "famous").

Third, the "celebrities" have learned the "lessons" to avoid monopoly long before. It is sufficient that if a commercial organization is created in the name of a citizen of any "lost" state in India which has only one percent share in the Armenian monopoly product market, then we will not

---

<sup>22</sup> In the anti-monopolist and competition protection legislations of different countries the negative influences on competition environment are prohibited (for instance, the Russian Federation, the Republics of Kazakhstan, Ukraine etc.), but they were not considered as monopolistic activity.

<sup>23</sup> The Constitution of the Republic of Armenia (with changes) was adopted in 2015 December 6 by public voting and came into force on 22 December 2015, see the official website of legal information system of Armenia [www.arlis.am](http://www.arlis.am):

<sup>24</sup> RA Law on economic competition, 5 December, 2000, HO -112, [http://competition.am/uploads/resources/Law\\_of\\_SCPEC\\_12\\_04\\_2011\\_arm.pdf](http://competition.am/uploads/resources/Law_of_SCPEC_12_04_2011_arm.pdf)

have monopoly in that commodity market in accordance with the law.<sup>25</sup> In other words, the status of monopoly can always be avoided if desired. The great market dominance of the former "monopoly" on the market did not go down. The 99% share in the market gives the trading company the same chance as in the case of 100%. In such cases, a large market managing entity does not need a monopoly on the market by law to maintain the constitutional norm. Therefore, the problem is not in the market share but in the possibility of abusing this section. Whether it is the same result in the field of competition protection or the infringement of the consumer's interests, we control the activities of a monopoly commercial organization (70, 90 or 100% share). The regulatory body faces the necessity of solving the same problem: that is not to allow the abuse of market power.

Fourth, both in the American and European models of the protection of competition not the monopoly (dominating) position is prohibited but the monopolistic activity (abuses).

Fifth, even in the cases of best wishes and applied mechanisms we can not eliminate monopoly in all product markets. Moreover, there is no need to eliminate it. Consequently, the problem should not be the elimination of monopoly but the limitation of its formation and the introduction of effective competition protection mechanisms.

Sixth, some of the Republic's commercial organizations have an objectively dominant position. The state attitude towards them should be dual. On the one hand, there is a need to keep the behavior of such economic entities in the center of attention of the state regulatory body (not to allow this position to be abused) and to create an opportunity to increase their competitiveness in the external markets on the other hand. A similar approach should also be made to the emerging major commercial organizations whose products will face the problem of becoming competitive in the external market.

An absolutely different approach requires monopolies that operate only on imports. The activities of such monopolies should be under strict supervision of the state regulatory body. One of the effective ways of controlling their activities is to obtain periodic (monthly, quarterly)<sup>26</sup> information<sup>27</sup> on their price, local cost structure and volume of goods. As the experience of England, the United States, the Federal Republic of Germany and other European Union countries shows, strengthening the demand for corporate reporting will reveal many facts about corruption, tax evasion and the misleading of consumers and shareholders<sup>28</sup>.

#### **Manifestations of monopolistic activity in several Armenian commodity markets**

Armenia became a monopolistic country during the Soviet era. The overwhelming majority of mechanical engineering, large and small chemistry, color metallurgy, textile industry and shoe production, many types of food, cognac and wine products were sold out of Armenia and the state

---

<sup>25</sup> According to the RA Law, Monopoly is 100 percent share in the market (article 6, paragraph 1). According to «On legal acts» the 86<sup>th</sup> article of the RA the Legal act is interpreted by the lateral meaning of the words and expressions in it.

<sup>26</sup> Nowadays the Committee gets the information about the dimensional indicators but it is not sufficient to mark.

<sup>27</sup> About its importance see Miqaelyan M., V., The economic competition and the state regulatory issues of monopoly in the Republic of Armenia, Yerevan, 2005, page 65.

<sup>28</sup> Ivanov I., D., Modern monopolies and competitions (forms and methods of monopolistic practice). M., 1980, p. 134.

remained within the monopolistic country. However, monopoly activity (with its classic manifestations) did not develop in any commodity market and sales and acquisition of goods were under strict supervision of state bodies.

After political independence, parallel to the formation of a multidimensional economy, the existing "fertile soil" contributed to the development of monopoly activity. At the same time, new commodity companies with monopoly and market power have emerged in different commodity markets of the country whose monopolistic activities are still very popular today. First of all, the level of concentration and monopoly level are high in many commodity markets of the Republic. Despite the fact that in order to ensure free and fair competition in commodity markets and to protect consumers' interest, the State Commission for the Protection of Economic Competition (hereinafter referred to as the Commission)<sup>29</sup> has been established since January 2001, but its 17-year activity can not be considered effective because of the high level of monopoly in the economy where monopolistic activities flourish and prosper instead of free competition. Especially ineffective is the last eight to ten years activity.<sup>30</sup> Moreover, if in the first period the Commission has ensured the publicity of its activities according to paragraph 2, Article 10 of the RA Law (Commission sessions are open and the decisions are immediately posted on the Commission website) and published the bulletin each year reflecting its activity, then it has stopped the publication of the bulletin since 2009 and the installation of the decision on the website since 2013.

The trends in food production, exports and pricing in the world market and the internal market protection and development issues in the Republic of Armenia as well (based on the specific types of food products) have resulted in the following conclusion:<sup>31</sup> consumers' total income annual loss is around 290 million dollars because of the prices higher than the average prices. Even assuming that in the case the prices are reduced the consumers will not increase the demand for food products, their annual income loss per capita is \$ 87.7 dollars which is about 2.3 per cent per capita of GDP and 4.2 per cent per capita consumption. At the same time the companies make decisions about other variables besides prices. The product type is a combination of price, quality, intangible value, customer service and other features among which the companies make choices to succeed in the market. In situations where the market limits the company's ability to set flexible prices, the latter can compete with the regulation of non-price variables. One company can increase its advertising costs which will enable the company to enhance its reputation and promote the increase of sales in the market and the other can offer better after-sales service while the other company can improve the offered product package

---

<sup>29</sup> In accordance with the demands of the second and third paragraphs of the 20<sup>th</sup> Article of the Law of RA by the order of the president of the RA the seven members of the Commission were pointed (including the president and his vice president).

<sup>30</sup> Till 2016 the assessment of the Committee is given more in details in Miqaelyan M., V., Miqaelyan G., M., The main issues of economic competition protection of the Republic of Armenia, the News magazine of social sciences, 2017, N 2, p. 229-234, Michael Miqaelyan, Abusive competition and the challenges of its regulation in Armenia, Bulletin of Yerevan State University, Sociology, economics, 2017, N 3 (24), p. 11-18.

<sup>31</sup> Sargsyan H., Markosyan A., The economic reforms and the perspectives of their growth. – Yerevan, «Zangak» publishing house, 2014, p. 279-353.

(appearance, packaging improvements or due to special offers). Consequently, the price level and behavior do not always reflect the severity of competition and there is a need to address the marketing behavior. This conclusion is particularly important taking into account the economic analysis realized by the SCPEC's and the focus on the price level instead of the negative impacts of anti-competitive policies and government interventions by companies.<sup>32</sup>

Consequently, the Commission did not fulfill the function provided for in the aforementioned Article of the RA Law. In most Armenian commodity markets concentration levels have gradually increased, dominating entities have driven their competitors out of the markets and/or increased their shares using the competitors' accounts. It can be verified by examining the Commission's recent annual activity programs and reports.

As it is evidenced in Table 1, both the number of economic entities and the size and composition of their shares in the petrol and diesel fuel markets have changed significantly. During ten years a new economic entity has emerged ("CPS Oil" LTD) which did not exist in the first quarter of 2006 (even did not have a 5% share) and suddenly it became the leader in those markets. In the terms of fair competition this is an impossible phenomenon that the Commission has never referred to.<sup>33</sup>

The commission was not at its height either in 2018 in commenting on price changes in these commodity markets as an objective process conditioned by external economic factors in its annual program of activities.<sup>34</sup> In our opinion, the Commission has demonstrated either a serious professional shortcoming or negligence in the analysis or an obligation to justify and "ignore" the abuse of economic agents. In both cases we are dealing with the inadequacy of the state body acting on the account of the taxpayers for their failure to perform their functions fully. This is evidenced by the practice of commenting on the inflation rate as a result of the new rates of excise tax and tax on diesel fuel with increased value tax and justifying the actions of economic entities with those changes since January 1, 2010.

---

<sup>32</sup> The same place, p. 333.

<sup>33</sup> See the annual activity reports of 2006 and 2009 of SCPEC of the RA, the annual program of activity of 2018 and the interpretation of the Committee on inflation in these markets.

[http://competition.am/uploads/resources/Report\\_2006\\_Vo\\_13\\_11\\_04\\_07.pdf](http://competition.am/uploads/resources/Report_2006_Vo_13_11_04_07.pdf) ,

[http://competition.am/uploads/resources/Report\\_2009\\_vo52.pdf](http://competition.am/uploads/resources/Report_2009_vo52.pdf),

[http://competition.am/uploads/resources/Annual\\_Program\\_2018.pdf](http://competition.am/uploads/resources/Annual_Program_2018.pdf),

[http://competition.am/index.php?page=news\\_cases&newsID=1489&lng=1](http://competition.am/index.php?page=news_cases&newsID=1489&lng=1)

<sup>34</sup>We touched upon the not augmented "analysis" of the Commission and its not being proved in our other research (see the previous edition of this periodical).

Table 1

## The dynamics of several criteria of «Petrol» and «diesel fuel» commodity markets in 2006-2016

Name of commodity market	2006				2016*			
	The number of firms	The level of concentration %	Progressive firms		The number of firms	The level of concentration %	Progressive firms	
			Name	Department			Name	Department
Petrol	7	82.6	«Flash» LTD, «Civil petrol service» PO, «Mika Armenia Trading»	45.1 37.5 5.3	3	100	«CPS Oil Corporation» LTD, «Flash» LTD, «Max Petrol» CJSC,	60 34 6
Diesel fuel	11	79.8	«Flash» LTD, «Sokol Oil» LTD, «Civil petrol service» PO,	41.0 24.4 14.4	3	100	«CPS Oil Corporation» LTD, «Flash» LTD, «Max Petrol» CJSC,	- - -

\*The Committee had addressed the study and analysis of diesel fuel market the last during 2010 annual activity program and 2009 annual activity program reporting according to which by the first 9 months indicators of 2009 7 marketing subjects were acting in the market such as “Flash” LTD, “Petrol group” LTD, “Mika Corporation CSJC with 47.3, 40.8 and 7.0 percent shares respectively.

Let's see how petrol and diesel fuel prices actually correspond to the legislative changes (see Table 2). Last year on December 30 in petrol stations petrol was sold at 410 drams and diesel fuel was sold at 380 drams per liter. Petrol sales price without AVT (hereinafter AVT) and excise tax on 30 December, 2017 was 322.8 drams per liter and on January 15, 2018 was 328.14 drams, the difference is 5.34 AMD. It turns out after the new excise tax rate has been applied, the economic entity has gained an additional 5.3 drams of revenue per 11 of January 15 on January 22 it was 13.68 drams income, on February 15 for 22 drams and the selling price growing rate (without excise tax and AVT) was 6.8% which is significant and should be of concern to the Commission in terms of abuse of dominating position.

Table 2

**The calculation of the prices of petrol and diesel fuel and the changes in their composition under the legal changes**

	30.12.2017	15.01.2018	22.01.2018	15.02.2018	15.02.2018 with % compared with 30.12.2017
<b>Petrol*</b>					
1, price, drams	410	430	440	450	109,76
2) Excise tax, drams (30.12.2017 for one ton 25000, since 2018 January 1 40000)	18.87	30.19	30.19	30.19	160
3) AVT, drams	68.33	71.67	73.33	75.00	109.8
4) The price of petrol sale without AVT and excise tax	322.8	328.14	336.48	344.81	106.8
5) difference compared with 30.12.2017, drams	-	5.34	13.68	22.01	-
<b>Diesel fuel**</b>					
1, price, drams	380	440	450	460	121.1
2) Excise tax, drams (30.12.2017 10% not less than for one ton 35000, since 2018 January 1 13000)	29.17	10.83	10.83	10.83	37.1
3) AVT, drams	-	73.33	75	76.67	-
4) The sale price of diesel without AVT and excise tax / taking into account the influence of AVT ***	350.83 / 321.6	355.84 / -	364.17 / -	372.5 / -	106.2 / 115.8
5) Difference compared with 30.12.2017, drams	- / -	5.01 / 34,24	13.14 / 42.57	21.67 / 50.9	- / -

\*The coefficient of petrol average density is 1t=1325 l,

\*\* The coefficient of diesel fuel average density is 1t=1200 l,

\*\*\* If the diesel fuel would have taxed with AVT and accepting that the salary, the fatigue of main resources and revenue would have totally formed 50 %, then the sale price would have become 321.6 drams without AVT and excise tax.

Meanwhile, according to the optimistic assessment of the Commission on January 12 in 2018, there can be no mention of abuses in the fuel market.<sup>35</sup> Even after the economic entities twice raised the petrol price by 10 drams the regulator did not consider it necessary to start proceedings for the disclosure of abuses.

The situation is slightly different in the diesel fuel market. Last year diesel fuel was not taxed by AVT and the excise tax amounted to 10% of the exemption price but not less than 35,000 drams per 1 ton. Since January 1, 2009 the excise tax rate for diesel fuel amounted to 13,000 drams per ton and it was started taxable by AVT. The excise tax on diesel fuel in December totaled 29.17 drams, the selling price (excluding excise tax) was 350.83 drams and in January 2018 it was 10.83 drams and from 355.84 drams it became 372.5 drams respectively.

To ensure comparability in the same conditions, let us assume that last December diesel fuel is taxed by AVT (taking into account the AVT impact) then the selling price (without excise tax and AVT) will be 321.6 drams. In this case, as compared to last December, the selling price of diesel fuel (excluding excise tax and AVT) surpassed by 32.24, 42.57 and 50.9 drams respectively. In other words, economic entities and those with oligarchic market economies have gained extra profits from the possibility of changing tax legislation.

The examples are not single. Numerous examples can be brought from other commodity markets some of which we have covered in our previous publications<sup>36</sup> and others will be discussed in further studies. They show not only the ineffectiveness of the activities of the Commission but also its criminal indifference and professional ignorance and inability.

The solution to the problem can be achieved through the transformation of institutional structures and the application of new regulatory mechanisms.

### **Institutional Measures**

a) a radical change in the formation mechanism of the regulatory body. The goal is to ensure the independence of the regulator and its individual members. More than 18 years' experience shows that both the regulator and its individual members are in the process of making decisions in an effort to overestimate the "superior" reprimand. Separate members in their turn try to "win" the favor of the Regulator Chairman (Committee Chairman) with the hope of continuing to work in a new timeframe after the expiry of the timeframe established by law and also hoping to use foreign business trips and other services as well. In the case of the aforementioned favor, members with such posture (unfortunately they are majority, as a rule) are in a "privileged" condition over the entire period of time appointed. It is not accidental that, as a rule, not the professionals and principal members continue to work the second and the longer period of time but the "puppets" and "commissioners" of the Chairman of the Commission who are guided not by the objective necessity of solving the problem while voting for decision but by the temptation to receive the satisfaction of

---

<sup>35</sup> See the respond of the Competitive body of the RA to ARU. The can be a word about the abuses in fuel market [http://competition.am/index.php?page=news\\_cases&newsID=1489&lng=1](http://competition.am/index.php?page=news_cases&newsID=1489&lng=1)

<sup>36</sup> See Miqaelyan M., V., Miqaelyan G., M., The main issues of economic protection of the RA, the Bulletin of social sciences, 2017, N 2, p. 229-234, Michael Miqaelyan, Abusive competition and the challenges of its regulation in Armenia, Bulletin of Yerevan State University, Sociology, Economy, 2017, N 3 (24), p. 11-18, M., V. Miqaelyan, A., Kh. Markosyan, E. Matevosyan, About the issues of Economic competition (the previous edition of this periodical) and etc.

the Chairman of the Commission. This is a circumstance that contradicts the principle of coordinating the regulatory body [1].

Consequently, it is desirable to minimize the role of the subjective factor in appointing members of the regulatory body. The members of the Regulatory Body should be appointed on a rotational basis with independent and recruited bank personnel who meets certain demands.

b) reorganize the two state regulatory bodies, the RA State Commission for the Protection of Economic Competition and the Public Services Regulatory Commission in the form of merging with the State Commission for the Protection of Economic Competition and the Public Services Regulatory Commission [2]. The necessity of this is conditioned on one hand by the collision between the interdepartmental interests (in some cases) and due to the small area of the country and the need for the optimization of the public administration system, on the other hand <sup>37</sup>.

#### **Application of new regulatory mechanisms**

The 18-year experience of the activities of the Commission has revealed some obstacles and omissions of existing mechanisms, the elimination and the elaboration of new mechanisms have become urgent.

Let's introduce some of them and suggest solutions.

a) Ineffective mechanism for the implementation of the decisions made by the Commission which often turns out to be non-existent. According to Article 23, paragraph 1, point e of the Law of the Republic of Armenia, the obligation of the Commission to fulfill the decisions of the Commission is under the president's responsibility. At the end of the service (usually by the head of the Legal Service) the courts are often "dumped" into seemingly simple cases at first sight and in some cases they are not subject to discussion in the Commission as there is no clear mechanism for controlling those decisions.

Since the Commission is a collegiate body the control should also be exercised collectively.

b) Election of the staff. The quality and effectiveness of the work of the Commission largely depends on the quality and impartiality of the staff and the Commission is responsible as the collegial body. It is appropriate that the issue of appointing leading cadres is resolved at the collegial level.

c) As we have shown above, the activities of the Commission over the last nine years have gradually become non-transparent even though the transparent and public function is enshrined in the RA Law. One of the reasons for this is the absence of a transparent and the mechanism for controlling its public activity .

#### **Conclusion**

Thus, we conclude from the above mentioned that there are numerous institutional, managerial and organizational deficiencies and shortcomings in the studied system the quick and systematic reforms of which will open the way for noticeable improvement of the level of economic competition in the republic, the creation of favorable environment for entrepreneurial activity and investment.

---

<sup>37</sup> See M. Miqaelyan, the market and the necessity of its formation, the Republic of Armenia, daily paper, 03.12.1996

**References**

1. Միքայելյան Մ.Վ. Հայաստանի ապրանքային շուկայի կենտրոնացման մակարդակը և առաջնահերթությունները //Սոց. մոտեցումները Հայաստանի մարտահրավերներին. գլոբալ հեռանկարները, տեղական իրողությունները, Գիտաժողովի նյութեր, Եր., 2010. էջ՝ 328-335:
2. Մարկոսյան Ա.Խ., Մկրտումյան Մ.Ս. Բնական մենաշնորհների պետական կարգավորումը //Եր., 2002, "ԱՐՏ" հրատ. 245 էջ:

**References**

1. M.,V. Mikaelyan, Concentration Levels and Priorities of Armenian Product Markets, Socialistic Approaches to the Challenges of Armenia, Global Perspectives, Local Realities, Conference materials, Yerevan, 2010, pp. 328-335.
2. Markosyan A.Kh., Mkrtumyan M.M. State regulation of natural monopolies, Yerevan, 2002, p. 245.

**ՄԵՆԱՏԻՐՈՒԹՅՈՒՆԸ ԵՎ ՀԱՅԱՍՏԱՆԻ ՀԱՆՐԱՊԵՏՈՒԹՅՈՒՆՈՒՄ  
ԴՐԱ ԿԱՐԳԱՎՈՐՄԱՆ ՀԻՄՆԱԽՆԴԻՐՆԵՐ**

**Մ.Վ.Միքայելյան<sup>1</sup>, Ա.Խ.Մարկոսյան<sup>1,2</sup>, Է.Ն.Մաթևոսյան<sup>1</sup>, Լ.Յու.Յարմալոյան<sup>3</sup>**

*<sup>1</sup>Երևանի պետական համալսարան*

*<sup>2</sup>Շուշիի տեխնոլոգիական համալսարան*

*<sup>3</sup>Մ.Վ. Լոմոնոսովի անվան Մոսկվայի պետական համալսարան, Երևանյան մասնաճյուղ*

Հասարակական ընկալման մեջ «մենատեր» եզրույթը զարգացման որոշակի փուլեր է անցել: Եթե 20-րդ դարի սկզբին այդ եզրույթն օգտագործվել է նեղ իմաստով՝ որպես մեկ վաճառողի և բազմաթիվ գնորդների (կամ մեկ գնորդի և բազմաթիվ վաճառողների) շուկայական փոխհարաբերություն, ապա հետագայում՝ մրցակցության պաշտպանության օրենսդրությունների ընդունմանը զորգահեռ, թե՛ այդ հարաբերությունների պետական կարգավորման, և թե՛ տնտեսագիտական ու իրավագիտական գրականության մեջ տիրապետող դարձավ դրա լայն իմաստով կիրառությունը, որի դեպքում կարգավորման հիմքում ընկած է ոչ թե շուկայում միակ սուբյեկտ լինելու հանգամանքը, այլ՝ տնտեսվարողի շուկայական իշխանության այն աստիճանը, որը նրան հնարավորություն կնձեռի չարաշահել այդ իշխանությունը:

Ներկայումս մրցակցության պաշտպանության համաշխարհային փորձը վկայում է, որ մրցակցության և (կամ) սպառողների շահերի պաշտպանության առումով կարևոր չէ, թե որ տնտեսվարողն է չարաշահումներ կատարել, մենատերը՝ թե՛ շուկայական մեծ իշխանությամբ տնտեսվարողը (այսուհետև՝ Մ և ՇԻՏ): Երկու դեպքում էլ տնտեսական հետևանքները նույնն են՝ շուկայի մուտքի խոչընդոտներ են հարուցվում և սպառողների շահերն են ոտնահարվում: Այդ է պատճառը, որ դրանց կարգավորումներն էլ տարբերակված չեն:

Նման փորձ կա նաև Հայաստանում: Չնայած մրցակցության պաշտպանության մասին օրենքում տարբերակված են Մ և ՇԻՏ ունեցող տնտեսվարողները, սակայն երկուսի նկատմամբ էլ կարգավորման նույն լծակներն ու մեխանիզմներն են կիրառվում:

Ուսումնասիրությունները վկայում են, որ կարգավորողը միշտ չէ, որ համարժեք գնահատական է տալիս և վերաբերմունք է ցուցաբերում տնտեսվարողների նկատմամբ: Մասնավորապես, 2018թ.-ի տարեսկզբին հարկային օրենսգրքի որոշ դրույթների ուժի մեջ

մտնելու հետ կապված գնահի մեկնաբանությունը Մ և ՇԻՏ-ի գործողություններով պայմանավորված մասնագիտական առումով վիճահարույց է:

**Բանալի բառեր.** մենատիրություն, մենաշնորհ, ապրանքային շուկա, գերիշխող դիրք, մենատիրական գործունեություն, մրցակցության պաշտպանություն

## МОНОПОЛЬНАЯ ДЕЯТЕЛЬНОСТЬ И ПРОБЛЕМЫ ЕЕ РЕГУЛИРОВАНИЯ В РЕСПУБЛИКЕ АРМЕНИЯ

**Մ.Վ.Միսաքյան<sup>1</sup>, Ա.Մ.Մարկոսյան<sup>1,2</sup>, Յ.Ն.Մատեոսյան<sup>1</sup>, Լ.Ս. Երմալով<sup>3</sup>**

<sup>1</sup>Երևանский государственный университет

<sup>2</sup> Шушинский технологический университет

<sup>3</sup> Московский государственный университет имени М.В. Ломоносова, Ереванский филиал

В общественном восприятии термин «монополист» прошел через определенные этапы развития. Если в конце 19-го и начале 20-го столетий этот термин использовался в узком смысле, как рыночные отношения одного поставщика и нескольких покупателей (или одного покупателя и нескольких поставщиков), то в дальнейшем в экономической и юридической литературе и в практике государственного регулирования рынка, его стали применять в самом широком смысле. Притом, основой урегулирования является не тот факт, что монополист является единственным субъектом на рынке, а скорее степень рыночной власти, которая позволяет ему злоупотреблять эту силу.

Глобальный опыт защиты конкуренции в настоящее время доказывает, что с точки зрения конкуренции и защиты интересов потребителей, не имеет значения, является ли предприятие монополистом или доминирующим на рынке субъектом предпринимательства. В обоих случаях экономические последствия одинаковы: создаются рыночные барьеры и нарушаются интересы потребителей. Вот почему механизмы их регулирования не различаются.

Существует также такой опыт в сфере защиты экономических отношений Республики Армения. Хотя законодательство закрепило понятия "монополия" и "доминирующая на рынке экономическая организация", в отношении обоих применяются те же рычаги и механизмы воздействия.

Исследования показывают, что в последние годы регулятор не всегда действует эффективно и не дает адекватную оценку монопольной деятельности субъектов. С целью повышения эффективности работы регулятора необходимо повисить степень ее независимости и предусмотреть некоторые механизмы контроля за его действиями.

**Ключевые слова:** монополия, монополист, рынок, монопольная деятельность, доминирующий на рынке, защита конкуренции.

Ներկայացվել է՝ 27.07.2018թ.

Գրախոսման է ուղարկվել՝ 31. 07.2018թ.

Երաշխավորվել է տպագրման՝ 06.12.2018թ.

## **THE THEORETICAL AND PRACTICAL MANIFESTATIONS AND PROBLEMS OF SHADE ECONOMY. ARMENIAN SHADE ECONOMY IN THAT CONTEXT**

**A. S. Saribekyan**

*Yerevan State University*

---

*Shade economy exists in every country no matter it is a developed country or a developing one. Today, shade economy comprises 22 percent of global GDP around the world which is more than \$ 10 trillion and which is gradually increasing. Developing countries have a significant role here. Armenia is not also an exception where not only the scale of the shade but also its penetration into the socio-economic system are problematic.*

*There is a general opinion according to which it is impossible to completely and finally defeat the "shade", but it is quite realistic to reduce it for several times. Therefore many countries have succeeded to implement it in their economies. Here it is important to understand the causes and consequences of the studied phenomena which, being highly correlated and connected with each other, have created a rather closed and vicious circle.*

*"Shade" has become a global problem today. Naturally, the fight against "shade" is not only one of the most important issues for individual countries but also for the world economy.*

*Shade economy in Armenia is of a systemic character with structural multilevel issues which means the review of the RA economic policy and implementation of structural reforms considering the struggle against the corruption and shade economy as the primary priority.*

**Key words:** *shade economy, corruption, shade circulation, shade in economy, the specific role of shade in GDP*

### **Introduction**

The phenomenon of shade economy has recently been discussed quite often conditioned by its growing scale, large scale of emerging into the different socio-economic spheres and by its diversity of new forms and types of "shade", shortly, with its predictable and unpredictable "shady" manifestations. Shade economy exists in every country no matter it is a developed country or a developing one. Today, shade economy comprises about 22 percent of global GDP around the world which is more than \$ 10 trillion and which is increasing [1:15]. Here, the growing specific weight of developing countries is particularly evident [2:5].

There is a general opinion that it is impossible to completely and finally defeat the "shade", but it is quite realistic to reduce it for several times [3:7]. Therefore, many countries have succeeded to implement it in their economies. Shade economy, along with corruption, directly depends on the level of development of the society which the necessity of correct understanding of socio-economic relations and interests and the importance of adequate treatment and struggle against which these phenomena is conditioned by.

Shade economy forms corruption in politics and in the sectors of vital importance of the economy. Corruption, in its turn, helps new spheres and types of shade economy to be formed. Shade economy and corruption hinder the development of national economy, the establishment of civil society and its institutional development, rise of the living standards of the population thus endangering the normal development and dignified existence of the state. That is why the primary task of each state is the thorough investigation and also the approximately oriented assessment of its impact on the state and the living standards of population and the possible management and reduction of corruption and "shade" by all these means.

Here it is very important to understand the reasons and consequences of these already studied events, the purposes and ways which, being highly interconnected and interrelated, have created rather close and vicious circle. This connection has become a norm of economic activity today on one hand and a world issue on the other. From this point of view the shade activity and the struggle against it have become one of the urgent and most important issues of not only separate countries but for the world economy at large.

Taking into consideration that fact that "shade" and corruption are interrelated and interconnected, their investigation suggests complex approach. Nevertheless, within this research the study of "shade" is mainly focused on as the logical continuation of the research done on corruption [4:531-542].

## Research results

### The essence of shade economy and its content peculiarities

The research on shade economy is rather complicated which is evidenced by the fact that there is no proper definition of shade economy yet. The definitions of "shade" are so numerous as multi-layered and diverse their time and space manifestations are. It is the intended hiding of income, informal labor market and informal employment, tax evasion, organized crime, drug trafficking and so on. The definition of "shade" is also complicated by the fact that the results from shade activity are hidden and, therefore, are not controlled by the state authorities, are not fixed by national statistical services and therefore it is not possible to determine the exact scales. It is not accidental that at the beginning of the study (1930s) "shade" was simply referred to as "*economy beyond the authority of the government*" [5:3]. And since the 1980s, when this phenomenon has gained international recognition, it has become the topic of hot discussions of economists, the definitions of shade economy has become diverse and varied due to various expressions of rapid growths of shade economy. In general, the shade economy is regarded as any economic activity which contradicts the law. It is also characterized as unregistered and uncontrolled activity in the official statistical bodies in which production, consumption, exchange and so on are included. J. Thomas, agreeing that "it is difficult to give a formal definition for shade economy," simply states that the shade economy "includes types of activities that are not registered in national income accounts" [5:86]. F. Smith defines it as "legal or illegal market production of goods and services that are not reflected in the official estimation of GDP" [see 5, 6]. D. Gills and L. Teddness define shade economy as "an economic activity that is not registered in national accounts and is left out of the tax base" [see 5, 6]. In some approaches, the concepts of "criminal" and "shade" economy are differentiated [6:71]. The "criminal" as well as the "shade" are prohibited economic activities which are intentionally hidden from accounting and are not recorded in official reports. Moreover, if the criminal type was considered to be based on violence, extortion and activities closely related to the criminal community and criminal capital, the shade type is not perceived as a criminal offense as it included the activity of production of ordinary products and services. There are two viewstands on criminal and shade economic relations today:

- The criminal and shade economies are regarded as separate economic sections,
- The shade economy is regarded as inseparable part of criminal economy.

In current science the issue of the close connection between the corruption and shade economy is in the centre of attention of the researchers. According to I. Klimkin and L. Timofeev, the main and evident peculiarity of shade economic relations is that they are inseparable from the corruption [7:55]. According to Yu. Latova and S. Kukalyeva, the phenomenon of corruption is the maintenance of official position for his/her own purposes and/or the corruptive economy is presented as a sphere of shade economy [7:57]. In this context the priority of shade economy and corruption is principally highlighted. Some researchers think that corruption is a part of shade economy, and,

consequently, its result. Others think that corruption is one of the results through which the tax payers pass on to the shade. One may argue round this topic endlessly as the shade and corruption being in close relations, mutually stimulate each other's expanding which results in:

- Distortion of ownership rights,
- Distortion of competitive mechanisms,
- Creating obstacles for fair entrepreneurial activity ,
- Leakage of the capital from the state,
- Reduction of inflow of investments,
- Reduction of technologies and innovations,
- Taxes which are not paid,
- Inefficient use of budgetary funds,
- Unfair high prices etc.

All these hinder the formation of a competitive economy, the development of civilized entrepreneurship, poverty reduction, growth of prosperity and effective civil society development thus promoting the expanding of the shade economy. In fact, the shade with its various expressions is present in any social-political and socio-economic systems in a certain extent and/or manner.

So, the shade economy is characterized by its narrow and broader sense. In the narrow sense, shade activity is the production of goods or services that is permitted by law but deliberately hidden in order to avoid taxes, social payments and other compulsory charges. In the broad sense, the shade economy can be described as out of law activity controlled by some of the privileged governing elite bodies in connection with the illegal distribution and redistribution of revenues and assets. It can include elements of crime as both trade of people, weapons and drugs and corruption, distortions of tax mechanisms and informal labor market in the form of informal economy. It is not accidental that informal economy is often coincided with the shade economy.

Despite the above mentioned opinions which say that the shade economy can not be estimated and it is difficult to give a proper estimation, however, two main methods of shade estimation are working now:

- Direct method or, otherwise, micromethod which is based on special observations and researches the main purpose of the analyses of which is the discovery of difference between the revenues and costs of different social groups.
- Indirect or macromethod on the basis of which the published data of such tax and financial bodies as consumption expenses, investments, real GDP per capita, tax weights in GDP, state expenses, the rate of GDP growth and so on are registered.

More often it is estimated by the rate of escaping from taxes of working measure of GDP which is a very important index taking into account the circumstance which enables to directly estimate the economic situation.

The sector of the economic activity that is not accounted, significantly influences a number of macroeconomic rates which characterise the state condition, especially that of Gross Domestic Product as a result of which the real situation of the economy is distorted, particularly:

- The real size of GDP is underestimated as the most part of goods and services which gauge the state and social needs, are not taken into account while determining the total GDP.
- The rate of growth of GDP is also underestimated in the case when shade economy is growing with quicker rates than "legal" economy.

### **Types of shade economy**

Shade which penetrates into different layers and levels of economic activities and is very various, is difficult to be classified on one hand and is necessary to be classified on the other. It is more difficult to classify it theoretically as practically it can have any expression. Therefore,

according to certain criteria and contextual peculiarities its summative assortment was done /see table/.

**Table 1*****The types of shade economy***

1. <i>According to contextual peculiarities</i>	
1.1. Non official economy or white collar	An activity which is forbidden by law, which supposes hiding the employment and hidden redistribution of the results gained. Mainly “officials” are dealing with this activity that is why this type is also called “white collar”. During this activity new goods are not produced, no service is provided. Only one part of population can use some of the incomes of shade economy due to the loss of others. According to economists, this non official activity is the biggest section of economy.
1.2. Artificial or gray economy	It is legal but not registered economic activity connected with goods production and consumption and also with the services. In this section the business entities consciously refuse the official registration not having the desire to pay taxes, duties and other expenses according to law.
2. Black economy	It is the production and consumption of goods and services prohibited by law which concerns all those types of economic activities which are beyond the normal economic activity. They are violence, robbery and crime and also the production of such goods which are prohibited by law (drug circulation and other misbehaviours).
2. <i>According to the degree of legitimacy</i>	
2.1. Legal, but informal economic activity (informal, legal, illegal)	It is not prohibited by law and doesn't violate the rights of business entities, but at the same time it is not registered, typical example is house production.
2.2. Illegal economic activity	It violates the rights of other business entities and is not regulated by law. These are so called pink markets (rosy markets), example, the violation of ecological security.
2.3. Semi legal economic activity (semi-legal economy)	It is not contradicted to the law by its character, but at the same time is realized illegally in “grey markets” thus avoiding the law, among them are stock exchanges, activities without patents and employment without registration.
2.4. Illegal, criminal economic activity	It is prohibited by law and is regarded as an illegal activity in “black markets”, example, drug trade, illegal weapon industry and sale, trafficking of people, robberies and forcing etc.
3. <i>According to the rate of registration of economic activity</i>	
3.1. Hidden economy	An economic activity which is intentionally hidden by business entities from tax and statistical bodies
3.2. Lost economy	An economic activity which is not manifested in reports, i.e. business entities are insufficiently informed as a result of incomplete illustration of data or mistake made unwillingly.
4. <i>According to statistical registration of economic activity</i>	
4.1. Registered economy	An economic activity which is not manifested in reports by business entities but it is discovered by statistical bodies and is registered by special researches.
4.2. Not registered economy	An economic activity neither manifested in reports nor in statistical bodies.

So, the shade economy is a type of economic activity that is not registered and is not regulated by state authorities, it includes activities prohibited by law (illegal economy), legally authorized but not reported in the accounting records ("informal economy") and a criminal economic activity.

There are usually necessary and sufficient conditions for the formation of the shade economy and for any phenomenon as well. The necessary condition for the shade economy are those preconditions that are gradually formed on economic, social and legal spheres (see Table).

**Table 2.*****The preconditions of the formation of shade economy***

<b>Preconditions</b>	<b>Characteristics</b>
1. <i>Economic preconditions</i>	-high taxes -the shortcomings of privatization process -financial crisis and its negative influence on the whole economy -the activity of not registered economic structures etc.
2. <i>Social preconditions</i>	-low living standards of the population which supports the formation of different hidden economic activities , -high rate of unemployment and getting incomes by any means,, -unequal distribution of gross domestic product.
3. <i>Legal preconditions</i>	-incomplete legislation, -incomplete activity of legal authorities, -the absence of struggling mechanism against economic crime in illegal and criminal economic activity.

The sufficient condition for the formation of shade economy are the reasons vital for the shade and those which take it to the real field.

**Table 3*****The reasons for the formation of shade economy***

• load	The distortion of the balance between economic growth and tax
-the tax load is increasing quicker or more significantly than economic growth -the tax load is increasing and the economic growth is decreasing /typical for the period of economic decline/	
• of organisations	Increase of disorder of the average norm of revenue and tax load
• /consumers/ and the life quality and price /living standards, average consuming bucket/	Increase of disorder of real incomes of the population
•	Low rate of compulsory punishment
•	Discrepancy of shade activity and the punishments for it
•	Presence of “chain” in the formation of shade means

Shade activity affects the total socio-economic situation of the country. Admitting shade activity as a negative phenomenon with its numerous and various manifestations, however, it is interesting that the positive effects of the shade economy are also distinguished by some theorists [see 8] (see table).

**Table 4*****The results of shade economy***

<b><i>The negative consequences of shade economy</i></b>
Non favourable changes of the political situation of the country: some candidates get their positions in the government through those people who are delt with shade economy and therefore continue their corrupted activity and as a result the distrust of the population increases towards the legislative and executive branches of the government
The social lay out of the population into rich and poor

<p>Loss of morals and increase of temptation of getting incomes by any means /official position, status, robbery, corruption/  Reduction of budget revenues of all levels, the budget incomes reduction as the result of tax withholding, no income no cost  Distortion of tax field, more tax levies from responsible citizens to cover the results of economic activities and escaping from tax payments which leads to the expanding of other shade activities of business entities  Increase of corruption and crime  Wrong motivation of investment activity, the investments do not always result in new production and/or new service provision leading to non optimal economic construction  Distortion of a number of macroeconomic indices characterizing the state's situation and the real condition of economy, particularly:</p> <ul style="list-style-type: none"> <li>➤ Underestimation of the size of GDP considerable part of the goods and services which satisfy the needs of the state and the society are not taken into account while determining the total GDP</li> <li>➤ Underestimation of the growing tempo of GDP shade economy grows more rapidly than "legal" economy</li> </ul>
<i>The positive consequences of shade economy</i>
<p>Labor market for poor population as a result of which the revenues are distributed for the benefit of the latter  The satisfaction of consuming demand when the state can not gauge the demand of certain goods and products for some reasons: (business entities dealt with shade activity come to «help»)</p>

The study of the theory of shade economy gives an opportunity to understand the causes of the formation of shade activity and the factors it is conditioned by. The factors which the shadow economy is conditioned by can be subjective and objective or systemic (see Table).

**Table. 5**

*The factors which the shade economy is conditioned by*

Subjective which directly motivate people to deal with shade economy
Objective or systemic which are not conditioned by the will of the individual, they are systemic thus creating favorable environment to develop and expand the shade economy

Summarizing, we can simply conclude that how various, numerous and contradictory the manifestations of shade economy can be in real life.

**2.The manifestations of shade economy, the tendencies and issues of expanding, international practice**

*The spherical manifestations of shade economy*

For a given period, the real manifestations of the shade economy are quite diverse and not always predictable by its location and type of activity. Sometimes such events of crime as people, arms and drug trade, organized crime, etc. are included in shade economy which is also characterized as criminal economy. Sometimes it is limited by corruption, tax mechanisms and informal labor market. In the framework of this study the second option is also considered where the informal economy is particularly notable and is considered as a key component of the shade economy. The informal labor market is a reality for 2/3 of the world workers. It is rather a standard of living today more than an exception as EC Development Center experts say. An informal labor market can be manifested in different ways, ranging from unregistered labor markets ending with street trade where even global brands can be bought. Thus, 20% of Procter & Gamble's trade is implemented through street trade in developing countries. Therefore, this way of trade is the only one that demonstrates a stable trend of growth. Interestingly, this type of trade is foreshadowed even by the business plan of the company [3:4].

Despite the large-scale activities against illegal employment, the informal labor market will continue to be one of the main sources of shade economy. Indeed, informal employment is developing not only in developing countries, but also in developed countries which is primarily due to increased unemployment in Western countries and new technological opportunities as well (part-time employment, creation of one's own goods and services, their offer and demand etc. control over which is rather complicated today). As a result, if the main components of the shade economy previously were weak economic growth or missing tax components, the component of informal employment of shade sector will become dominant in the future [see 3].

### ***The tasks and trends of the development of shade economy***

«Shade» developments are still carrying intensive character all over the world with their problematic manifestations and developing trends. Today shade circulation occupies great place all over the world fluctuating round  $\frac{1}{4}$  of world goods circulation. Particularly it comprised more than 10 trillion dollars in 2016 which is 22,66 percent of world GDP\*. According to the same source, the «shade» has begun to express decreasing trends in the world /see Table/.

**Table 6**

### ***Shade economy of world scale /fact and prediction/***

Research by the Association of certified and certificated accountants (ACCA), 2017, <http://www.accaglobal.com>, citing by the author

Years	2010	2016	2017	2020	2025
The capacity of shade economy, USA, trillion US Dollars	-	> 10	-	-	-
Shade economy in world GDP /%/	35.5	22.66	22.5	22.1	21.4

In this context the summative data from the World Bank about the regional developments of shade economy are very interesting according to which the shade economy is the highest in the countries of Latin America and the lowest is in the Middle East and South African countries where active political struggle is being done against the shade.

**Table 7**

### ***Shade economy according to separate regions /by percents to GDP/***

Region	Sh.E average rate	Sh.E. minimum rate	Sh.E. maximum rate
Eastern Asia	33,3	13,4	53,0
Europe and Central Asia	40,5	19,3	67,5
Latin America	42,1	20,1	67,2
Midle East and South Africa	28,5	19,2	38,7
Northern Asia	34,0	23,5	44,8

\* The survey was conducted by the Association based on the results of surveys conducted by entrepreneurs, analytical conclusions of experts and predictions of methods of mathematical analysis. By fixing their definition of the shade, the association outlined its study framework on shade economy. Accordingly, it is defined as a "consciously concealed" economic activity from authorities /by saying concealed they understand not only tax evasion, but also the violation of working norms, avoidance of statistical reporting and so on/.

While assessing the capacity of shade economy such variables as consumer expenses, investments, real GDP per capita, the proportion of taxes in GDP, public expenses, GDP growth rates, etc. were taken into account. The study targeted 28 countries.

The studies done by the Association of Certified and certificated accountants on the positional movements of the rated countries and the changes of the sizes of the «shade» are quite impressive /see Tables 5,8,9/.

**Table 8**

**The positions of the countries according to shade economy level, 2016 \*\***

Research by the Association of certified and juror accountants (ACCA), 2017,  
<http://www.accaglobal.com>, <https://www.vedomosti.ru/opinion/articles>, citing by author

Countries	THE COUNTRIES WITH THE SMALLEST SHADE ECONOMY						THE COUNTRIES WITH THE BIGGEST SHADE ECONOMY										
	USA	JAPAN	CHINA	SINGAPORE	GERMANY	...	...	KENYA	ESTONIA	BULGARIA	PAKISTAN	BRAZIL	SRI LANKA	RF	UKRAINE	NIGERIA	AZERBAIJAN
Country position /among 28 countries/	1	2	3	4	5	...	...	19	20	21	22	23	24	25	26	27	28
Specific weight of the shade in GDP /%/	7.8	10	10.2	12.45	13			27	28	30	31.7	35	38	39	46	48	67

**Table 9**

**The rates on shade economy \*\*\* /% to GDP/**

Research by the Association of certified and juror accountants (ACCA), 2017,  
<http://www.accaglobal.com>, <https://www.vedomosti.ru/opinion/articles>, citing by the author

Country	2010	2016	2025	Trends
<i>In the world</i>	35.5	22.66	21.4	Stable reduction
USA	9,0	7.8		Reduction
Switzerland	9,1	13,4	-	Expressed growth
Japan	12,1	10		Reduction
England	13,2	-		-
The Netherlands	13,2	-		-
New Zealand	13,6	-		-
Germany	13,9	13		Reduction
Singapore	14,0	12.45	12.5	Slow growth following the abrupt reduction
China	14,3	10.2		Reduction
Spain	20	-		-
Kenya	-	27		-
South African Republic /SAR/	-	28	-	Growth
Estonia	-	28	-	-
Bulgaria	-	30	-	-
Pakistan	-	31.7	32	Growth

\*\* The next 2018 research publication on the world shade economy survey does not exist or is not yet available by the Association of Certified and Licensed Accountants, that is why 2016 data is regarded here which allow to understand the trends of shade economy development at the world level and by countries.

\*\*\* In this table shade assessment 1-100 points bar is conditionally divided into 3 levels - low /1-13/, average /13-27/, high /27-100/. In this article the countries having low and high shade position are studied.

Lithuania	34,0	-	-	-
Brazil	-	35	-	-
Sri Lanka	-	38	-	-
Romania	38,9	-	-	-
Estonia	42,3	-	-	-
Latvia	44,3	-	-	-
RF	49,0	39	39.3	Growth following the reduction
Nigeria	-	48	-	-
<b>Armenia</b>	<b>40.14</b>	<b>13&lt;corruption&lt;27</b>		<b>Reduction</b>
Belarus	53,0	13<corruption<27		-
Ukraine	58,1	46	-	-
Azerbaijan	63.3	67	-	Growth
Bolivia	68.1	-	-	-
Georgia	72,5	13<corruption<27	-	Reduction

The lowest rates of shade activities among 28 developed countries were recorded in the United States (7.8% of GDP), Japan (10%), China (10.2%) and Denmark, Switzerland, New Zealand, Singapore as well. The highest results were recorded in the countries of Western Europe, particularly in Sweden, Germany and Austria. The scale of state intervention has a clear impact on the shade economy. It is also remarkable that in South European countries and Japan shade business entities pay taxes on income from drug trafficking, robberies and other illegal activities.

It is interesting that when in 2010 35.5% of the global gross domestic product was in shade which was around 1.6 times more than in 2016 (22.66%), Switzerland (8.6%), the USA (8.8%) and Austria (9.8%) had the lowest shade economy level worldwide. It's true that the shade economy is the lowest in Switzerland but it's noteworthy that this rate has recently risen. Nearly 67% of the cash circulation in Switzerland is not economically justified and many economists consider it as a result of shade economy. Shade economy turnover in Germany was 13.9% of GDP in 2010. The shade sector has a consistent reduction trend here which is contributed by the growth of gross domestic product and the creation of new employment. In Spain the shade turnover comprised about 20% of GDP. Small businesses, tourism and real estate spheres are mostly in the shade sector. In Spain the level of payments and compulsory social contributions is rather high which is the objective reason for the existence of a shade economy.

Azerbaijan is in the first place with shade economy where shade economy comprises 67% of GDP. Nigeria is in the second place with 48% of GDP, the third is the Ukraine with 46% and the fourth is Russia with 39%.

The chronological comparison of the developing countries on shade economy is also remarkable. If in 2010 the highest rate of shade economy was registered in Georgia as 68.8% of GDP, then in recent years as a result of a consistent struggle against shade it has been placed among favorable positions giving up the first unfavorable place to Azerbaijan where the shade specific weight of GDP has risen from 63.3% in 2010 to 67% in 2016 consistently demonstrating a steady growth in shade. During the observed period this rate has decreased from 48% to 39% in Russia and in the Ukraine it decreased from 54.9% to 46%. The shade predictions are also notable according to which shade in Russia will remain high in 2025 with 39.3% of GDP thus being the highest with about 84% more than the world average. And this is the case when the reduction of global average rate of the shade. In 2025 this rate will comprise 21.39%.

It is more purposeful to regard the shade economy developments in Armenia separately and more objectively.

### **Shade economy in Armenia: developments and issues**

### The trends of the development of shade economy

Shade economy has been recorded in Armenian since the Soviet period. It has also continued to manifest itself during post-Soviet era preserving average level of shade. 35.39% of economy had been under shade in 2008 which continuing its growth comprised 41.08% in 2009. Afterwards, the shade has shown a stable decreasing rate till 2013 thus comprising 34.56%. Shade economy has shown a growing rate in 2014-2015 comprising 34.78% and 35.96% correspondingly /see Table 9/.

**Table 10**

#### The sizes of shade economy in RA in 2008-2015

2008	2009	2010	2011	2012	2013	2014	2015
35,39	41,08	40,14	38,44	35,52	34,56	34,78	35,96

Afterwards this rate has decreased appearing in the middle level interval in 2016 /27-13%/. According to the predictions on 2025 shade/GDP rate will continue to show decreasing trend /see Table 9/.

### The spherical and sectoral manifestations of shade economy

The spherical and sectoral manifestations of shade economy are also troubling. The criminal economy is in the forefront of shade economy in Armenia such as arms turnover, drug trafficking, organized crime etc. which varies between \$ 20-30 annually in average [see 9].

The tax evasion by business entities also plays a major role in shade economy. There is a serious problem with offshore schemes. High class capital in Armenia is represented by government representatives or government-sponsored individuals who have de-facto /not de-juro/ tax privileges instead of which they provide services to the authorities starting from power and financial support to ensuring their enormous financial revenues during the elections. The half-shade turnover of large businesses is also used in state policy, in particular for the purpose of obtaining military weapons which would have been problematic from political viewpoint to be included in the reporting period. Part of small business and micro business including family and individual entrepreneurship are not mainly registered and are in shade. Till 2008 there was a tax exemption for the agricultural sector, which, though being enshrined in law, brought new shades with it. The same can be said about unregistered remittances comprising large amounts. The shade economy is present in almost all branches of economy in Armenia. Almost all types of economic activities are shade. According to non official data, the shade economy in Armenia fluctuates between 40-60% and this rate reaches up to 80% in retail trade and services [see 10].

The specific weight of informal employment is also high in the shade economy (see Table 11).

**Table 11**

#### The rate of informal employment \* In agricultural and non agricultural sector /%/

*armstat.am, Labor market in RA, formal and informal employment, 2018*

Years	2008	2009	2010	2011	2012	2013	2014	2015	2016
-------	------	------	------	------	------	------	------	------	------

\* The level of formal employment is the specific weight of those having informal employment in total employment.

Agricultural sector	50.7	52.1	50.4	50.4	50.1	49.4	49.9	47.7	46.6
Non agricultural sector	22.0	20.0	17.7	17.7	19.3	19.6	22.0	17.9	18.1

Informal employment is divided into agricultural and non agricultural spheres which is conditioned by the fact that rural farms are officially considered as self-employed which is considered to be enough problematic from the point of view of official registration and control. The problem is also difficult from the viewpoint that in agricultural sector the formal employers comprise about 50% of total employers. Informal employment fluctuates between 22% in 2008 to 17% in 2016 out of agricultural sector. Although the decreasing trends in formal economy it continues to be troubling.

#### ***About the latest events of shade turnover in Armenia***

For a part of representatives of economic activity in Armenia the shade is a way to become rich and for another part just to survive. There is a clear dependence between the shade economy and the poor social condition in Armenia which has been clearly reflected in recently discovered *major trading networks* /"supermarkets"/ *working within the shade schemes*. The former authorities considered it normal that PB can supply goods to large trading network but neglected a circumstance that small businesses work with turnover tax while the majority with VAT and the appropriate registration mechanism is not provided by law. Instead of solving the existing gap legally, the problem has been settled at the level of normative acts by reaching an agreement with the tax authorities. Nowadays government considered this approach wrong and described it as corruption and the commodity turnover within that framework as shady. Of course, it is not known how it has been corrected and/or who was punished as the official information is not much on it or it states nothing. And finally, this is not the task, the task is that "City"s and other large companies have ceased contracts as a result of which hundreds of private businesses were closed because they finally pay VAT for the goods purchased for the turnover tax. Certainly, major commercial networks announced about the rise in prices for goods as a threat which was boycotted by citizens. In fact, it turned out that the reduction of shade economy could lead to significant anomalies and social additional tension. Moreover, the next government may consider that corruption is what the government has done to suppress small businesses thus disturbing economic development.

*The schemes which have been recently discovered in mining industry are also notable.* The shares of 19 companies engaged in mining and geological searching in the Republic of Armenia were purchased at different times by several individuals and organizations and were sold to the organizations working in Cayman Islands. Meanwhile, the shares of 17 companies were sold to one foreign company which suggests that the ownership of companies and assets registered in Armenia is reralized from the same center and many companies acting in mining industry have been appeared under the control and rule of one company leading to increased concentration and reduction of competition in commodity markets.

International participation is also present in these schemes which makes the situation worse. Here the problem is not the personalities but the fact of the existence of a well-organized criminal-oligarchic system in Armenia.

The schemes of shade distribution of loans and remittances which feed the criminal oligarchic system and play the role of security bag for them have been actively discussed recently and are worrying as quota stability and super profits in shade turnover are provided through them.

Under the even not thorough observations of shade developments it becomes clearly evident that the greatest beneficiaries of the created situation are the authorities and partially some representatives of society. The government being closely grown with business gets enormous bonuses and the society with its indifference towards tax evasion only strengthens these informal relations

which is a specific reaction to the unfair and inefficient state activity. It presupposes the necessity of providing a favorable practical atmosphere for economic development through consistent struggle against corruption and shade.

Here the problem of including the investments is particularly highlighted as

- a vital means of empowerment of economy on the basis of modern technologies on one hand,

- the most serious danger connected with shade economy and corruption threatens the investors on the other hand.

In this context the situation is not quite favorable which is proved by the stable reduction of the direct investment capacity during 2014-2017 in Armenia /see Table/.

**Table 12**

**The flows of foreign and direct investments in 2014-2017, mln AMD**

armstat.am/publications/ RA social economic situation in 2018

	2014	2015	2016	2017
Total investments	167441,9	118409,3	81581,3	74619,9
Direct investments	117202,3	69426,8	62679,3	93043,9

Thus, the shade economy is increasing - investments are reduced - scientific-technical progress is disrupted - economic growth is diminishing - unemployment is rising - poverty does not decline. In this chain, the fight against corruption and the task of reduction of shade economy are particularly important under the current poverty reduction urgency. The continuous high poverty rate in Armenia varies between (30-29%) for a long time. Meanwhile, the same index in Georgia is twice lower than in Armenia, in Azerbaijan - 6 times, in Kazakhstan - 4.5 times lower [see 10]. This demonstrates once again the importance of fighting against corruption and the shade economy in the economic development process.

***The issue of including the shade officially in GDP***

As a purposeful overcoming opportunity of the above mentioned tasks it is necessary to touch upon one methodological task which is to include the shade into GDP officially.

Shade as an informal economy is an indisputable component of the economy of any country. This means that it should definitely be taken into account in the calculation of GDP indices which is practiced in almost all countries. It is not circulated in Armenia as an official index. There are some expert assessments that are reflected in international reports. Meanwhile, it is important that the shade economy must be taken into account in the methodology of calculating GDP which can be obtained as a result of various expert assessments. By its essence, this index shows the amount of unpaid taxes, i.e. the hidden turnover and hidden real income. If the shade GDP indicator is officially calculated and circulated, it will enable to have a clear understanding of the economy movement, newly opened industry and the final result according to the rate of its decrease or increase. In this context, the debates round the topic "Caucasus and Central Asia. Regional Economic Perspectives [see 13]" by the International Monetary Fund (IMF) are interesting according to which the shade economy of Armenia comprises more than 35 percent of the gross domestic product of the country. If this index is clearly calculated and adopted officially, "... it would mean that the economic policy of Armenia should be revised, the tax field should be changed" [see 14], where the tax-GDP ratio should be one of the key indicators. First, including the shadow indicator in GDP will:

- Limit the chance of various speculations of GDP index on economy growth, increase of tax revenues, shade reduction and so on,
- Enable to count the tax load by law, to estimate the possible tax revenues and/or tax miscalculations. Such approach will support to abolish the monopoly in Armenia and the formation of open competitive economy.

From this viewpoint it will be proper if *in the calculation methodology of GDP the approach of including shade into GDP and its manifestation as a component of anti-corruption and target rate of the struggle against the shade* are taken into account.

### Conclusion

The above mentioned is more highlighted in “shade increase - investment decrease – slow down of scientific-technical progress – unemployment rate increase – poverty rise” chain in the way of efficient realization of the current issues.

Summarizing, we can say that shade economy staying in the middle level of shade in Armenia and varying between /35-30/ percent during the whole post-Soviet period today also continues to carry a strict systemic character thus showing serious structural problems which should be solved through structural reforms considering the struggle against corruption and shade as the primary supremacy.

### References

1. Выходящие из тени. Теневая экономика до 2025 года» Исследования Ассоциации дипломированных сертифицированных бухгалтеров (АССА), <http://www.accaglobal.com>.
2. Теневой сектор будет расти вместе с ВВП, 03.07.2017, Исследования Ассоциации дипломированных сертифицированных бухгалтеров (АССА), <http://www.accaglobal.com>
3. Бахвалова М., Тень, знай свое место! Как бороться с теневой экономикой и можно ли ее победить, 12.07.2017, [http://www. Banki.ru](http://www.Banki.ru)
4. Սարիբեկյան Ա. Կոռուպցիան որպես ազգային անվտանգության սպառնալիք. հակակոռուպցիոն քաղաքականության խնդիրները և մոտեցումները, «Կառավարման ակադեմիա, Հանրային կառավարում, Միջազգային գիտաժողով, հատուկ թողարկում, Երևան, 2017, էջ 3-4.
5. Бовкун Н.Ч., Тамашевич В.Н, Теневая экономика, М:, 2015
6. Бекряшев А.К., Белозеров И.П. Теневая экономика и экономическая преступность, М:, 2013
7. Байзаков Данияр Богенбаевич ‘Теневая экономика и коррупция - существующая взаимосвязь’, Казахстан 2015
8. Удодова В. И., Позднякова А. М., Влияние коррупции на экономический рост и развитие стран, 2013
9. <http://www.worldbank.org/>, World Development Indicators, nov. 2018, [www.weforum.org/gcr](http://www.weforum.org/gcr), The Global Competitiveness Report 2018, [armstat.am/Year Book-08.2018/pravonar.indd](http://armstat.am/Year Book-08.2018/pravonar.indd), [http://www.police.am/statistiks /year.htm](http://www.police.am/statistiks/year.htm)
10. Տնտեսությունը ստվերի մեջ, թե ստվերը տնտեսության մեջ. Ի՞նչու են Հայաստանում «ընդունում» հարկերի չվճարումը, Հրանտ Միքաելյան, Կովկասի հնասիրտուտը ՀՀ-ում ,03.09.2015, <http://verelq.am/hy/node/3324>
11. armstat.am, Աշխատանքի շուկան ՀՀ-ում, Ֆորմալ և ոչ ֆորմալ զբաղվածություն, 2018

12. Հայաստանի տնտեսությունը 2016 թվականին. ՀՀ տնտեսական սպասելիքներ 2017թ. ընթացքում, «Անվտանգության քաղաքականությունների քննարկումների բարելավումը Հայաստանում» ծրագիր (NED), հեղինակ: AIISA Partner Experts, Armenian Expert Community, Գագիկ Մակարյան, Հայաստանի գործատուների հանրապետական միության նախագահ, ՄԱՀՀԻ գործընկեր փորձագետ, [25.03.2017](http://www.aravot.am/2012/11/14/311366/)

13. Արժույթի միջազգային հիմնադրամը (ԱՄՀ), «Կովկաս եւ Կենտրոնական Ասիա. տարածաշրջանային տնտեսական հեռանկարներ», զեկույց, 2017թ.

14. Հարությունյան Տ., Արժույթի միջազգային հիմնադրամը (ԱՄՀ) ստվերի մասին, <http://www.aravot.am/2012/11/14/311366/>, 2017

## References

1. Emerging from the shade. Shade economy till 2025, Research by Association of certified and certificated accountants, (ACCA), <http://www.accaglobal.com>.

2. Shade sector will rise along with GDP, 03.07.2017, Research by Association of certified and certificated accountants, (ACCA), <http://www.accaglobal.com>.

3. Bakhvalova M. Shade, go to your place! How to struggle against shade economy and may it be defeated, 12.07.2017, [http://www. Banki.ru](http://www.Banki.ru)

4. Saribekyan A. Corruption as a threat for national security: tasks and approaches of anti-corruption policy //RA Academy of Management, Public Management, International Conference, special issue, Yerevan, 2017, p. 3-4.

5. Bovkvun N.Ch., Tamashevich V.N. Shade economy, M., 2015.

6. Bekryashev A.K., Belozarov I.P. Shade economy and economic crime, M., 2013.

7. Daniyar Bogenbay Bayzakov, “Shade economy and corruption – existing interrelation”, Kazakhstan, 2015.

8. Udodova V.I, Pozdyakova A.M. The influence of corruption on the economic growth and the development of the countries, 2013.

9. World Development Indicators, nov. 2018, <http://www.worldbank.org/>, [www.weforum.org/gcr](http://www.weforum.org/gcr), The Global Competitiveness Report 2018, [armstat.am/Year-Book-08.2018/pravonar.indd](http://armstat.am/Year-Book-08.2018/pravonar.indd), [http://www.police.am/statistiks /year.htm](http://www.police.am/statistiks/year.htm)

10. Economy in the shade or the shade in the economy. Why do people “accept” tax evasion in Armenia? Hrant Miqaelyan, Caucasus Institute in the RA, 03.09.2015, <http://verelq.am/hy/node/3324>

11. armstat.am, Labor market in the RA, Formal and informal employment, 2018.

12. The economy of Armenia in 2016, Economic expectations during 2017, «The improvement of security polices in Armenia» project (NED), author: AIISA Partner Experts, Armenian Expert Community, Gagik Makaryan, the President of the Republican Union of employees, AIISA expert-partner, [25.03.2017](http://www.aravot.am/2012/11/14/311366/)

13. International Currency Fund (ICF), «Caucasus and Central Asia, regional economic issues», report, 2017.

14. Harutyunyan T. International Currency fund (ICF) about shade, <http://www.aravot.am/2012/11/14/311366/>, 2017.

## ՍՏՎԵՐԱՅԻՆ ՏՆՏԵՍՈՒԹՅԱՆ ՏԵՍԱ-ՊՐԱԿՏԻԿ ԴՐԱՆՈՐՈՒՄՆԵՐԸ և ԽՆԴԻՐՆԵՐԸ. ՀԱՅԱՍՏԱՆՅԱՆՆ ԱՅԴ ՀԱՄԱՏԵՔՍՏՈՒՄ

**Ա.Ս. Սարիբեկյան**

*Երևանի պետական համալսարան*

*Բանալի բառեր.* ստվերային տնտեսություն, կոռուպցիա, ստվերային շրջանառություն, ստվերը տնտեսությունում, ստվերի տեսակարար կշիռը ՀՆԱ-ում

Ստվերային տնտեսությունն առկա է յուրաքանչյուր երկրում, անկախ նրանից զարգացած երկիր է, թե՛ զարգացող: Այսօր ստվերային շրջանառությունն ամբողջ աշխարհում կազմում է համաշխարհային ՀՆԱ-ի շուրջ 22 տոկոսը՝ ավելի քան 10 տրիլիոն դոլար, ինչը գնալով աճում է: Այստեղ արտահայտված դեր ունեն զարգացող երկրները: Հայաստանը նույնպես բացառություն չէ, որտեղ խնդրահարույց են ոչ միայն ստվերի մասշտաբները, այլ նաև նրա ներթափանցվածությունը հասարակակա-տնտեսական համակարգում:

Կա ձևավորված կարծիք, որ հնարավոր չէ ամբողջությամբ և վերջնականապես հաղթել «ստվերը», բայց լրիվ իրատեսական է այն նվազեցնել մի քանի անգամ: Համենայն դեպս դա հաջողվել է շատ երկրների: Այստեղ շատ կարևոր է հասկանալ ուսումնասիրված երևույթների պատճառները և հետևանքները, որոնք խիստ փոխկապված լինելով՝ ստեղծել են բավական փակ ու արատավոր շրջան:

«Ստվերն» այսօր դարձել է համաշխարհային մակարդակի խնդիր: Բնականաբար «ստվերի» դեմ պայքարը հանդիսանում են ոչ միայն առանձին պետությունների, այլև համաշխարհային տնտեսության կարևորագույն խնդիրներից մեկը:

Ստվերային տնտեսությունը Հայաստանում կրում է համակարգային բնույթ՝ կառուցվածքային բազմաշերտ խնդիրներով, ինչը նշանակում է ՀՀ տնտեսական քաղաքականության վերանայում և կառուցվածքային բարեփոխումների իրականացում՝ որպես առաջնային գերակայություն դիտարկելով կոռուպցիայի և ստվերի դեմ պայքարը:

*Բանալի բառեր.* ստվերային տնտեսություն, կոռուպցիա, ստվերային շրջանառություն, ստվերը տնտեսությունում, ստվերի տեսակարար կշիռը ՀՆԱ-ում

## ТЕОРЕТИКО-ПРАКТИЧЕСКИЕ ПРОЯВЛЕНИЯ И ЗАДАЧИ ТЕНЕВОЙ ЭКОНОМИКИ: АРМЕНИЯ В ЭТОМ КОНТЕКСТЕ

**А.С. Сарибекян**

*Ереванский государственный университет*

Теневая экономика существует в любой стране, вне зависимости от того, развитая ли страна или развивающаяся. Сегодня теневой оборот в мире составляет около 22 процентов ВВП - больше 10 триллиона долларов, которое постоянно возрастает. В росте большое значение играют развивающиеся страны. Армения не является

исключением, где проблематичны не только масштабы тени, но и степень ее проникновения в общественно-экономическую структуру.

Существует мнение, что тень невозможно полностью и окончательно победить, однако, вполне реально в несколько раз сократить ее. По крайней мере это удалось многим странам. Здесь важно понять причины и последствия исследуемых явлений, которые, будучи строго взаимосвязаны, создали довольно закрытый и порочный круг.

“Тень” сегодня стал всемирной проблемой. Следовательно, борьба против тени является одной из важных задач не только отдельных стран, но и всемирной экономики.

Теневая экономика в Армении носит системный характер с многослойными структурными задачами. Это предполагает пересмотр экономической политики РА и осуществление структурных реформ, где борьба против коррупции и тени будет рассматриваться как важнейший приоритет.

**Ключевые слова:** теневая экономика, коррупция, теневой оборот, тень в экономике, удельный вес

Ներկայացվել է՝ 28.09.2018թ.

Գրախոսման է ուղարկվել՝ 02. 10.2018թ.

Երաշխավորվել է տպագրման՝ 06.12.2018թ.

## AUTHORS

**Tokmajyan H.V.** - Shushi University of Technology, Ashot Bekor str. 4, Shushi, RA, +374(93) 00-10-30, [tokmajyan@shushitech.am](mailto:tokmajyan@shushitech.am)

**Martirosyan T.S.** - National University of Architecture and Construction of Armenia, Teryan str. 105, Yerevan, RA, +374(99) 07-76-67, [trgran7711@mail.ru](mailto:trgran7711@mail.ru).

**Markosyan A.Kh.** - Shushi University of Technology, Ashot Bekor str. 4, Shushi, RA, +374(41) 52-76-35, e-mail: [ashotmarkos@rambler.ru](mailto:ashotmarkos@rambler.ru)

**Matevosyan E.N.** - Yerevan State University, Aleq Manukyan 1, Yerevan, RA, +374(91) 51-20-48, e-mail: [meleonora06@rambler.ru](mailto:meleonora06@rambler.ru)

**Nersisyan K.A.** - Shushi University of Technology, Ashot Bekor str. 4, Shushi, RA, +374(97) 22-17-22, e-mail: [knersisyan@mail.ru](mailto:knersisyan@mail.ru)

**Torosyan G. A.** - Institute of Water Problems and Hydro-Engineering Named After I.V. Eghiazarov, Armenakyan str. 125, Yerevan, RA, +374(99) 20-59-32, [gevorgtorosyan@gmail.com](mailto:gevorgtorosyan@gmail.com)

**Tokmajyan V.H.** - Shushi University of Technology, Ashot Bekor str. 4, Shushi, RA, +374(43) 04-08-04, [tokmajyanv@gmail.com](mailto:tokmajyanv@gmail.com)

**Aleksanyan V.A.** - Shushi University of Technology, Ashot Bekor str. 4, Shushi, RA, +374(97) 23-11-11, e-mail: [artsakhgk@rambler.ru](mailto:artsakhgk@rambler.ru)

**Gabayan G.S.** - □Hydroenergetica□ LTD, Nork, 7 st, 16, Yerevan, RA, +374(98) 94-94-44, e-mail: [grigor.gabayan@hydroenergetica.com](mailto:grigor.gabayan@hydroenergetica.com)

**Nurijanyan S.Sh.** - Institute of Water Problems and Hydro-Engineering Named After I.V. Eghiazarov, Armenakyan str. 125, Yerevan, RA, +374(93) 28-22-02, e-mail: [nurij49@mail.ru](mailto:nurij49@mail.ru).

**Vardapetova E.E.** - National Museum-Institute of Architecture after Alexander Tamanyan, ..... +374(94) 43-53-91, e-mail: [evgeniavardapetova@gmail.com](mailto:evgeniavardapetova@gmail.com)

**Miqaelyan M.V.** - Yerevan State University, Aleq Manukyan 1, Yerevan, RA, +374(91) 41-90-18, e-mail: [mvmiqayelyan@inbox.ru](mailto:mvmiqayelyan@inbox.ru)

**Yarmaloyan L.Yu.** - M.V. Lomonosov Moscow state university, Yerevan branch, RA, +374(94) 49-69-99, e-mail: [lusineyarmaloyan@yahoo.com](mailto:lusineyarmaloyan@yahoo.com)

**Saribekya A.S.** - Yerevan State University, Aleq Manukyan 1, Yerevan, RA, +374(94) 41-45-31, e-mail: [samalja@yahoo.com](mailto:samalja@yahoo.com)

## ՀԵՂԻՆԱԿՆԵՐ

**Թոքմաջյան Հ.Վ.** - Շուշիի տեխնոլոգիական համալսարան, Աշոտ Բեկորի 4, Շուշի, ԱՀ, +374(93) 00-10-30, [tokmajyan@shushitech.am](mailto:tokmajyan@shushitech.am)

**Մարտիրոսյան Տ.Ս.** - Ճարտարապետության և շինարարության Հայաստանի ազգային համալսարան, Տերյան 105, Երևան, ՀՀ, +374(99) 07-76-67, [trgran7711@mail.ru](mailto:trgran7711@mail.ru).

**Մարկոսյան Ա.Խ.** - Շուշիի տեխնոլոգիական համալսարան, Աշոտ Բեկորի 4, Շուշի, ԱՀ +374(41) 52-76-35, e-mail: [ashotmarkos@rambler.ru](mailto:ashotmarkos@rambler.ru)

**Մաթևոսյան Է.Ն.**- Երևանի պետական համալսարան, Ալեք մանուկյան 1, Երևան, ՀՀ, +374(91) 51-20-48, e-mail: [meleonora06@rambler.ru](mailto:meleonora06@rambler.ru)

**Ներսիսյան Կ.Ա.**- Շուշիի տեխնոլոգիական համալսարան, Աշոտ Բեկորի 4, Շուշի, ԱՀ, +374(97) 22-17-22, e-mail: [knersisyan@mail.ru](mailto:knersisyan@mail.ru)

**Թորոսյան Գ.Ա.** - Ակադեմիկոս Ի. Վ. Եղիազարովի անվան ջրային հիմնահարցերի և հիդրոտեխնիկայի ինստիտուտ, Արմենակյան 125, Երևան, ՀՀ, +374(99) 20-59-32, [gevorgtorosyan@gmail.com](mailto:gevorgtorosyan@gmail.com)

**Թոքմաջյան Վ.Հ.** - Շուշիի տեխնոլոգիական համալսարան, Աշոտ Բեկորի 4, Շուշի, ԱՀ, +374(43) 04-08-04, [tokmajyanv@gmail.com](mailto:tokmajyanv@gmail.com)

Ալեքսանյան Վ.Ա. - Շուշիի տեխնոլոգիական համալսարան, Աշոտ Բեկորի 4, Շուշի, ԱՀ, +374(97) 23-11-11, e-mail: [artsakhgk@rambler.ru](mailto:artsakhgk@rambler.ru)

**Գաբայան Գ.Ս.** - «Հիդրոէներգետիկա» ՍՊԸ Նորք, 7-րդ փողոց, 16 տուն, Երևան, ՀՀ, +374(98) 94-94-44, e-mail: [grigor.gabayan@hydroenergetica.com](mailto:grigor.gabayan@hydroenergetica.com)

**Նուրիջանյան Ս.Շ.**- Ակադեմիկոս Ի. Վ. Եղիազարովի անվան ջրային հիմնահարցերի և հիդրոտեխնիկայի ինստիտուտ, Արմենակյան 125, Երևան, ՀՀ, +374(93) 28-22-02, e-mail: [nurij49@mail.ru](mailto:nurij49@mail.ru).

**Վարդապետովա Ե.Է.**- Ալեքսանդր Թամանյանի անվան ճարտարապետության ազգային թանգարան-ինստիտուտ, Հանրապետության հրապարակ, Կառավարության շենք N3, Երևան, ՀՀ, +374(94) 43-53-91, e-mail: [evgeniavardapetova@gmail.com](mailto:evgeniavardapetova@gmail.com)

**Միքայելյան Մ.Վ.** - Երևանի պետական համալսարան, Ալեք մանուկյան 1, Երևան, ՀՀ, +374(91) 41-90-18, e-mail: [mvmiqayelyan@inbox.ru](mailto:mvmiqayelyan@inbox.ru)

**Յարմալոյան Լ.Յու.** - Մ.Վ. Լոմոնոսովի անվան Մոսկվայի պետական համալսարան, Երևանի մասնաճյուղ, ՀՀ, +374(94) 49-69-99, e-mail: [lusineyarmaloyan@yahoo.com](mailto:lusineyarmaloyan@yahoo.com)

**Սարիբեկյան Ա.Ս.**- Երևանի պետական համալսարան, Ալեք մանուկյան 1, Երևան, ՀՀ, +374(94) 41-45-31, e-mail: [samalja@yahoo.com](mailto:samalja@yahoo.com)

## АВТОРЫ

**Алексаян В.А.** - Шушинский технологический университет, ул. Ашот Бекора 4, Шуши, РА, +374(97) 23-11-11, e-mail: [artsakhgk@rambler.ru](mailto:artsakhgk@rambler.ru)

**Вардапетова Е.Э.** - Национальный музей-институт архитектуры имени Александра Таманяна, пл. Республики, дом правительства N3, Ереван, РА, +374(94) 43-53-91, e-mail: [evgeniavardapetova@gmail.com](mailto:evgeniavardapetova@gmail.com)

**Габаян Г.С.** - ООО <<Гидроэнергетика>>, Норк, 7-я ул., д. 16, Ереван, РА, +374(98) 94-94-44, e-mail: [grigor.gabayan@hydroenergetica.com](mailto:grigor.gabayan@hydroenergetica.com)

**Маркосян А.Х.** - Шушинский технологический университет, ул. Ашот Бекора 4, Шуши, РА, +374(41) 52-76-35, e-mail: [ashotmarkos@rambler.ru](mailto:ashotmarkos@rambler.ru)

**Мартirosян Т.С.** - Национальный университет архитектуры и строительства Армении, ул Теряна 105, Ереван, РА, +374(99) 07-76-67, e-mail: [tigran7711@mail.ru](mailto:tigran7711@mail.ru)

**Матевосян Э.Н.** - Ереванский государственный университет, Алека Манукяна 1, Ереван, РА, +374(91) 51-20-48, e-mail: [meleonora06@rambler.ru](mailto:meleonora06@rambler.ru)

**Микаелян М.В.** - Ереванский государственный университет, Алека Манукяна 1, Ереван, РА, +374(91) 41-90-18, e-mail: [mvmiqayelyan@inbox.ru](mailto:mvmiqayelyan@inbox.ru)

**Нерсисян К.А.** - Шушинский технологический университет, ул. Ашот Бекора 4, Шуши, РА, +374(97) 22-17-22, e-mail: [knersisyan@mail.ru](mailto:knersisyan@mail.ru)

**Нуридзян С.Ш.** - Институт водных проблем и гидротехники им. Академика И.В. Егиазарова, Арменакаяна 125, Ереван, РА, +374(93) 28-22-02, e-mail: [nurij49@mail.ru](mailto:nurij49@mail.ru).

**Сарибекян А.С.**- Ереванский государственный университет, Алека Манукяна 1, Ереван, РА, +374(94) 41-45-31, e-mail: [samalja@yahoo.com](mailto:samalja@yahoo.com)

**Токмаджян В.О.** - Шушинский технологический университет, ул. Ашот Бекора 4, Шуши, РА, +374(43) 04-08-04, [tokmajyanv@gmail.com](mailto:tokmajyanv@gmail.com)

**Токмаджян Л.В.** – Армянский национальный политехнический университет, Ереван, ул. Теряна 105, +374(93) 92-40-40, [tokmajyanlevon@gmail.com](mailto:tokmajyanlevon@gmail.com)

**Токмаджян О.В.** - Шушинский технологический университет, ул. Ашот Бекора 4, Шуши, РА, +374(93) 00 – 10- 30, e-mail: [tokmajyan@shushitech.am](mailto:tokmajyan@shushitech.am)

**Торосян Г.А.** - Институт водных проблем и гидротехники им. Академика И.В. Егиазарова, Арменакаяна 125, Ереван, РА, +374(99) 20-59-32, [gevorgtorosyan@gmail.com](mailto:gevorgtorosyan@gmail.com)

**Ярмалоян Л.Ю.**- Московский государственный университет имени М.В. Ломоносова, Ереванский филиал, РА, +374(94) 49-69-99, e-mail: [lusineyarmaloyan@yahoo.com](mailto:lusineyarmaloyan@yahoo.com)

## The article copyright Submission Format Requirements

Articles can be submitted in Armenian, English or Russian up to 14 p. ( titled “Economic” up to 24 p).

Sheet format A4, margins up 20mm , down 20mm, left 15mm, right 30 mm.

The fonts: Armenian – Unicode /GHEA Grapalat/, Russian, English – Times New Roman.

The space between the lines – 1,15

1. The title of the article is given in the article’s submitted language , in capital letters, in Armenian 11, Russian and English 12 bold font size at the right bottom of the page.
2. Universal Decimal Classification consisting of 6 symbols at least is given in the left corner of the next page.
3. A line down , in the middle , the article’s submitted language , the title, capital letters, in Armenian 12, Russian and English 14 bold font size.
4. Two lines down, from the left, in the article’s submitted language, the review of the author’s name and surname, initial affiliation, in Armenian 11, Russian and English 12 bold font size
5. Aline , from the left, in the article’s submitted language, ( Italic) is given the name of the organization , in Armenian 9, Russian and English 10 font size.
6. Disabling text in horizontal solid line, from the left corner of the page are given the Key Words (up to 5-8 words), in Armenian 10, Russian and English 11 font size
7. Two lines down, in the article’s submitted language, in the middle, (Italic), is written summery of the article., 10-20 lines, in Armenian 9, Russian and English 10 font size
8. Two lines down is given the main text of the article, in Armenian 10, Russian and English 11 font size.The paragraphs begin from new line, 10 mm from the depths. The expound of the theme are guaranteed of the following scheme: “Introduction”, “ conflict settings”, “Research results” , “ Conclusion”. In case of need can also be other section with corresponding titles.
9. The formulas are presented in separated lines, in the middle and are numbered on the right, in brackets. The formulas , as well as math’s symbols and expressions are given in the text in Microsoft Equation, Italic 10 font size.
10. There can be found pictures, diagrams , graphs and tables in texts. The pictures and diagrams are numbered by transit numbering by sign “pic”. The description of pictures, diagrams , the names of pictures , diagrams graphs and the signs of description are given below. They can be placed vertical or horizontal in Armenian 9,Russian and English 10 bold font. Tables are numbered by “pic” transit numbering. The names of tables , sign description are given above. They could be placed vertical or horizontal. If the table can’t be placed on a single page, it must be transferred to the other page and mentioned as condonation. In table column must not be left free lines, there must be put dash or write “ not” (“determined”).
11. Pictures , diagrams graphs in electronic version are colored as a rule.
12. At the end of the article , two lines down, from 10 mm left corner is typed “ lietarture” Armenian 11, Russian and English 12 bold font. A line down is presented the list of literature numbered by link sequence . In list the sources must be marked [ ...] and include the authors last name and the first letter of name , full names of theme , publishing dates , ( place publishing,town, year, tom and pages). Official information as well as a-mail computer programs, reports, commands, copyrights patents, in case of patents are given the whole details. The sources are given in an original languages. At the same time Armenian and Russian sources are given in latin fonts.
13. On separate pages is given the translation of the article headquarters and summary.(beseides article presented language), Armenian , Russian ( resume) and English ( summary).
14. The Articles should be sent to the info@bulletin.am .
15. The published and corrected version of the text are submitted with author(s).
16. On a separate sheet of paper are given the information about the authors ( surname, name, affiliation (the whole) , picture, academic degree, address, telephon, organization, position,e-mail.

## Հոդվածների հեղինակային օրինակների ձևակերպման համար ներկայացվող պահանջներ

Հոդվածները կարելի է ներկայացնել հայերենով, ռուսերենով և անգլերենով՝ մինչև 14 էջի (“Էկոնոմիկա” խորագրով՝ մինչև 24 էջի) սահմաններում:

Էջի ֆորմատը՝ A4, լուսանցքները՝ վերևից 20մմ, ներքևից 20մմ, աջից 1.5մմ և ձախից՝ 30 մմ:

Տառատեսակը հայերեն՝ Unicode /GHEA Grapalat/, ռուսերեն և անգլերեն՝ Times New Roman:

Միջտողային հեռավորությունը՝ 1,15:

1. Էջի վերին աջ անկյունում, հոդվածի ներկայացման լեզվով, գլխատառերով՝, հայերեն՝ 11, ռուսերեն և անգլերեն՝ 12 bold տառաչափով տրվում է հոդվածի խորագիրը:
2. Հաջորդ տողի էջի ձախ անկյունում տրվում է ՀՏԴ-ն՝ առնվազն վեցանիշ թվով:
3. Դրանից մեկ տող ներքև, մեջտեղում, հոդվածի ներկայացման լեզվով գլխատառերով դրվում է վերնագիրը՝ հայերեն՝ 12 bold, ռուսերեն և անգլերեն՝ 14 bold տառաչափով:
4. Երկու տող ներքև, ձախից, հոդվածի ներկայացման լեզվով, հեղինակի (հեղինակների, որոնց թիվը, որպես կանոն, չի կարող գերազանցել 4-ը) Անվան, Հայրանվան սկզբնատառերը և Ազգանունը՝ հայերեն՝ 11, ռուսերեն և անգլերեն՝ 12 bold տառաչափով:
5. Մեկ տող ներքև, ձախից, հոդվածի ներկայացման լեզվով, շեղատառերով (*Italic*) տրվում է կազմակերպության (կազմակերպությունների) անվանումը՝ հայերեն՝ 9, ռուսերեն և անգլերեն՝ 10 տառաչափով:
6. Անջատելով տեքստը հորիզոնական հոծ գծով՝ էջի ձախ անկյունից, հոդվածի ներկայացման լեզվով, տրվում են Բանալի բառերը (5-8 բառ)՝ հայերեն՝ 10, ռուսերեն և անգլերեն՝ 11 տառաչափով:
7. Երկու տող ներքև, հոդվածի ներկայացման լեզվով, մեջտեղում, շեղատառերով (*Italic*), գրվում է հոդվածի համառոտագիրը՝ 10-20 տող՝ հայերեն՝ 9, ռուսերեն և անգլերեն՝ 10 տառաչափով:
8. Երկու տող ներքև ներկայացվում է հոդվածի հիմնական տեքստը՝ հայերեն՝ 10, ռուսերեն և անգլերեն՝ 11 տառաչափով: Պարբերությունները սկսվում են նոր տողից՝ 10 մմ խորքից: Երաշխավորվում է նյութի շարադրման հետևյալ սխեման. «**Ներածություն**», «**Խնդրի դրվածքը**», «**Հեղափոխության արդյունքները**», «**Եզրակացություն**»: Անհրաժեշտության դեպքում կարող են լինել նաև այլ բաժիններ՝ համապատասխան վերնագրերով:
9. Բանաձևերը ներկայացվում են առանձին տողով, մեջտեղում և համարակալվում են աջ մասում, փակագծերի մեջ: Բանաձևերը, ինչպես նաև տեքստում տեղադրվող մաթեմատիկական սիմվոլներն ու արտահայտությունները տրվում են Microsoft Equation-ով, *Italic*՝ 10 տառաչափով:
10. Տեքստում կարող են լինել նկարներ, գծապատկերներ, գծագրեր և աղյուսակներ: Նկարները և գծապատկերները համարակալվում են միջանցիկ համարակալմամբ՝ «**Նկ.**» նմուշառմամբ: Նկարների, գծապատկերների, գծագրերի անվանումները, նշանակումների բացատրությունները տրվում են ներքևում: Դրանք կարելի է տեղադրել ուղղաձիգ կամ հորիզոնական դիրքով՝ հայերեն՝ 9, ռուսերեն և անգլերեն՝ 10 bold տառաչափով: Աղյուսակները համարակալվում են միջանցիկ համարակալմամբ՝ «**Աղ.**» նմուշառմամբ: Աղյուսակների անվանումները, նշանակումների բացատրությունները տրվում են վերևում: Դրանք կարելի է տեղադրել ուղղաձիգ կամ հորիզոնական դիրքով: Եթե մեկ թերթի վրա աղյուսակը չի տեղավորվում, պետք է շարունակել մյուս թերթի վրա՝ նշելով, որ շարունակությունն է: Աղյուսակի սյունյակներում ազատ տեղեր չպետք է մնան. պետք է դնել գծիկ կամ գրել «չկա» («չի որոշված»):
11. Նկարները, գծապատկերները, գծագրերը էլեկտրոնային տարբերակով, որպես օրենք, տրվում են գունավոր տարբերակով:
12. Հոդվածի վերջում, երկու տող ներքև, ձախից՝ 10 մմ խորքից տպագրվում է «**Գրականություն**»՝ հայերեն՝ 11, ռուսերեն և անգլերեն՝ 12 bold տառաչափով: Մեկ տող ներքև ներկայացվում է գրականության ցանկը՝ համարակալված ըստ հղումների հերթականության: Ցանկում աղբյուրները պետք է նշվեն [...] տեսքով և ընդգրկեն՝ հեղինակի/ների/ ազգանունը և անվան /Հայրանունի/ առաջին տառը /երը/, նյութի լրիվ անվանումը, հրատարակության տվյալները /տեղը, հրատարակչությունը, քաղաքը, տարեթիվը, հատորը, էջերը/: Տեղեկատվական պաշտոնական, այդ թվում՝ էլեկտրոնային աղբյուրների, համակարգչային ծրագրերի, հաշվետվությունների, հրահանգների, հեղինակային իրավունքի արտոնագրերի, պատենտների դեպքում ներկայացվում են լրիվ տվյալները: Աղբյուրները բերվում են բնօրինակի լեզվով: Միևնույն ժամանակ, հայերեն և ռուսերեն աղբյուրները ներկայացվում են նաև լատինատառ շարվածքով:
13. Առանձին էջերի վրա տրվում է հոդվածի գլխամասի և համառոտագրի թարգմանությունը (բացի հոդվածի ներկայացման լեզվի)՝ հայերեն, ռուսերեն (Резюме) և անգլերեն լեզուներով (Summary):
14. Հոդվածները պետք է ուղարկել info@bulletin.am էլ. հասցեով:
15. Տեքստի խմբագրված և սրբագրված տարբերակը համաձայնեցվում է հեղինակ(ներ)ի հետ:
16. Առանձին թղթի վրա տրվում է հեղինակների մասին տվյալները (Ազգանուն, Անուն, Հայրանուն (լրիվ), լուսանկարը, գիտական աստիճանը, գիտական կոչումը, հասցեն, հեռախոսը, կազմակերպությունը, զբաղեցրած պաշտոնը, էլեկտրոնային հասցեն):

## Требования, предъявляемые к оформлению авторских образцов статей

Статьи можно представить на армянском, русском и английском языках объемом до 14 страниц (статьи под рубрикой "Экономика" до 24 страниц)

Формат страницы: А4, поля сверху 20мм, снизу 20мм, справа 15мм и слева 30мм

Шрифт армянский - Unicode/GHEA Grapalat/, русский и английский - Times New Roman.

Междустрочное расстояние - 1,15

1. В верхнем правом углу страницы заглавными буквами (на языке статьи) записывается название рубрики по шрифту: армянский – 11 **bold**, русский и английский - 12 **bold**.
2. На следующей строке в верхнем левом углу страницы записывается УДК (минимум шестизначное число).
3. На следующей строке набирается заголовок статьи заглавными буквами по центру по шрифту: армянский – 12 **bold**, русский и английский - 14 **bold**.
4. Две строки ниже, слева, на языке статьи набирается фамилия и инициалы автора (соавторов, как правило, не более 4 человек) по шрифту: армянский – 11 **bold**, русский и английский - 12 **bold**.
5. На следующей строке, слева, на языке статьи курсивом (*Italic*) дается название организации (организаций) по шрифту: армянский - 9, русский и английский - 10.
6. Отделив текст горизонтальной выделенной линией, слева даются ключевые слова (5-8 слов) по шрифту: армянский - 10, русский и английский - 11.
7. Две строки ниже, на языке статьи, по центру курсивом (*Italic*) дается аннотация (10-20 строк) по шрифту: армянский - 9, русский и английский - 10.
8. Две строки ниже, дается основной текст статьи по шрифту: армянский - 10, русский и английский - 11. Абзацы начинаются с новой строки с отступом 10 мм. Рекомендуется следующая схема изложения материала: "Введение", "Постановка задачи", "Результаты исследования", "Заключение". В случае необходимости могут быть также другие разделы с соответствующими названиями.
9. Формулы располагаются отдельной строкой по центру и нумеруются в правой части в скобках. Формулы, а также математические символы и выражения приводятся по "Microsoft Equation", курсивом (*Italic*) по шрифту - 10.
10. В тексте могут быть рисунки, графики, чертежи и таблицы. Рисунки и графики нумеруются по порядку - "Рис.". Названия рисунков, графиков, чертежей, объяснения обозначений приводятся снизу. Их можно расположить в вертикальном или горизонтальном положении по шрифту: армянский - 9 **bold**, русский и английский - 10 **bold**. Таблицы нумеруются по порядку - "Таб.". Названия таблиц, объяснения обозначений приводятся сверху. Их можно расположить в вертикальном или горизонтальном положении. Если таблица не помещается на одной странице, нужно продолжить ее на следующей странице, отметив, что это продолжение данной таблицы. В таблице не должно быть свободных столбцов, в этом случае нужно поставить черточку или написать "нет" ("не определено").
11. Рисунки, графики и чертежи в электронной версии, как правило, приводятся в цветном варианте.
12. В конце статьи, через две строки, с отступом слева 10 мм печатается "Литература" по шрифту: армянский - 11 **bold**, русский и английский - 12 **bold**. На следующей строке приводится список использованной литературы, пронумерованный по последовательности ссылок. В списке источники должны указываться в виде [...] и включать фамилию и инициалы автора (авторов), полное название статьи (материала), данные публикации (место, издательство, город, год, том, страницы). В случае официальной информации, в том числе электронных источников, компьютерных программ, отчетов, инструкций, сертификатов об авторских правах, патентов, приводятся полные данные. Источники приводятся на языке оригинала. В то же время армянские и русские источники печатаются также латинскими буквами.
13. На отдельных листках дается перевод названия статьи, фамилии и инициалов автора (авторов), названия организации (организаций), ключевых слов и аннотации (кроме языка статьи) на армянский язык (Սմբոխնում), русский язык (Резюме) и английский язык (Summary).
14. Статьи нужно отправить на почту info@bulletin.am.
15. Отредактированная версия текста согласовывается с автором (авторами).
16. На отдельном листе приводятся сведения об авторах (Фамилия, Имя, Отчество (полностью), фотография, ученая степень, ученое звание, адрес, номер телефона, организация, занимаемая должность, адрес электронной почты).

## CONTENTS

<b>H.V. Tokmajyan</b> <b>T. S. Martirosyan</b>	The strategic way of solving the problem of the Sevan	3
<b>A.Kh. Markosyan</b> <b>E.N. Matevosyan</b> <b>K.A. Nersisyan</b> <b>L.V.Tokmajyan</b>	Water resources of the Republic of Armenia and the exporting opportunities of potable water	13
<b>G. A. Torosyan</b>	Groundwater depletion of the ararat artesian basin	29
<b>V. H. Tokmajyan</b> <b>V.A. Aleksanyan</b> <b>G.S. Gabayan</b> <b>S. Sh. Nurijanyan</b>	Change in the Republic of Armenia water resources due to global climate change	38
<b>E.E. Vardapetova</b>	Trends and peculiarities of interaction of tourism and museums in Armenia. Effect of synergy	44
<b>M.V. Miqaelyan</b> <b>A.Kh. Markosyan</b> <b>E.N. Matevosyan</b> <b>L.Yu. Yarmaloyan</b>	Monopoly and the problems of its regulation in Armenia	56
<b>A. S. Saribekyan</b>	The theoretical and practical manifestations and problems of shade economy armenian shade economy in that context	72

**ԲՈՎԱՆԴԱԿՈՒԹՅՈՒՆ**

<b>Հ.Վ. Թորմաջյան</b>	Սևանա լճի հիմնախնդրի լուծման ռազմավարական ուղղությունը	3
<b>Տ.Ս. Մարտիրոսյան</b>		
<b>Ա.Խ. Մարկոսյան</b>	Հայաստանի Հանրապետության ջրային ռեսուրսները եվ խմելու ջրի արտահանման հնարավորությունները	13
<b>Է.Ն. Մաթևոսյան</b>		
<b>Կ.Ա. Ներսիսյան</b>		
<b>Լ.Վ. Թորմաջյան</b>		
<b>Գ.Ա. Թորոսյան</b>	Արարատյան արտեզյան ավազանի ստորերկրյա ջրերի հյուծումը	29
<b>Վ.Հ. Թորմաջյան</b>	Կլիմայի գլոբալ փոփոխության պայմաններում Հայաստանի Հանրապետությունում ջրային ռեսուրսների փոփոխությունը	38
<b>Վ.Ա. Ալեքսանյան</b>		
<b>Գ.Ս. Գաբայան</b>		
<b>Ս.Շ. Նուրիջանյան</b>		
<b>Ե.Է. Վարդապետովա</b>	Զբոսաշրջության եվ թանգարանների փոխազդեցությունների միտումները եվ առանձնահատկությունները Հայաստանում: Սիներգիայի էֆեկտը	44
<b>Մ.Վ. Միքայելյան</b>	Մենատիրությունը եվ Հայաստանի Հանրապետությունում դրա կարգավորման հիմնախնդիրներ	56
<b>Ա.Խ. Մարկոսյան</b>		
<b>Է.Ն. Մաթևոսյան</b>		
<b>Լ.Յու. Յարմալոյան</b>		
<b>Ա.Ս. Սարիբեկյան</b>	Ստվերային տնտեսության տեսա-պրակտիկ դրսևորումները և խնդիրները. հայաստանյանն այդ համատեքստում	72

## СОДЕРЖАНИЕ

<b>О.В.Токмаджян</b> <b>Т.С.Мартиросян</b>	Стратегическое направление решения проблемы озера Севан	3
<b>А.Х. Маркосян</b> <b>Э.Н. Матевосян</b> <b>К.А. Нерсисян</b> <b>Л.В. Токмаджян</b>	Водные ресурсы Республики Армения и возможности экспортирования питьевой воды	13
<b>Г.А. Торосян</b>	Истощение подземных вод араратского артезианского бассейна	29
<b>В.О. Токмаджян</b> <b>В.А.Алексянян</b> <b>Г.С. Габаян</b> <b>С.Ш. Нуридзянян</b>	Изменение водных ресурсов Республики Армения в условиях изменения климата	38
<b>Е.Э. Вардапетова</b>	Тенденции и особенности взаимодействия туризма и музеев в Армении. Эффект синергии	44
<b>М.В.Микаелян</b> <b>А.Х.Маркосян</b> <b>Э.Н.Матевосян</b> <b>Л.Ю. Ярмалоян</b>	Монопольная деятельность и проблемы ее регулирования в Республике Армения	56
<b>А.С. Сарибекян</b>	Теоретико-практические проявления и задачи теневой экономики: Армения в этом контексте	72