The peculiarities and challenges of the water use in the Southern Region of the Republic of Moldova

Les particularités et les défis de l'utilisation de l'eau dans la Région Sud de la République de Moldavie

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ABSTRACT: The purpose of present research is the complex assessment of water use at regional and local level. The main objectives are as follows: 1) the comparative analysis of volumes of abstracted and used water by the sources of origin and by the main categories of use; 2) assessing the trend evaluations of the volume of abstracted and used water in the years 2010-2023; 3) determining the causes and effects of the values of water use indices and their trends; 4) identifying the problems and opportunities of water use in the study region. The study area includes the Southern Region of Republic of Moldova. The key applied methods are: statistical, cartographic, analytical, including SWOT analysis, comparative method. The main results of this research are: 1) summary and comparative assessment of water use in the study area; 2a) 2010-2016 years with negative trends; 2b) 2017-2023 years with positive trend; 3) water use volume are conditioned by the proximity to the Dniester and Prut, by the size of urban centers, by rainfall and by the capacity of water supply systems; 4) SWOT analysis of water use of in the conditions of climate aridification and of masiive depopulation, of increasing demand of water and capacities of water supply systems.

KEY WORDS: water use, agriculture, irrigation, households, South region.

RÉSUMÉ: L'objectif de la présente recherche est l'évaluation complexe de l'utilisation de l'eau au niveau régional et local. Les principaux objectifs sont les suivants : 1) l'analyse comparative des volumes d'eau prélevée et utilisée par les sources d'origine et par les principales catégories d'utilisation ; 2) les évaluations des tendances du volume d'eau prélevée et utilisée au cours des années 2010-2023 ; 3) la détermination des causes et des effets des valeurs des indices d'utilisation de l'eau et de leurs tendances ; 4) l'identification des problèmes et des opportunités de l'utilisation de l'eau dans la région d'étude. La zone d'étude comprend la région sud de la République de Moldavie. Les principales méthodes appliquées sont : statistique, cartographique, analytique, y compris l'analyse SWOT, la méthode comparative. Les principaux résultats de cette recherche sont les suivants : 1) évaluation sommaire et comparative de l'utilisation de l'eau dans la zone d'étude ; 2a) années 2010-2016 avec des tendances négatives ; 2b) années 2017-2023 avec une tendance positive ; 3) le volume d'utilisation de l'eau est conditionné par la proximité du Dniestr et du Prut, par la taille des centres urbains, par les précipitations et par la capacité des systèmes d'approvisionnement en eau ; 4) analyse SWOT de l'utilisation de l'eau dans les conditions d'aridification climatique et de dépeuplement massif, d'augmentation de la demande en eau et des capacités des systèmes d'approvisionnement en eau.

MOTS CLÉS: utilisation de l'eau, agriculture, irrigation, ménages, région Sud.

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1. Introduction

The Southern Region occupies more than 1/4 (27%) from the total area of the Republic of Moldova (RM), but its share in the total water consumption is only 2.2% and 13% in water consumption in the right bank of the Dniester River. This situation is due to the lower level of urbanization and industrialization, insufficient of water capture and transport capacities from the Dniester and Prut riverbeds, to the predominance of small rivers with low-flow (Bacal, 2017, Bejan, 2013). Also, the Southern Region it is much more vulnerable to climate change and the more frequent occurrence of droughts (Table 6), and the water management sector and agricultural sector have a less resilience to the challenges generated by climate changes and by recent socio-economic transformations. This situation requires the implementation of coherent public policies for the sustainable exploitation and protection of water resources, based on in-depth scientific research of water resources, their limits and opportunities for their use in various socio-economic activities. The analysis of the particularities of water resources use is of major importance for increasing the resilience and ecological security in the Southern Region of Republic of Moldova.

The present study is based on the Water Framework Directive 2000/60/EC (2000) and its Guideline (2003) about the economic analysis of water uses and the integrated water management, and on provision of Water Low of RM No 272/2011 in this field. For the elaboration of present paper have been analyzed recent research on assessment of water sector, especially on: regional water resources assessment models (Xu et al., 2004); water use efficiency under climate change conditions (Fu et al., 2024); modelling of agricultural water policies to climate change (Saeedi et. al, 2024); impact assessment of droughts on water use efficiency in different climatic regions (Farhan, 2024); dynamic effects of irrigation technology (Micah, 2020); water use in livestock agri-food systems and its contribution to local water scarcity (Wisser et al., 2024); domestic water use (Mazzoni, 2023, Makki et al., 2013). Also, must be mentioned recent publications regarding economic analysis of water use (Aznar-Sánchez, 2018), the influence of the COVID-19 pandemic on the dynamics of water use (Wen et al., 2024) and on sustainable water use (Freitas et al., 2022, Sebusang, 2022).

The methodological novelty of present study consists in the complex and comparative assessment of water use of a region with a very pronounced rural and agrarian character (Table 6), much more vulnerable and less resilient to current natural and socio-economic challenges.

The present study is a continuation of our researches about the water use analysis at the regional level (Bacal, 2018, Burduja, 2022, 2023), particularly on the Northern (Bacal, 2022b, 2023b) and Central Development Region of the Republic of Moldova (Bacal, 2020, Burduja, 2020). Also, some aspects of water use elucidated in the present study were previously analyzed in our studies elaborated at the level of river basins (Bacal, 2017, 2022a, 2023a, Bejan, 2023).

2. Data and Methods

The main statistical and analytics support of this research included:

1) Generalized Annual Reports of Moldavian Water Agency „Water use in the Republic of Moldova" (2010-2023), from which were extracted the data on the annual volume of abstracted and used water at the level of administrative-territorial units (districts) and summary presented in the tables and figures of this article;

2) Annual Reports of the Associations of Water Users for Irrigation (AWUI) (2013-2023) on the condition and use of centralized irrigation systems from lower courses of Dniester and Prut rivers.

3) Yearbooks of Environmental State Inspectorate (ESI) on the quality of environmental factors and on the activity of Ecological Inspections (2010-2023), widely used for the analysis of the branch structure of water use, the identification of the biggest water consumers on economic activities at local level, as well as to the identification of regional and local problems in the use and management of water resources and for elaboration of the SWOT analysis presented at the end of this paper;

4) The Report of National Bureau of Statistics on the public water supply systems and the number of present population (2023), used to evaluate public water supply systems in urban and rural localities in the Southern Region, to complete and analyze water use data for domestic purposes, including population access to public aqueducts and water consumption per capita;

5) Annual Reports „Financial and production indices of the activity of water supply and sewerage companies" of the Associations „Moldova Water-Chanel" (2010-2022) on the status, activity and rentability of water supply systems from urban area in the region of study. Also, these reports were used for identifying the problems and opportunity in the water management sector.

The methodological concepts of the present study aimed the complex assessment of the water use at the regional and local levels. These include the analysis of water use and its dynamics on the sources of origins (surface and underground), on the main categories of water use and on the second level administrative-territorial units (districts) from this region. Also, are evaluated the current challenges of water use sector (Bejan, 2023), especially the massive depopulation and aging of rural localities, the accelerated climate changes and the low sectorial capacities to adapt to them, as well as the opportunities offered by the high access to rural pubic aqueducts for domestic purposes (NBS, 2023 a.b) and by the rational use of water for agriculture and householders.

The main methods, which are used in this study, are: statistical-mathematical, cartographical, including GIS techniques, analytical, especially SWOT analysis, deductive and comparative methods. Statistical-mathematical methods were used for data processing and the development of graphic support regarding the volume of captured water and used at the regional and local level (districts) and identifying the recent dynamics of the respective indicators. The cartographic methods, based on GIS techniques, were applied for the spatial representation of the administrative-territorial organization of the South Region of Republic of Moldova, the hydrographic basins and the main watercourses within it, the volume of water collected according to the sources of origin and used according to the main categories of use in the districts of the South Development Region (SDR) and in the Territorial Autonomy Unit (TAU) of Gagauzia. The analytical methods were used for comprehensive analysis of indices regarding the volumes of abstracted and used water, per total, from surface and underground sources and by main usage categories, as well as for establishing the cause-effect relationships and the feed-back of the measures implemented in order to increase the degree of quality water assurance and the resilience of the main water-dependent sectors. The SWOT analysis method was applied to identify problems and opportunities regarding the provision of water resources and their use at the regional and local level (Table 6) on the example of the Southern Region of the Republic of Moldova. The comparative method was used to analyze intra-regional and inter-regional differences and similarities regarding the provision and use of water for various socio-economic needs during the analyzed periods (2010-2023).

3. Study area

According to the economic-geographic tipology, the Republic of Moldova (RM) is divided into 4 regions: Northern, Central, Southern and Eastern (Bacal, 2018). The *North Region* overlaps with the

North Development Region, established by the Law of Republic of Moldova (RM) No. 438 from 28.12.2006 on Regional Development and includes 11 administrative districts, as well as the Balti municipality (Low of RM No. 764-XV/2001). The *Central Region* comprises 13 administrative districts, which form the *Central Development Region* and the *Chisinau municipality*, which includes the homonym development region. The Eastern (Transdnestrian) Region comprises Territorial Autonomous Units from Left Bank of Dniester, including 5 districts (Camenca, Râbnița, Dubăsari, Grigoriopol and Slobozia) and Tiraspol municipality. Also, the separatist authorities of Tiraspol controls the territories on the right side of the Dniester river, including the Bender city and 6 villages from its proximity. The total area of South Region is 9.2 thousand km^2 or 27% of total surface of Republic of Moldova, including South Development Region (DR) – 7.4 thousand km^2 (22%) and *Territorial Autonomy Unit* (TAU) *of Găgăuzia* – 1.8 thousand km^2 (5.5%). The *South Development Region* includes 8 administrative districts (Ștefan Vodă, Căușeni, Cimișlia, Basarabeasca, Leova, Cantemir, Cahul and Taraclia) (Figure 1). The population number of the South Region is 643 thousand inhabitants (NBS, 2023a) or 21% of total population from Republic of Moldova, including in the South *Development Region* – 494 thousand (17%) and in the TAU of Gagauzia – 150 thousand (4.8%). The total number of localities is 327, including 12 towns and 213 villages.

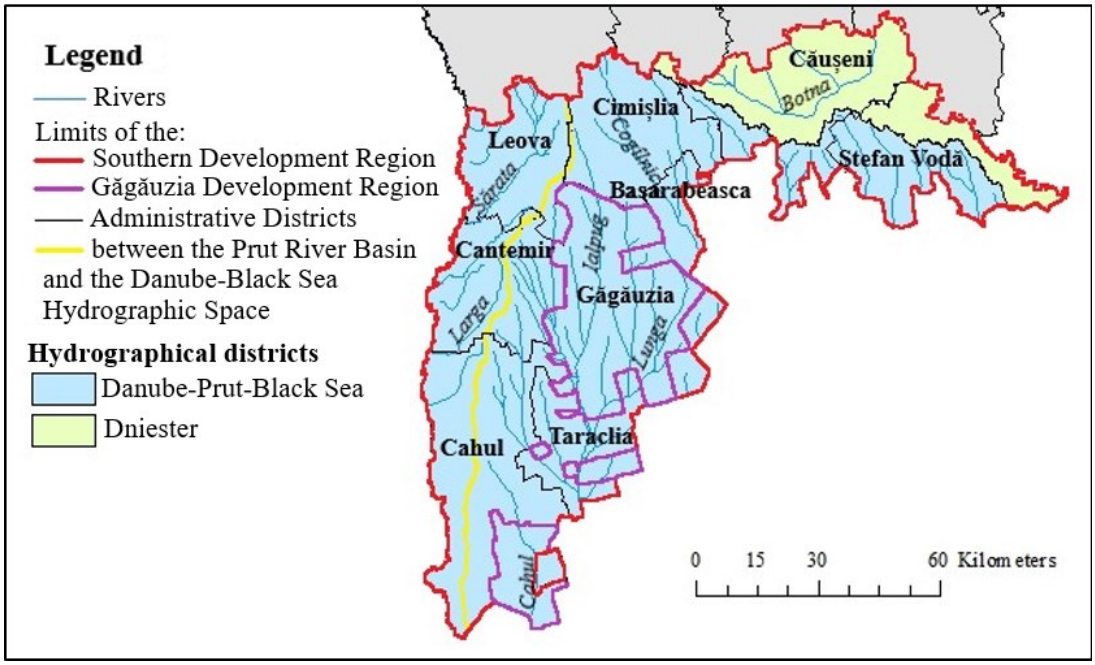

Figure 1 Southern Region of Republic of Moldova.

Most of the territory of the Southern Region is located in the Danube-Black Sea Hydrographic Area (Bacal, 2017, 2023, Bejan, 2023), including the basins of the Ialpug rivers (TAU of Găgăuzia, Cahul and Cantemir administrative districts), Cogâlnic (Cimișlia, Basarabeasca and Căușeni administrative districts), the Sărata and Hadjider rivers (the administrative districts of Causeni and Ștefan-Vodă). In the Dniester basin are the localities from the district of Ștefan-Vodă located in the meadow of this river, as well as most of the localities from Căușeni administrative district are located in the Botna river basin, a tributary of the Dniester. In the basin of the Prut River are located the absolute majority of the localities from district of Leova, as well as the localities from Cantemir and Cahul districts located in the meadow of this river. The Southern Region in the conditions of climate aridification is the most vulnerable and limited region in the country in terms of water resources.

4. Results and discussion

4.1 The volume of abstracted water

According to the data of the Moldavian Water Agency, during the analyzed period (2010-2023), in the Southern Region were abstracted, on average, 17.8 million m^3 of water, or 11.6% of the total volume of abstracted water in the right bank of Dniester river, including in the South RD districts – 14.2 million m^3 (9.2%) and in the Gagauzia TAU– 3.7 million m^3 (2.4%). The volume of abstracted and used water is conditioned by the demand for water, the water resources available from surface and underground sources, as well as the technical-economic capacities of capture, transportation, water treatment and water use for various socio-economic activities. Thus, the maximum volume of abstracted water is registered in the administrative districts with direct access to the Dniester and Prut rivers (Burduja, 2022), including in the districts of Cahul (3.9 million m^3), Ștefan Vodă (2.4 million m^3) and Căușeni (2.0 million m^3), with medium-sized urban centers and larger irrigated areas, as well as in TAU of Gagauzia, with a higher level of urbanization and of access to public aqueducts (NBS, 2023 a,b). The minimum volume was captured in the districts with smaller sizes and urban centers and with reduced capacities for capturing, distributing and using of water for agricultural and domestic purposes (Bacal, 2023 b), including in the districts of Basarabeasca (835 thousand m^3), Leova (1.2 million m^3) and Cantemir (1.0 million m^3) (table 1).

Table 1 The volume of abstracted water and share of catchement sources in the administrative districts from the South Development Region and Territorial Autonomy Units of Gagauzia, thousand m^3.

No.	ATU	Average of 2010-2023 years					2023 year				
		Total	surface		underground		Total	surface		underground	
		thousand m^3	thousand m^3	%	thousand m^3	%	thousand m^3	thousand m^3	%	thousand m^3	%
1	Căușeni	1987	211	11	1779	90	2260	340	15	1930	85
2	Ștefan Vodă	2442	1255	51	1185	49	2530	1160	46	1360	54
3	Cimișlia	1323	7,1	0,5	1316	99	1460	40	2,7	1420	97
4	Basarabeasca	835	176	21	658	79	880	240	27	630	72
5	Leova	1202	466	39	736	61	1570	780	50	790	50
6	Cantemir	1019	260	26	759	74	960	240	25	720	75
7	Cahul	3916	2476	63	1439	37	4720	2970	63	1740	37
8	Taraclia	1442	531	37	911	63	1780	600	34	1180	66
	South DR	**14166**	**5384**	**38**	**8781**	**62**	**16160**	**6370**	**39**	**9770**	**60**
9	**Gagauzia TAU**	**3674**	**16,4**	**0,4**	**3658**	**100**	**4090**	**0**	**0**	**4090**	**100**
	Southern Region	**17840**	**5400**	**30**	**12439**	**70**	**20250**	**6370**	**31**	**13860**	**68**

***Sources**: elaborated by authors according data of Moldavian Water Agency (2010-2023)*

From ***surface sources*** were abstracted, on average, 5.4 million m^3 of water or 6.1% of PDFN and 30% of the total volume of water captured in the respective region, including in the Southern RD – 6.3 million m^3 (38 %). Surface sources are predominated, only in Cahul (63%) and Ștefan Vodă (51%) districts. Unlike the other regions of the Republic, the Southern Region has much less access to the Dniester and Prut riverbeds. In addition, majority of the South Region is located in the basins of small and medium rivers, with a very low flow (Table 6) and the climate aridification, which manifests with much higher intensity compared to the central and northern regions. The functional irrigation systems from these sources are in much smaller numbers, and a large part have been destroyed or are in a state of advanced wear, especially in Căușeni, Cahul and Cantemir districts. Similar to Edineț and Ungheni districts, most of the abstracted water from the Prut riverbed in Cahul district is used for households. In the rest of the districts from the Southern DR,

with the exception of the Ștefan Vodă district, but also in the Gagauzia TAU, predominate underground sources.

The ***total volume of water abstracted from underground sources*** in the Southern Region was, on average, 12.4 million m^3 of water or 70% of the total volume, including 8.8 million m^3 (62%) in the Southern RD and 3 .6 million m^3 (100%) in Gagauzia TAU. The maximum volume of abstracted water from these sources is recorded in the Gagauzia TAU (3.6 million m^3), as well as in the districts of Căușeni (1.8 million m^3) and Cahul (1.4 million m^3), with larger sizes and with a higher level of access to public aqueducts supplied from underground sources [NBS, 2023). The minimum volume was captured in the districts of Basarabeasca (666 thousand m^3), Leova (732 thousand m^3) and Cantemir (762 thousand m^3), with smaller urban centers and a lower level of access to aqueducts.

In the years 2010-2016, there is a general trend of a slow reduction (-8%), which is also manifested in the six of the eight districts (Table 2), being caused, in large part, by the significant reduction of the volume of abstracted water from surface sources (Figure 2), and by the reduction of water used for irrigation and other agricultural needs, especially in the Causeni and Cantemir districts. Subsequently, in the years 2017-2023, is observed a significant increase (by 1.2 times or from 16.5 million m^3 to 20.3 million m^3) of the total volume of abstracted water, which is manifested in all districts of South DR and Gagauzia TAU (Figure 3), with a minor exception of Basarabeasca district. The pronounced positive trend is mainly due to the significant expansion of rural public aqueducts (Buruja, 2022, NBS, 2023 b) and to the partial restoration of irrigation systems (AWUI, 2013-2023), but also to the maximum water use in the drier years 2020 and 2022. The maximum increase is attested in the districts of Leova (and Taraclia (by 1.4 times), Cimișlia (by 1.5 times). The negative dynamics is found only in the districts of Causeni (by 1.4 times) and Cantemir (by 1.5 times).

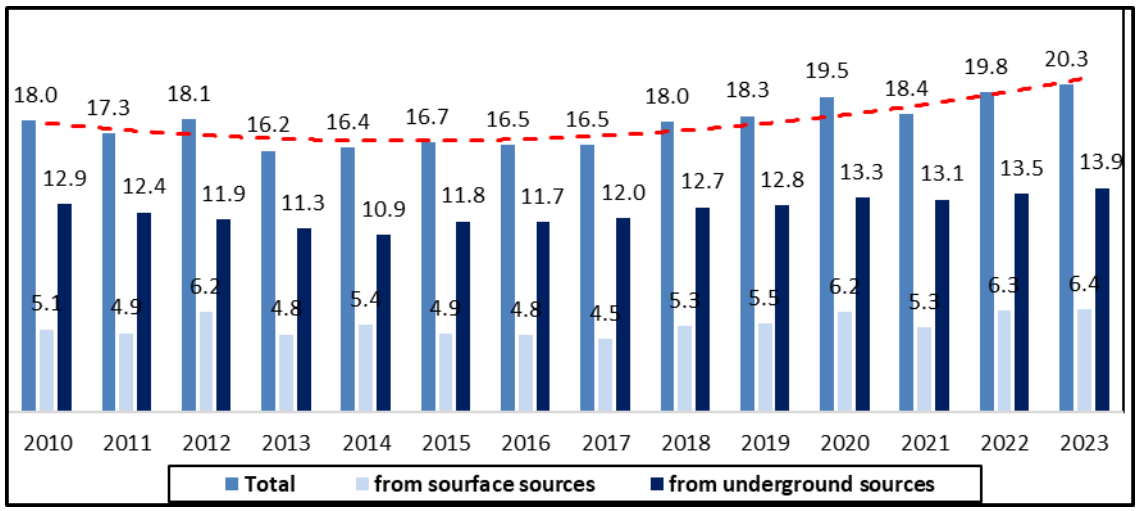

Figure 2 Dynamics of the volume of abstracted water, per total and on the sources of origin, in the Southern Region, in million m^3 ***(Sources**: elaborated by authors according data of Moldavian Water Agency).*

The volume ***of water abstracted from surface*** *sources* also registers an oscillating trend, but against the background of a pronounced positive trend in the South DR (+26% or by 1.3 million m^3). The maximum increase can be seen in the districts of Leova (by 2.0 times), Cahul (by 1.5 times) and Taraclia (by 1.3 times), as a result of the connection to the newly main aqueducts in the Leova district (table 2), connecting the suburban localities of the Cahul city to the urban network (Southern Regional Development Agency, 2023, GIZ Project, 2015), in both cases being supplied

with water from the Prut river, but also to the restoration and construction of irrigation systems of agricultural companies in these districts. The very pronounced negative dynamics can be observed in the Gagauzia TAU (from 100 thousand m^3 to 0 m^3) and in the Cantemir district (by 1.9 times or by 190 thousand m^3), and a less pronounced one – in the Basarabeasca and Ștefan Vodă districts.

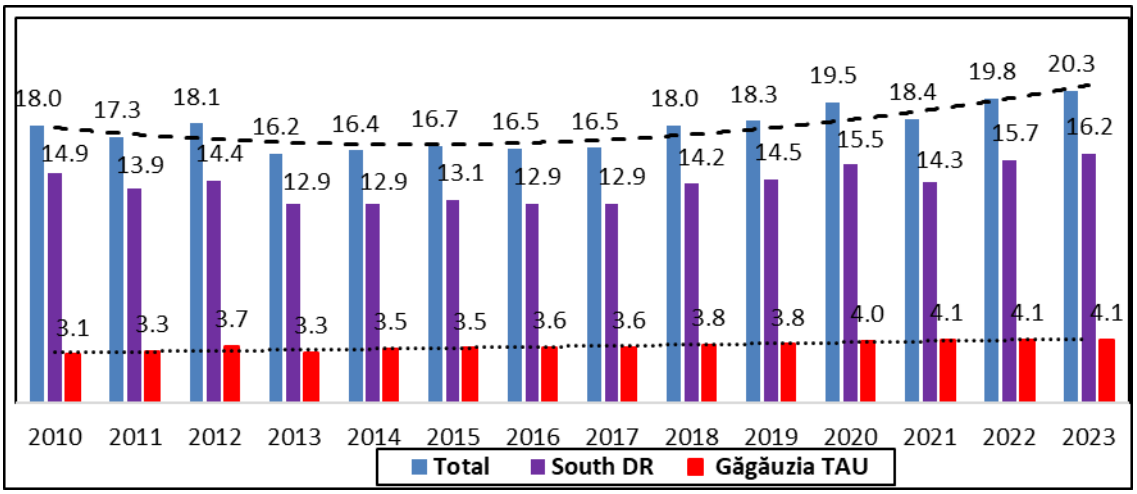

Figure 3 Dynamics of the total volume of abstracted water in the Southern Region, in million m^3 *(**Sources**: elaborated by authors according data of Moldavian Water Agency).*

Table 2 Dynamics of the total volume of abstracted water in the administrative districts from the South Development Region and Territorial Autonomy Units of Gagauzia, thousand m^3.

	ATU	Years														Ave-rage
		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
1	Căușeni	2830	2400	1800	1750	1760	1680	1660	1660	1840	1790	2110	2080	2200	2260	*1987*
2	Ștefan Vodă	2430	2390	2960	2570	2860	2280	2250	1920	2220	2380	2590	2210	2600	2530	*2442*
3	Cimișlia	1150	1190	1260	1170	1140	1380	1190	1310	1440	1500	1470	1410	1450	1460	*1323*
4	Basarabeasca	790	690	1000	830	600	850	860	870	920	920	890	790	800	880	*835*
5	Leova	1150	1060	1210	890	860	990	970	1220	1160	1250	1500	1220	1780	1570	*1202*
6	Cantemir	1310	1170	1130	910	1010	1020	990	960	960	960	960	960	960	960	*1019*
7	Cahul	3960	3770	3890	3690	3540	3790	3760	3690	4090	3870	4020	3910	4120	4720	*3916*
8	Taraclia	1250	1250	1190	1090	1090	1150	1230	1300	1570	1840	1930	1720	1800	1780	*1442*
	South DR	**14870**	**13920**	**14440**	**12900**	**12860**	**13140**	**12910**	**12930**	**14200**	**14510**	**15470**	**14300**	**15710**	**16160**	***14166***
9	**Gagauzia TAU**	**3120**	**3330**	**3680**	**3250**	**3510**	**3540**	**3600**	**3600**	**3760**	**3780**	**4020**	**4100**	**4060**	**4090**	***3674***
	Southern Region	**17990**	**17250**	**18120**	**16150**	**16370**	**16680**	**16510**	**16530**	**17960**	**18290**	**19490**	**18400**	**19770**	**20250**	***17840***
	Total RM	**160290**	**156790**	**159450**	**148970**	**146520**	**149710**	**152460**	**149040**	**151190**	**153670**	**160050**	**150330**	**159540**	**158090**	***154007***
	Share of SR, %	11,2	11,0	11,4	10,8	11,2	11,1	10,8	11,1	11,9	11,9	12,2	12,2	12,4	12,8	*11,6*

***Sources**: elaborated by authors according data of Moldavian Water Agency (2010-2023)*

Note: The total on the Republic of Moldova (RM) are not included volume of water in the left side of Dniester River

In the years 2010-2016, there is also a general trend of slow reduction (-7%), which is also manifested in all the districts of the Southern DR, except for the Cahul district, as well as in the UTA Gagauzia. The maximum reduction can be seen in the Căușeni (by 2.7 times) and Cantemir (by 1.8 times) districts, as a result of the massive damage and decommissioning of pumping stations and centralized water distribution networks captured from the Dniester and Prut rivers (AUWI, 2013-2017). Later, in the years 2017-2023, is observed a significant increase (1.4 times or from 4.5 million m^3 to 6.3 million m^3) of the total volume of captured water, which is manifested in all districts from South DR and in the Gagauzia TAU, with the exception of Cantemir district. The

maximum increase is registered in the districts of Leova (by 2.2 times), Căușeni (by 2.3 times). The very pronounced positive dynamics is mainly due to the recent extension of the main aqueducts in the Leova and Cahul districts (GIZ Projects, 2015), to the partial restoration of the centralized irrigation systems in these districts, but also to the maximum water use for irrigation in the drier years 2020 and 2022.

Overall, the trend of the total volume of abstracted water from underground sources is similar to that of the total volume of captured water, being marked by an oscillating evolution against the background of a weakly pronounced positive general trend (+8%) (Figure 2). In the Gagauzia TAU is registered a very pronounced positive dynamic (+35% or by 1.0 million m^3). The increase of the volume of water captured from underground sources can be seen in five of the eight districts of the South DR, and the maximum increase is attested in the administrative districts of Taraclia (by 1.5 times), Cimișlia (+23%) and Ștefan Vodă (+16%). The negative dynamics can be found only in the districts of Cahul (by 1.6 times), Căușeni (by 1.5 times) and Cantemir (by 1.4 times).

In the years 2010-2016, is observed a decrease (by 1.2 times) of the volume of abstracted water from underground sources, which is attested only in the South DR (> by 1.3 times). The negative dynamics is manifested in half of the districts of the South RD, including in districts of Căuşeni (by 1.8 times) and Cahul (by 1.6 times). The increase in the volume of water captured from underground sources is registered in the Gagauzia TAU (with 34% or 600 thousand m^3), as well as in the districts of Cimișlia, Basarabeasca and Taraclia. In the years 2017-2023, both in the South DR and in the Gagauzia TAU is attested a slow positive trend (+14%), which is due to the expansion of public aqueducts (NBS, 2023b), which are supplied from underground sources. The insignificant negative trend (by 1.2 times) can be found only in the Leova district, as a result of the connection to the main aqueducts from the Prut riverbed, as well as in the Basarabeasca district, due to the reduction of water use at agro-industrial enterprises and at poultry factories (ESI, 2018). In addition, the data of the Moldavian Water Agency regarding the volume of abstracted and use water from underground sources, especially for domestic purposes are incomplete, and the recent data of the National Bureau of Statistics tell us about a much greater increase in metered water use to rural public aqueducts.

4.2 The volume of used water

In the Southern Region were used, on average, 14.9 million m^3 of water or 13% of the total volume of water used on the right side of the Dniester River (Table 3), including in the Southern DR – 12.4 million. m^3 (11%). The maximum volume of water used is also recorded in the districts with direct access to the Dniester and Prut riverbeds [Burduja D., 2022], including in the districts of Cahul (2.9 million m^3), Ștefan Vodă (2.3 million m^3) and Căușeni (2.0 million m^3), as well as in Gagauzia TAU (2.4 million m^3), with a higher level of urbanization and of access to public aqueducts (NBS, 2023a,b). The minimum volume of water was used in the administrative districts with a smaller urban centers (Bejan, 2023), including Basarabeasca (644 thousand m^3) and Cantemir (968 thousand m^3).

More than 2/3 (9.9 million m^3) of the total volume of used water was intended for **agricultural needs**, including 2.1 million m^3 (15%) for regular irrigation and 7.8 million m^3 (52%) – for other agricultural needs. For domestic purposes was used, on average, more than ¼ (27% or 4.1 million m^3 of water) of the total volume, and for technological purposes − 759 thousand m^3 or only 5.1%, a fact that is due to the much lower level of industrialization and urbanization compared to the other regions from the Republic of Moldova. Thus, in this region, the volume of water used for agriculture directly conditions the total volume of used water. At the same time, in the standardized forms received and processed by the Moldavian Water Agency, drinking water supplied to the population by rural public aqueducts is frequently attributed to the agricultural

needs, which artificially increases (by 15-30%) the share of this sector in the total volume of used water (Bacal, 2020).

Table 3 Volume of water used and share of usages categories of water in the administrative districts from the South DR and Territorial Autonomy Units of Gagauzia, thousand m^3 (average of 2010-2023 years).

No.	ATU	Total	Agriculture						households		technological	
			Total		irrigation		other					
		thousand m^3	thousand m^3	%	thousand m^3	%	thousand m^3	%	thousand m^3	%	thousand m^3	%
1	Căuşeni	1964	1571	80	348	18	1223	62	327	17	66,4	3,4
2	Ştefan Vodă	2346	2145	91	1223	52	922	39	169	7,2	30,7	1,3
3	Cimişlia	1101	683	62	12,9	1,2	670	61	381	35	35,7	3,2
4	Basarabeasca	646	410	63	181	28	229	35	230	36	12,1	1,9
5	Leova	1136	816	72	74,3	6,5	721	63	259	23	51,4	4,5
6	Cantemir	959	818	85	104	11	734	77	121	13	30,0	3,1
7	Cahul	3006	1436	48	173	5,7	1263	42	1192	40	379	13
8	Taraclia	1278	745	68	8,6	0,7	736	58	348	27	37,9	3,0
	South DR	**12437**	**8623**	**69**	**2124**	**17**	**6499**	**52**	**3027**	**24**	**643**	**5,2**
9	**Gagauzia TAU**	**2459**	**1296**	**53**	**40**	**1,6**	**1256**	**51**	**1042**	**42**	**116**	**4,7**
	Southern Region	**14896**	**9919**	**67**	**2164**	**15**	**7755**	**52**	**4069**	**27**	**759**	**5,1**

***Sources**: elaborated by authors according data of Moldavian Water Agency (2010-2023*)

The maximum water use in this sector is registered at a large agricultural companies with a complex profile, especially from Taraclia, Căușeni and Ștefan Vodă administrative districts (Burduja, 2022, Bejan, 2023). In most of the respective companies, the largest amount of water is used for growth of fodder crops and vegetables (State Environmental Inspectorate, 2010-2023), and the amount of water used depends also on the technical capacities -current finances of agricultural enterprises. Also, the demand for water for agriculture is ensured by the Associations of Water Users for Irrigation (2013-2023), especially from the Ștefan Vodă and Cahul administrative districts.

For ***irrigation*** were used, on average, 2.2 million m^3 of water or 17% of the total volume of used water in the South DR (figure 4.a). The maximum volume of water for irrigation was used in the districts of Ștefan Vodă (1.2 million m^3 or 52%) and Căușeni (348 thousand m^3). According to the data of the Moldavian Water Agency, in recent years in the districts of Cantemir, Cimișlia, Taraclia, as well as in UTA Găgăuzia, was not assigned water for regular irrigation, a fact disproved by the ecological inspections. The small volume of water used in irrigation is conditioned both by natural conditions (low flow and insufficient rainfall, increased risk of soil salinization), and by the technical and economic possibilities of using water for irrigation (Table 6) (Bacal, 2017).

In the Gagauzia TAU, in agriculture sector were used, on average, 1.3 million m^3 or only ≈3% of the total volume of water used for these purposes in the right side of Dniester river and 53% of the total volume of water used (figure 4.b). The lower share of agriculture compared to the Southern DR is explained by the higher consumption for domestic purposes (figure 4.b), as a result of higher access to public aqueducts and the higher degree of urbanization (Table 6). The maximum water use is recorded at large agricultural enterprises and of at Association of Water Users for Irrigations.

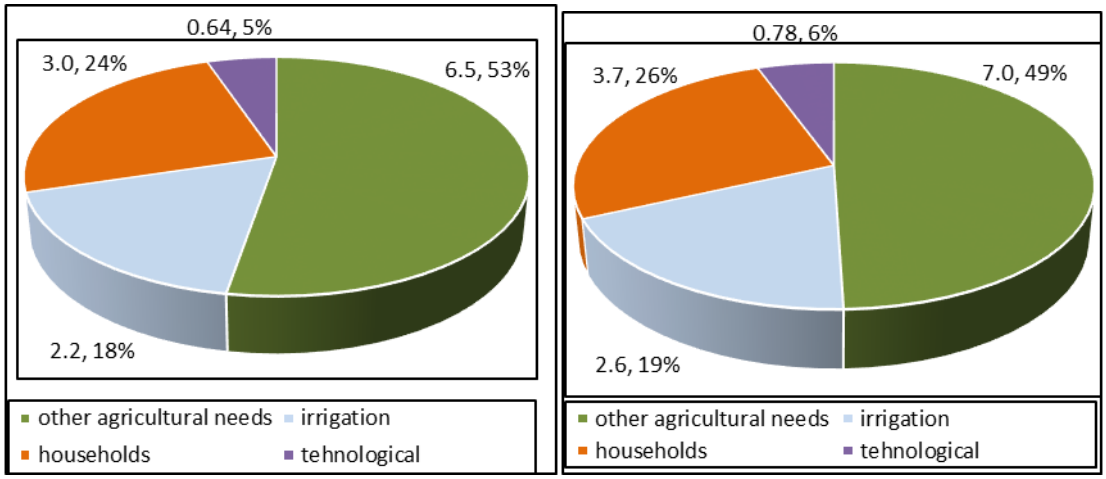

Figure 4 The volume of used water (mil. m^3) and the share of categories of water use in the Southern Region, average of the years 2010-2023, a) South DR and b) Gagauzia TAU *(**Sources**: elaborated by authors according data of Moldavian Water Agency (2010-2023).*

Compared to the Northern or Central Regions (Bacal, 2023), animal husbandry is less developed, including due to insufficient water resources needed for fodder crops (table 6). An average volume of use water is registered at the poultry factories from Cimișlia and Basarabeasca districts, at pig complexes from the Cahul and Comrat districts (ESI, 2010-2017). Also, water use for the growth of plants and animals in the households should not be neglected, which, as a rule, are not equipped with authorized sewerage systems and produce a major impact on the environment and on the human body in the rural localities (Bejan, 2023).

For **household purposes** was used, an average of 4.1 million m^3 or 27% of the total volume of water used in the respective region, including 3.0 million m^3 (24%) in the South DR and 1.0 million m^3 (42%) in the Gagauzia TAU (Figure 4). The volume of water used for domestic needs is conditioned by the number and size of the urban centers served, as well as of the rural localities, which have more extensive public water supply systems and provides the statistical forms on water use indices (Burduja, 2022). The maximum volume of water for domestic needs was used in the Cahul district (1.2 million m^3), with a larger urban center and a biggest capacity for distribution and consumption of potable water captured from the Prut riverbed. An average water use for domestic purposes can be seen in the districts of Cimișlia (381 thousand m^3), Taraclia (348 thousand m^3) and Căușeni (327 thousand m^3), with medium-sized urban centers. The minimum volume of water for domestic purposes is found in the districts of Cantemir (121 thousand m^3) and Ștefan Vodă (169 thousand m^3), with smaller urban centers. The maximum share of water used for domestic purposes is also attested in the districts of Cahul (40%), Basarabeasca (36%) and Cimișlia (35%). In addition, if we add the volume of water distributed by rural public aqueducts, usually attributed to agricultural uses, then the share of water used for households in most districts will increase considerably (by up to 15-30%).

For ***technological*** (industrial) ***purposes*** were used, on average, 759 thousand m^3 of water or only 5.1% of the total volume of water used in the Southern Region, including 643 thousand m^3 (5.2%) in the Southern DR and 116 thousand m^3 (4.7%) – in the Gagauzia TAU (Table 3). The maximum volume of water for these purposes was used in the Cahul district (379 thousand m^3), due to the city of Cahul, in which are concentrated the largest and most numerous industrial enterprises from the region of study. In the other districts, the total volume of water used for industrial purposes does not exceed 50 thousand m^3, with the small exception of Căușeni district (66 thousand m^3).

Companies from food industry in the branch structure of water consumption predominate, followed by service and commercial centers, medical and education institutions, markets and car washes. The biggest water consumers from the food industry are: the wines factories from Gagauzia TAU, Căușeni, Taraclia, Cahul and Ștefan Vodă districts; the dairy factories in the cities of Cahul and Comrat, the juice and canning factories in the Ștefan Vodă and Căuşeni districts; the grain processing plants in Vulcănești and Iagrara, Leova district; the flour production factories in Ceadâr-Lunga; bakery factories from Comrat, Ceadâr-Lunga and Cahul cities; enterprises of sausage production from Cahul and Comrat cities; rural bakeries, mills and canteens, public catering enterprises.

The biggest consumers of water from the mining and building industry are: companies producing concrete articles grom Cahul and Comrat cities; production centers of pressed bricks and paving slabs in the district centers; building companies from Cahul and Comrat. A largest volume of water for technological purposes are used by the public companies for providing the water supply and sanitation services in the cities of Cahul and Comrat, as well as by the markets and car washes in the district centers. Also, an average water use is attested at the wood processing enterprises from Cahul, at the railway companies from Basarabeasca, at the fuel sales and storage stations (ESI, 2018).

The dynamics of the total volume of water used in the Southern Region is similar to that of the total volume of abstracted water. Overall, is observed a general positive dynamic, which includes 2 sub-periods with opposite trends: negative – in the years 2010-2017 and positive – in the years 2018-2023 (Figure 5).

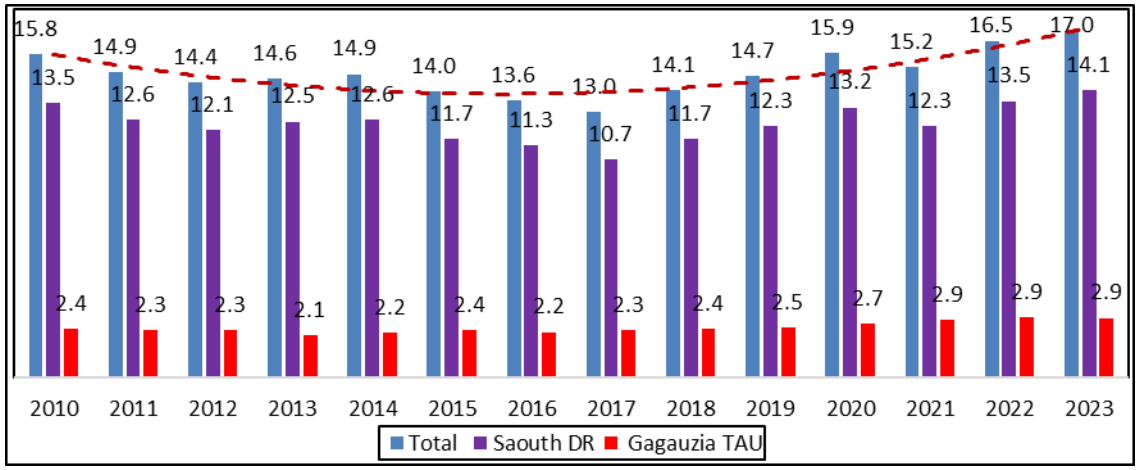

Figure 5 Dynamics of the total volume of water used in the Southern Region, in million m^3 ***(Sources**: elaborated by authors according data of Moldavian Water Agency (2010-2023).*

Thus, in the years 2010-2023, an oscillating trend is registered against the background of a slow increase (+7%), and the values from 2023 are almost equal to those from 2010. The general dynamics is determined exclusively by the South DR. At the same time, in UTA Gagauzia the total volume of water used increased by ≈1/4 or by ≈1.6 million m^3 (Table 4). Also, the increase of the total volume of used water is attested in the five of the eight districts from South DR. The higher increase is registered in the districts of Leova (+35%), Cahul and Taraclia (+18%). The negative trend can be found only in the districts of Cantemir (by 1.7 times), Căușeni (by 1.4 times) and Basarabeasca (Table 4), being caused by the decommissioning of the centralized irrigation systems, the gradual disconnection from the Bender pumping station, the damage of the other pumping stations in the respective area, the bankruptcy of several agricultural and agro-industrial

enterprises in these districts, but also to the application of technologies with less water consumption.

In the 2010-2017 years, there is also a more pronounced negative dynamic compared to the volume of water captured in this region. Thus, the total volume of water used in the Southern Region was reduced by ≈1.3 times or by ≈2.3 million m^3. The slow reduction trend is manifested in six of the eight districts of the South DR, as well as in the Gagauzia TAU, being caused, in large part, by the significant decrease of the volume of water from surface sources and by the reduction of water used for irrigation and other agricultural needs, especially in Căușeni (by 1.6 times) and Cantemir (by 1.5 times) districts. The positive trend can be observed only in the districts of Ștefan-Vodă and Cimișlia.

Later, in the 2018-2023 years, a significant increase (+27% or from 13.0 million m^3 to 17,0 million m^3) of the total volume of water used is observed, which is manifested in the all districts of the South DR and in the Gagauzia TAU (Figure 5, Table 4), with the exception of Basarabeasca and Cantemir districts, where are attested an insignificant reduction (by a few tens of thousands of m^3). The pronounced positive dynamics is caused by the significant increase of rural public aqueducts and by the partial restoration of irrigation systems, but also by the maximum consumption in the drier years 2020 and 2022. The maximum increase is recorded in the administrative districts of Ștefan Vodă (by 1.5 times), Leova and Căușeni (by 1.4 times).

Table 4 Dynamics of the total volume of water used in the districts from the South Development Region and Territorial Autonomy Units of **Gagauzia**, thousand m^3.

ATU	Years														Average
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	
Căușeni	2490	2200	1620	*2580*	*2590*	1510	1470	1500	1700	1750	1970	1940	2050	2120	*1964*
Ștefan Vodă	2390	2340	2230	2440	2780	2250	2220	1740	2160	2380	2650	2170	2570	2530	*2346*
Cimișlia	*1040*	1060	1130	1050	1020	1300	1110	960	*1100*	1110	1150	1100	1140	1150	*1101*
Basarabeasca	*670*	630	820	660	540	710	700	600	*650*	610	600	590	590	680	*646*
Leova	*1100*	*1040*	1120	820	*830*	920	930	1150	1100	1190	1410	1160	1660	1480	*1136*
Cantemir	1280	1140	1100	940	1040	1030	990	890	860	830	830	830	830	830	*959*
Cahul	3250	2980	2960	2980	2800	2890	2800	2700	2750	2850	2970	3120	3220	3820	*3006*
Taraclia	1230	1230	1140	1050	1040	1060	1120	1150	1350	1560	1630	1410	1470	1450	*1278*
Saouth DR	**13450**	**12620**	**12120**	**12520**	**12640**	**11670**	**11340**	**10690**	**11670**	**12280**	**13210**	**12320**	**13530**	**14060**	***12437***
Gagauzia TAU	2380	2310	2310	2090	2210	2350	2230	2310	2400	2460	2660	2850	2940	2920	*2459*
Southern Region	**15830**	**14930**	**14430**	**14610**	**14850**	**14020**	**13570**	**13000**	**14070**	**14740**	**15870**	**15170**	**16470**	**16980**	***14896***
Total RM	**114955**	**114655**	**115630**	**111620**	**106365**	**106785**	**105705**	**107180**	**109315**	**109130**	**119195**	**112470**	**120810**	**119420**	***112374***
Share of South Region, %	13,8	13,0	12,5	13,1	14,0	13,1	12,8	12,1	12,9	13,5	13,3	13,5	13,6	14,2	*13,2*

***Sources**: elaborated by authors according data of Moldavian Water Agency (2010-2023)*

Similar to the total volume of used water, the volume of ***water used in agriculture*** registers an oscillating dynamic, which includes 2 sub-periods with opposite trends: negative - in the years 2010-2017 and positive – in the years 2018-2023 (Figure 6). In the years 2010-2017, the volume of water used for agricultural needs in the Southern Region decreased by 1.5 times or with 3.1 million m^3, including in the Southern RD – by 1.6 times or from 10.0 million m^3 up to 7.2 million m^3) and in UTA Gagauzia TAU– by 1.4 times or from 1.5 million m^3 to 1.2 million m^3. The negative dynamics are recorded in the six of the eight districts of the South DR, and the highest rates of reduction in the volume of water used for agricultural purposes are observed in the districts of Căușeni (by 2.0 times), Cimișlia (by 1.8 times), Cantemir and Cahul (by 1.7 times), Ștefan Vodă (by 1.6 times). Positive dynamics can be seen only in Taraclia (by 1.3 times) and Leova (by 1.1 times) districts.

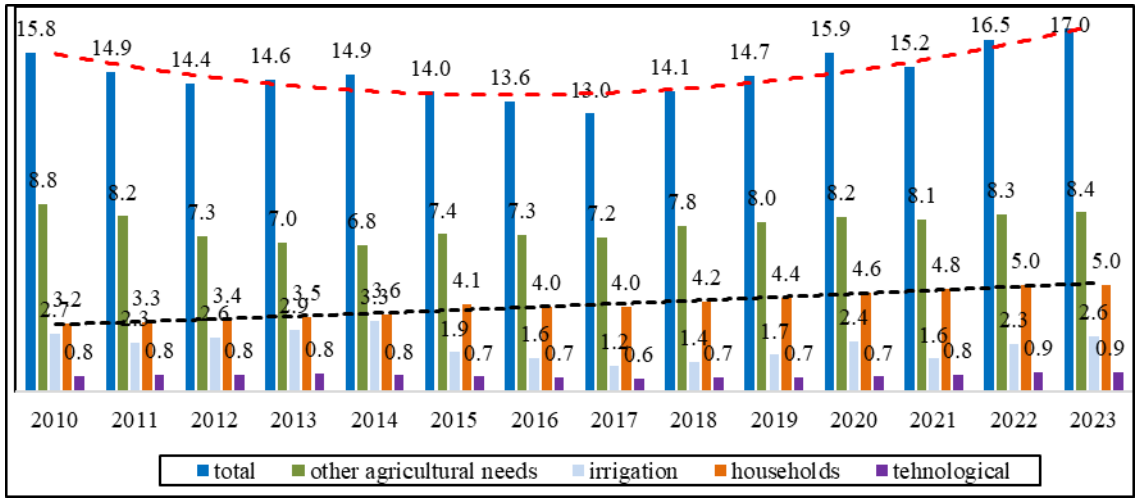

Figure 6 Dynamics of the volume of water used in the Southern Region by usage categories, in million m^3 ***Sources****: elaborated by authors according data of Moldavian Water Agency (2010-2023).*

In the years 2018-2023, the volume of water used for agriculture in the Southern Region increased by 1.3 times or with 2.6 million m^3, including with 2.3 million m^3 (31%) in the Southern DR and with 210 thousand m^3 of water (17%) – in the Gagauzia TAU. The positive dynamics are recorded in the all the districts of the South DR, with a minor exception of the Leova district. The maximum increase is attested in the districts with direct access to Dniester and Prut riverbeds, including districts of Cahul (by 1.5 times), Ștefan Vodă and Căușeni (by 1.5 times), which benefited more massively from the Program „Compact" of rehabilitation of centralized irrigation systems. In most districts, the increase of the volume of water used for agriculture is due not so much to the increase in water consumption in this sector, but to the biggest increase of the volume of water delivered by public rural water supply systems, frequently attributed to agricultural uses.

The volume of water used for ***regular irrigation*** registered an oscillating dynamic on the background of a general negative trend (by 1.3 times). In the years 2010-2017, the volume of water used for irrigation was reduced by 2.4 times or from 2.7 million m^3 to 1.2 million m^3, including in the Southern DR - by ≈2.0 times or from 2 .4 million m^3 to 1.2 million m^3 and in the Gagauzia TAU– from 330 thousand m^3 to 0 m^3. The negative trend is recorded in the all districts from the South DR, and the highest rates of reduction in the volume of water used for these purposes are observed in the Gagauzia TAU, as well as in the districts of Cantemir (by ≈6 times), Leova (by 5 times), Căușeni (by 2.0 times), Ștefan Vodă (by 1.8 times) and Cahul (by 1.7 times), where the most extensive centralized irrigation systems were taken out of use. In the 2018-2023 years, the volume of water used for irrigation in the Southern Region increased by 2.2 times or with over 1.4 million m^3 (Figure 5), a fact that is exclusively due to the Southern RD. The positive trend is registered in five of eight districts of the South DR. The maximum increase is found in the administrative districts with direct access to the Dniester and Prut riverbeds, including Cahul (by 10 times), Leova (by 4.0 times) and Căușeni (by 2.3 times), which benefited more massively by the „Compact Program" and the „Livada Moldovei" Project, including for the rehabilitation and construction of irrigation systems (Burduja D., 2022).

The volume of water used for ***household purposes*** registers a pronounced increase, which is observe in the entire analyzed period (2010-2023). The positive trend is due mainly to the multiple increase of rural aqueducts and metered water consumption. Thus, the volume of water used for these needs in the Southern Region increased in the years 2010-2023 by 1.6 times or with 1.8 million m^3 (Figure 6), including in the Southern DR – by 1.5 times or with ≈1.3 million m^3 and in the

Gagauzia TAU – by 1.7 times or with 550 thousand m^3. The faster growth is attested in the smaller districts, where are also observed the highest expansion rates of aqueducts, including Taraclia (by 2.3 times), Cimișlia (by 1.9 times), Cantemir and Leova (by 1.8 times each). The negative trend is registered only in the Basarabeasca district and is due to the reduction of water use of the urban population.

The volume of ***water used in industry*** increased in the years 2010-2022 with 25% (190 thousand m^3), including Găgăuzia TAU – by 1.9 times (from 90 thousand m^3 to 170 thousand m^3) and in the South DR – with 18% or by 120 thousand m^3. The positive trend of volume of water used for technological purposes is observed in the districts of Cimișlia (by 4.0 times), Leova (by 2.5 times), Taraclia (by 1.7 times) and Cahul (by 1.2 times), but the positive difference is insignificant (a few tens of thousands of m^3). The more pronounced negative dynamics are registered in the Cantemir (by 2.6 times), Basarabeasca (by 2.0 times) and Ștefan Vodă (by 1.8 times) districts, with smaller urban centers and a larger number of bankrupted industrial and transport companies. In the years 2010-2017, the volume of water used for technological purposes decreased by 1.4 times (150 thousand m^3), a fact that is exclusively due to South DR. The negative dynamics of 2010-2017 years is followed by a significant increase (by 1.5 times or by 330 thousand m^3) of the volume of water used for these purposes, including in the Gagauzia TAU– by 1.9 times or with 80 thousand m^3 and in the South DR – by 1.5 times or with 250 thousand m^3. The positive trend is conditioned not only to the increase of industrial production volumes, as a result of the implementation of the Association Agreement with the EU, but also to the increase in the level of record keeping and statistical reporting of water use (Bacal P., 2023). In addition, the positive difference in the years 2021-2023 compared to the year 2020 is due to the significant reduction of the pandemic restrictions applied in the year 2020. At the same time, despite the major perspectives of economic integration with the European Union, due to the strained relations with Russia and the reduced capacity of the local market, the rapid recovery of the industrial sector and the big increase of water consumption are unlikely (Bacal, 2018).

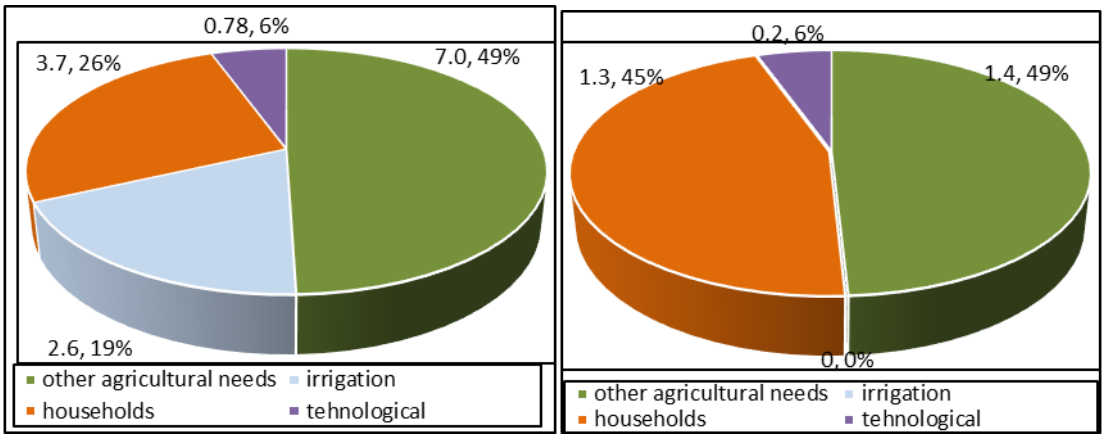

Figure 6 The volume of used water (million m^3) and the share of the usage categories of water use in the Southern Region, the year 2023, a) South Development Region b) Gagauzia TAU, *(**Sources**: elaborated by authors according data of Moldavian Water Agency (2023).*

In 2023, the ***total volume of water used*** in the Southern Region was 17.0 million m^3 or with 1.8 million m^3 more than in 2021 (Table 3), which is due to the massive use of water for irrigation. In the districts of the South DR, were used 14.1 million m^3 (83%) of water, and in the Gagauzia TAU – 2.9 million m^3 (17%). The biggest volume of used water is also recorded in the districts with direct access to the Dniester and Prut rivers, including the districts of Cahul (3.8 million m^3), Ștefan Vodă (2.5 million m^3) and Căușeni (2, 1 million m^3), as well as Gagauzia TAU (2.9 million m^3), with a

higher level of urbanization and of access to public aqueducts. An average volume of water was used in the districts of Leova and Taraclia (1.5 million m^3) (Table 5), with a massive water consumption by large agricultural companies. The minimum volume of water was used in the districts with a smaller urban center, including Basarabeasca (680 thousand m^3) and Cantemir (830 thousand m^3).

For ***agricultural purposes***, was used 11.0 million m^3 or 65% of the total volume of water used in the Southern Region, including 2.6 million m^3 (15%) for regular irrigation and 8.4 million m^3 (49%) – for other agricultural uses. For domestic purposes were used 5.0 million m^3 of water or 30% of the total volume, and for technological purposes – 940 thousand m^3 or only 5.5%. In the South DR, for agricultural purposes was assigned about 2/3 (9.6 million m^3) of the total volume of water used to, including for regular irrigation – 2.6 million m3 (19%) and for other agricultural usages – 6, 9 million m^3 (49%) (Figure 7.a). The biggest volume of water used in agriculture is registered in the districts of Ștefan Vodă (2.4 million m^3), Cahul (1.9 million m^3) and Căușeni (1.6 million m^3), with direct access to the Dniester and Prut River and, where have been preserved and rehabilitated the functional irrigation systems (AWUI, 2021). An average consumption of water in agriculture is observed in the Taraclia district (970 thousand m^3), Leova (680 thousand m^3) and Cantemir (690 thousand m^3), where are located several large agricultural companies. The minimum volume of water used for agriculture is attested in the districts of Basarabeasca (480 thousand m^3) and Cimișlia (660 thousand m^3), with smaller sizes and less capacity to capture and use water for agricultural purposes. The higher share (≥80%) of agriculture is attested in the districts of Ștefan Vodă and Cantemir, with a smaller urban center. An average share (60-80%) of agriculture can be seen in the Căușeni, Leova, Taraclia and Basarabeasca districts (Table 5), and the minimum share – in the Cahul districts (51%), due to the higher water consumption for domestic and industrial purposes in the Cahul city.

Table 5 Volume of water used and share of usages categories of water in the administrative districts from the South Development Region and Territorial Autonomy Units of Gagauzia, in thousand m^3 (2023 year).

No.	ATU	Total	Agriculture						households		technological	
			Total		irrigation		other					
		thousand m^3	thousand m^3	%	thousand m^3	%	thousand m^3	%	thousand m^3	%	thousand m^3	%
1	Căușeni	2120	1690	80	340	16	1350	64	370	17	60	2,8
2	Ștefan Vodă	2530	2280	90	1200	47	1080	43	200	7,9	50	2,0
3	Cimișlia	1150	660	57	10,0	0,9	650	57	450	39	40	3,5
4	Basarabeasca	680	480	71	240	35	240	35	180	26	10	1,5
5	Leova	1480	780	53	120,0	14,5	780	53	480	32	100	6,8
6	Cantemir	830	790	95	0	0	670	81	140	17	20	2,4
7	Cahul	3820	1930	51	710	19	1220	32	1430	37	460	12
8	Taraclia	1450	960	66	0	0	960	66	440	30	40,0	2,8
	South DR	**14060**	**9570**	**68**	**2620**	**19**	**6950**	**49**	**3690**	**26**	**780**	**5,5**
9	**Gagauzia TAU**	**2920**	**1430**	**49**	**0**	**0**	**1430**	**49**	**1320**	**45**	**160**	**5,5**
	Southern Region	**16980**	**11000**	**65**	**2620**	**15**	**8380**	**49**	**5010**	**30**	**940**	**5,5**

***Sources**: elaborated by authors according data of Moldavian Water Agency.*

For regular irrigation in the South DR was used 2.6 million m^3 of water, or 700 thousand m^3 of water more than in 2021, with abundant precipitation. The biggest volume of water for these purposes was used in the Ștefan Vodă district (1.2 thousand m^3) and Cahul (310 thousand m^3), with direct access to the Dniester and Prut rivers, where have been preserved and rehabilitated the complex irrigation systems. An average volume of water for regular irrigation was used in the

districts of Căușeni (340 thousand m^3) and Basarabeasca (170 thousand m^3) and, a fact due to the large agricultural enterprises in the respective districts. In the districts of Cantemir and Taraclia (Table 5), as well as in the Gagauzia TAU (Figure 7.b), was not allocated water for regular irrigation.

Agricultural uses of water other than regular **irrigation** predominate in most districts of the South DR, with the exception of the districts of Ștefan Vodă, where predominates the use of water for irrigation, and Cahul, where prevail household uses. The high share of agriculture without irrigation is conditioned both by the pronounced agrarian and rural character of these districts, the high consumption of water for animal husbandry, especially in large zoo technical complexes and in various agricultural uses other than irrigation, as well as the frequent allocation by the Moldavian Water Agency of the water delivered by the rural public water supply systems for agricultural use.

For ***domestic purposes*** were used 5.0 million m^3 or 30% of the total volume of water used, including 3.7 million m^3 (26%) in the South DR and 1.3 million m^3 (46%) in the Gagauzia TAU (Figure 7). The maximum volume of water for domestic purposes was used in Cahul district (1.4 million m^3), with a larger urban center and a large capacity for distribution and consumption of water captured from the Prut River (Bacal, 2023a) and in the Gagauzia TAU, with a higher level of urbanization and of access to public aqueducts. An average domestic water consumption can be seen in the districts of Cimișlia and Taraclia (450 thousand m^3 each), Leova (480 thousand m^3) and Căușeni (370 thousand m^3). The minimum volume of water used for domestic purposes is registered in the districts, with a smaller urban centers, which have a less access to public aqueducts, including Cantemir (140 thousand m^3), Basarabeasca (180 thousand m^3) and Ștefan Vodă (200 thousand m^3). The higher share of water used for these purposes is attested also in the Cahul (37%) and Cimișlia (39%) districts.

For ***industrial purpose*** were used 940 thousand m^3 of water or only 5.5% of the total volume of water used in the Southern Region, including 780 thousand m^3 (5.5%) in the South DR and 160 thousand m^3 (5.5%) – in the Gagauzia TAU. The biggest volume of water for these needs was used in the Cahul district (460 thousand m^3), as a result of the location of the largest and most numerous industrial enterprises in the city of Cahul. In the Gagauzia TAU (Table 5), for technological uses were assigned 170 thousand m^3 of water, and in the rest of the districts from the South Development Region, the volume of water used in industry did not exceed 100 thousand m^3 each.

Table 6 SWOT analysis of the use of water resources in the South Region of the Republic of Moldova.

Strengths	Weaknesses
• Multiple increase of the number and length of public water supply systems in rural areas; • The high level of access to public aqueducts in most districts of South Development Region and in the TAU of Gagauzia; • Good practices for the development of irrigation systems by AWUI supported by the Compact Program; • Active implementation of regionalization projects of water supply services in Cahul and Leova districts; • Financial support from foreign donors (GIZ, USAID, ADA, TIKA,); • The actual projects for rehabilitation, extension and construction of the key aqueducts from Dniester and Prut river to the central part of the region;	• Insufficient amounts of rainfall; • The more intense manifestation of climate changes and aridification; • Low flow of internal rivers and unsatisfactory status of most water reservoirs; • The high level of groundwater pollution; • Insufficient reserves of quality water; • Predominantly agrarian and rural character; • Economic underdevelopment of the study region; • The high degree of wear and tear of the old irrigation systems and the slow expansion of the new systems; • The big rivers flow at the borders of the region, a fact that complicates the supply of surface water; • Lack of key water supply aqueducts from the

• The Southern Region includes the lower courses of big rivers (Dniester and Prut) with higher water flows and with largest meadows; • Wetlands in the basin of the lower reaches of the Dniester and Prut rivers are declared a priority in the conservation of the biodiversity of aquatic and marsh ecosystems, which attracts significant financial support from local and external funding sources in this field.	Dniester and Prut rivers to the central part of the region; • Limiting access to water pumping stations downstream of Bender municipality (Căușeni district); • The gaps in the reporting of water management data; • Underfunding of water supply projects and the insufficiency of local sources of co-financing.
Oportunities	**Threats**
• Water supply to the population is a priority direction of regional and local programs; • Regionalization and and increasing the efficiency of water supply services; • Increasing the access to modern water supply and sanitation systems, improving the quality of life and reducing impact on the environment and human health; • Implementation of good practices for the development of irrigation systems; • Active attraction of foreign investments in the context of accession to the European Union; • The massive influx of remittances; • Implementation of alternative co-financing models, including crowdfunding platforms; • Optimized systems for reporting, monitoring and evaluating water resources and their use; • The creation of the Lower Dniester National Park and the implementation of the necessary measures to protect wetlands and biodiversity.	• The more intense manifestation of depopulation and aging processes, especially in the rural areas and small towns; • Acute insufficiency of financial resources for the implementation of planned measures and actions; • Accelerating climate change and aridification processes; • Superficial cooperation with the Ukrainian authorities and with the separatist authorities on the left side of the Dniester regarding the provision of water needs; • Proximity to Ukrainian territory frequently subject to Russian bombing; • Political and economic instability at the macro-regional and national level; • Major investment risks..

5. Conclusion

1. The volume of abstracted and used water is determinates by the demand for water, by the water available resources from surface and underground sources, as well as by the technical and financial capacities for capturing, transporting and using of water for various socio-economic activities.

2. The biggest volume of abstracted and used water is registered in the largest administrative districts with direct access to the Dniester and Prut rivers, including Cahul, Ștefan Vodă and Căușeni, as well as in Gagauzia TAU with a higher level of urbanization and of access to public aqueducts.

3. Unlike the other regions of the Republic, the Southern Region has a more pronounced agricultural and rural character, is less assured with water resources, have a low access to the Dniester and Prut riverbeds. Most of the region is located in the basins of small and medium rivers, with a very low flow and very polluted. As a result, from surface sources were abstracted only about 30% of the total volume. The surface sources predominate only in the Cahul and Ștefan Vodă districts.

4. More than 2/3 of the total volume of water was used for agriculture including 15% for regular irrigation and 52% – for other agricultural needs. For households was used, on average, more than

¼ (27%) of the total volume, and for technological activities − only 5.1%, a fact that is due to the much lower level of industrialization in the South Region.

5. The trend of the total volume of water used in the Southern Region registered an oscillating character on the background of a positive general dynamic. In first part (2010-2017) of analyzed period is observed a negative trend, and in the second part (2018-2023) is attested a significant increase of total volume of water use from respective region. The oscillating dynamics of water use is observed in the agriculture and industrial sectors, but the volume of water use for households registered a positive trend throughout the analyzed period, being caused by the multiply increase of length and capacities of public aqueducts, especially in the rural localities.

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