

WATER SUPPLY AND SEWAGE SYSTEM WITHIN BĂILEȘTI PLAIN

REȚEAUA DE ALIMENTARE CU APĂ ȘI SISTEMUL DE CANALIZARE DIN CÂMPIA BĂILEȘTIULUI

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Abstract: This article evaluates the implementation status of water supply and sewer systems in Băilești Plain, as a response to the alignment with the objectives of the National Sustainable Development Strategy 2030. The length of the water supply network and the sewer system was analyzed at the administrative-territorial unit (ATU) level and their correlation with the population in each ATU was assessed. The potable water distribution network is approximately 900 km, which is insufficient for the population in the region. Furthermore, the sewer network has a low level of implementation in rural areas, not yet reaching the objectives set by the strategies and Oltenia Water Company (OWC), namely providing access to essential utilities for the population.

Key-words: *water supply system, sewer system, Băilești Plain, sustainable development*

Cuvinte cheie: *rețea de alimentare cu apă, canalizare, Câmpia Băilești, dezvoltare durabilă*

1. INTRODUCTION

"Sustainable development heavily relies on access to clean water and sanitation facilities. However, in recent years, overuse, pollution and climate change have contributed to a global shortage of clean water" (Talukder et al., 2025). Water infrastructure represents the backbone of development, being essential for water, food and energy security. It does not only serve drinking water and wastewater services, but also irrigation, energy generation (water-food-energy nexus), flood and drought protection, and navigation across key transportation pathways (Valero et al., 2021).

The limited stock of freshwater resources has, however, become a subject of increasing concern worldwide, more so, in the backdrop of rapid urbanization, economic growth, and climate change (Sukhwani & Shaw, 2022). The extension of

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water infrastructure is essential for the development and wellbeing of local communities, especially in rural settlements.

The assessment of water supply for domestic and agriculture implies a wide-ranging approach (Mitrică et al., 2017). Not only the people need water, but also the animals belonging to the rural inhabitants or the crops they cultivate in their near home gardens. It is a well-known fact that the rural population irrigates their small crops by using water from the public supply network because of the lack of rainfall. Thus, a public water system supplied by water originating from a confined aquifer is a necessity in an area considered to be prone to water-deficient (Gâțescu, 2010) and to drought (Vlăduț, 2010).

2. DATA AND METHODS

Study area

Băilești Plain is a subdivision of Oltenia Plain, located in the southwestern part of Romania and covers an area of approximately 2,172 sqkm. It is a terraced plain (The Geography of the Romanian Danube Valley, 1969), formed as a result of the action of the Danube River, which has digressed over a 50 km wide area (Coteț, 1957). The altitudes gradually decrease on the NNW – SSE direction, following the flow direction of the Danube and the orientation of its terraces, from altitudes of 150-160 m (in the north) to 35-40 m (in the south). The limit to the Getic Plateau (located to the north) is given by an erosion slope with heights of 20-60 m, which marks the extension of the terraces (Fig. 1).

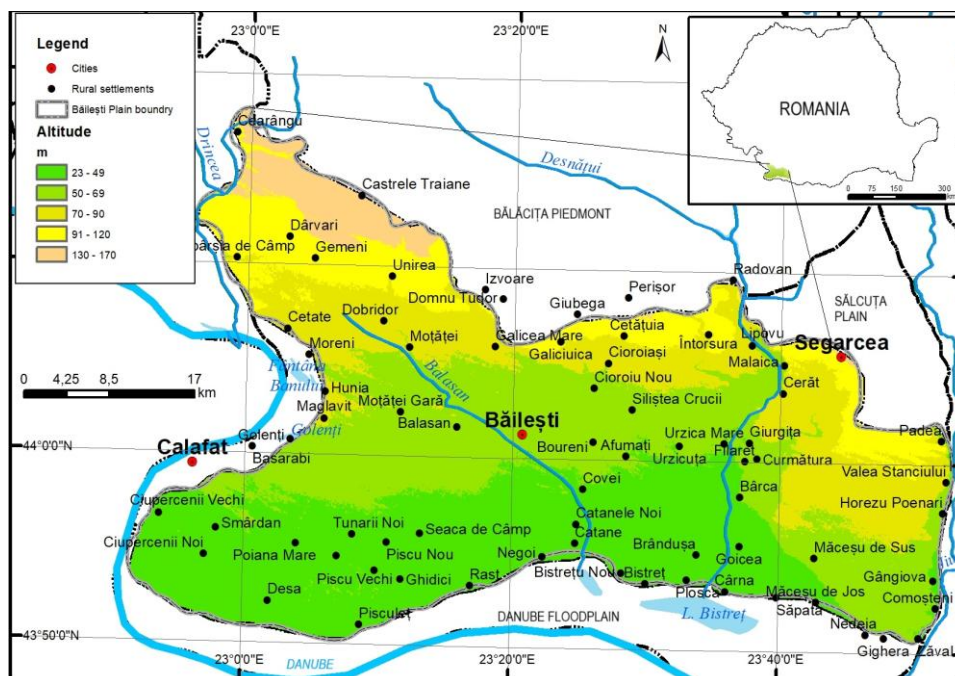


Fig. 1 Băilești Plain
(Source: based on geo-spatial.org data)

This terraced plain is covered with a dune mantle, which extends from the western to the southeastern part of the plain, at the confluence of the Desnățui river with the Danube (Vâlsan, 1916). The thickness of the dunes increases from east to west, reaching even 20-25 m; thus, the region appears as aeolian accumulation hills. The general orientation of the dunes follows the direction of the dominant winds (west winds) (The Geography of Romania, 2005).

The density of the hydrographic network is low, only 0.3 km/km². Among the tributaries of the Danube, only the Desnățui river cuts the terraces, having a north-south flow direction, while other smaller tributaries, such as the Balsan, the Baboia, and the Jivan, maintain the direction imposed by the parallelism of the terraces, following the NW-SE direction. The extension of the Danube floodplain, in the southern part of the study area, determined the appearance of ponds, the supply of which is directly related to the level of the Danube (especially when floods occur). The particularities of the relief determine the groundwater depths (10-20 m or even lower at the contact with the floodplain).

Data and Methods

The methodology used for this research consisted in finding the most recent data related to the water supply system and sewer for each administrative-territorial unit within Băilești Plain. The data used in this study were downloaded from the National Institute of Statistics website and from OWC website. Then, we created the water supply system map and the sewer system map in QGIS Desktop 3.28.2 based on NIS data related to their implementation and existence. Also, we created charts in Microsoft Excel to better visualize the relationship between the numbers of inhabitants living in the ATUs located in Băilești Plain with access to the water supply system and to the sewer system. A scientific paper on the development and progress of water supply and wastewater treatment in Romania was written by Strungaru et al. in 2019. Frone et al. wrote about the increasing access to water supply and sanitation in rural Romania (2019). The national and local sustainable development strategies were consulted to review the proposed objectives and targets. Additionally, articles from the local press were reviewed to assess the status of works and investment projects.

3. RESULTS AND DISCUSSIONS

According to the statistical data available for the year 2023, 17 administrative-territorial units (ATUs) out of the 50 located in Băilești Plain area did not have public water supply systems installed (Fig. 2). Among the localities where water supply relies solely on wells and personal fountains are Valea Stanciului, Gângiova, Măceșu de Sus, Cârna, Giurgîța, Afumați, Siliștea Crucii, Întorsura, Lipovu, Radovan, Galiciuca, Piscu Vechi, Ciupercenii Noi in Dolj County and Obârșia de Câmp, Curmir, Braniște, and Oprișor in Mehedinți County. The total length of the simple drinking water distribution network in the administrative-territorial units (ATUs) that overlaps fully or partially with Băilești Plain was 900.0 km in 2023. Over 10% of this network was installed in Calafat (93.5 km). Băilești had a total water supply network of 72.6 km, while Segarcea had 53 km of pipelines designated for drinking water transport (Fig. 3).

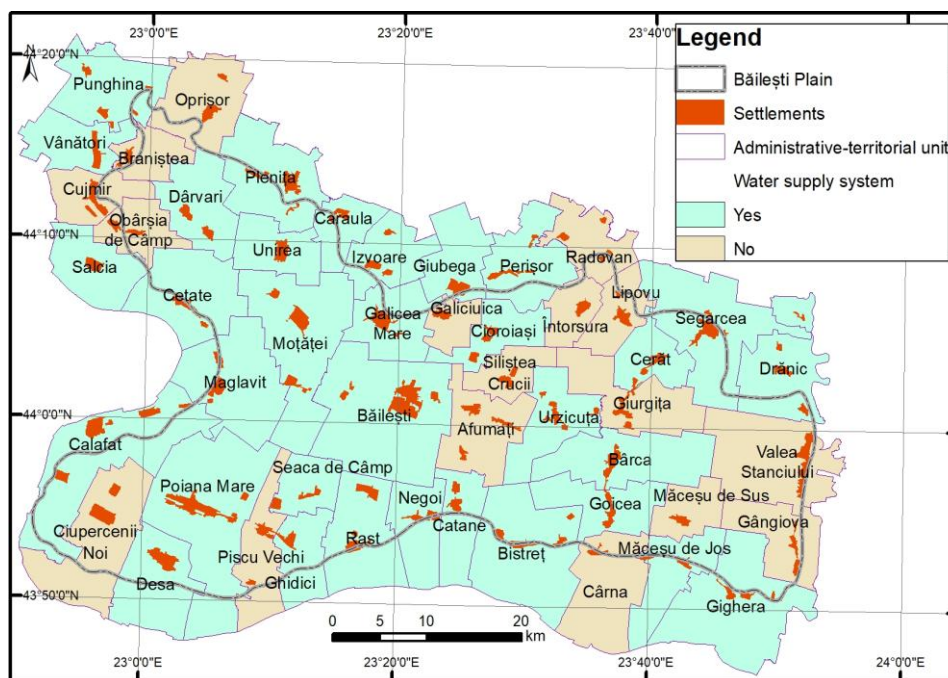


Fig. 2 Water supply system in Băilești Plain

(Source: NIS, 2023)

In the rural area, we mention Poiana Mare, a locality with approximately 9.800 inhabitants, which has a public water supply network of over 40 km. Besides this, the localities of Moțăței, Goicea, Bistreț, Urzicuța, Plenita, Bârca, and Unirea had between 30 and 40 km of public drinking water transport network, while in Drănic, Giubega, Măceșu de Jos, Dârvari, Seaca de Câmp, Galicea, Caraula, Rast, Maglavit, Perișor, Punghina, and Salcia, the network length ranged between 20 and 30 km. Ghidici and Cetate had a network length ranging between 20 and 25 km, while Cioroiși was close to 15 km (14.8 km). The localities of Negoii, Catane, Vânători, and Gighera had between 5 and 10 km of public water transport network in 2023.

The population of Băilești Plain exceeds 180.000 inhabitants, but approximately 40.000 people still did not have, at least theoretically, access to potable water from the public network in 2023. We say "theoretically" because there are cases where, although a public water supply network is present in the locality, not all residents benefit from the system. This may be due to its insufficiency, the reluctance of some households to connect to the public system, or simply because certain inhabited areas within the administrative-territorial units (ATUs) are more remote.

In Dolj County, most projects (201) are found under the priority axis "Technical and Urban Infrastructure" (Annex 2 – Dolj County Development Strategy). The expansion and modernization of water supply and wastewater systems in Băilești Plain area were targeted through the "Sectoral Operational Program (SOP) for Environment 2007-2013", followed by the "Large Infrastructure Operational Program 2014-2020" (with a completion deadline in 2023). During the 2014-2021

period, investments focused on the localities of Calafat, Băilești-Balasan, Maglavit, Poiana Mare, Piscu Vechi, Rastu Nou and Cerăt (OWC).

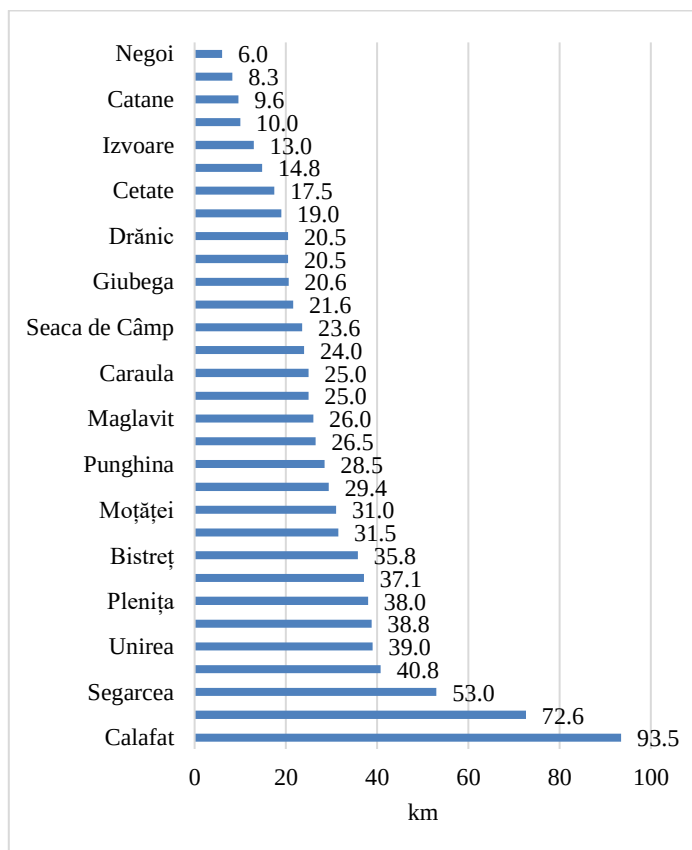


Fig. 3 Length of the water supply network in the localities of Băilești Plain
(Source: NIS, 2023)

OWC continues the previous investment plan with the new "Regional Water and Wastewater Infrastructure Development Project in Dolj County". The objective is to ensure a coverage rate close to 100% for centralized water supply and wastewater services in its operational area. The financing contract between OWC and the Ministry of European Funds (2019) was followed by the European Commission's decision to fund the project with 445 million Euros (2020). Băilești, Calafat, Poiana Mare, Piscu Vechi, Maglavit, Rast, Cerăt, and Plenița are targeted (OWC, 2023).

The largest investments are planned for Maglavit (€ 12.365.275), where extensive works include the expansion of the underground water intake, water treatment facility, a 12.3 km water distribution network and a 32.7 km sewer network. Similarly, for Poiana Mare (€ 10.109.505), the project includes a new pumping station on Tunarii Noi network, the extension of the water distribution

network by 30 km and a 26.3 km gravity sewer network. In Cerăt (€ 9.501.834), the new intake front consists of 8 boreholes at 65 meters depth, a new water treatment facility, an extended 18.8 km water distribution network and the extension of the gravity sewer network by 18 km. The extension works continue with Calafat (€ 8.749.218), Rastu Nou (€ 5.858.568), and Băilești (€ 1.237.710). These projects include new intakes from the Danube in Calafat, as well as the extension of networks in the area (OWC).

From the analysis of the situation presented by OWC in 2023 in the Water Register, available on its website, it is clear that, although progress has been made, there is still a large number of residents who are not connected to the public water supply systems (Table 1). In urban centers within the plain, the potable water supply coverage did not exceed 80% in 2023. In Băilești, only 14,385 inhabitants were connected to the public water supply system (Fig. 4), namely 75.24% of the total population number. In Calafat, 14,045 inhabitants (79.65% of the total population) were connected to the water supply system and in Segarcea 6,360 inhabitants (79.92% of the total population) used the public water supply system.

On November 5, 2024, the works for the water supply and wastewater system in Băilești were completed, with European funding of € 11.7 million under the Master Plan (POS MEDIU I). This has significantly increased the connection rate of the municipality's population to these systems, reaching 95%.

In Calafat, the water supply and wastewater systems are undergoing extensive modernization and expansion. Major projects are underway, funded by European funds through the National Recovery and Resilience Plan (PNRR), with a total investment value of approximately € 2.73 million.

For Segarcea, the water supply and wastewater systems are being expanded through the CL13 project (2023, April 5), funded by local and regional European funds. The project aims to extend the water distribution network by 13 km and add 887 new connections (with completion expected in early 2025).

Table 1 Main ATUs connected to water supply system within Băilești Plain

A.T.U.	Population	Population connected to potable water	Distribution network length (km)	Length of the supply pipeline (km)	Water source
Băilești	19,117	14,385	58.67	2.75	8 water boreholes
Calafat	17,632	14,045	51.32	-	Danube
Segarcea	7,957	6,360	41.15	4.97	3 water boreholes
Ciupercenii Vechi	3,913	1,183	15.37	7.90	Danube
Plenița	5,241	3,843	36.50	4.9	7 water boreholes, Orodol spring
Caraula	2,470	2,350	17.05		2 water boreholes
Goicea	2,387	1,773	31.53	0.44	2 water boreholes
Bârca	4,044	2,376	38.80	0.18	2 water boreholes
Bistreț Nou	1,060	271	8.53	0.02	1 water boreholes
Bistreț Vechi	2,445	1,252	16.8	0.07	2 water boreholes
Plosca	659	550	9.88	-	2 water boreholes
Poiana Mare	10,086	1,646	40.77	7.18	Danube
Măceșu de Sus	1,440	1,050	20.5	-	2 water boreholes

(Source: OWC, Water Register, Oltenia, 2023)

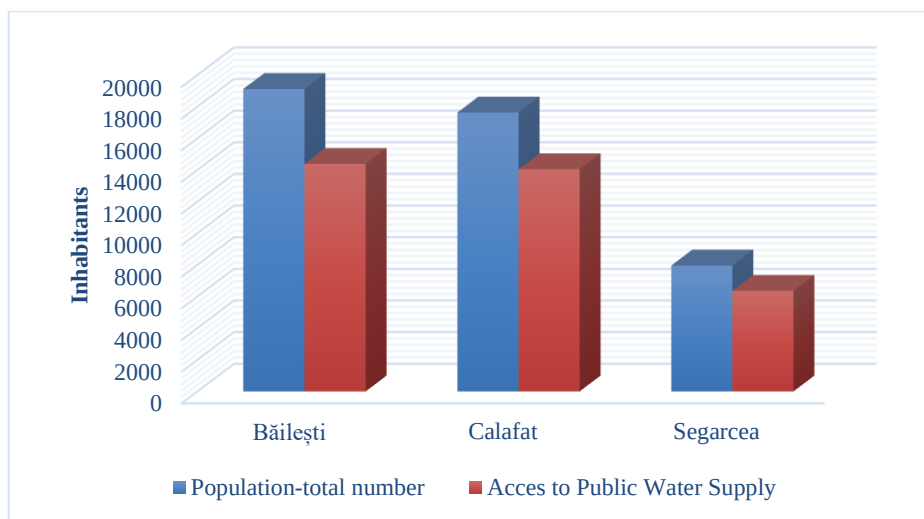


Fig. 4 Number of urban inhabitants with access to water supply network
(Source: OWC- Water Register, 2023)

In rural areas, the situation varies greatly. In Caraula, 2,350 inhabitants (Fig. 5) were connected to the public water supply system. This number represents 95.14% of the total population of Caraula. In Goicea, 1,773 inhabitants (74.27% of the total population) had access to the public water supply system. In Bârca, more than half of the population was connected to the public water supply system, but in Poiana Mare the percent of inhabitants connected to the public water supply system was less than 20 because this A.T.U. has 10,086 residents and, according to N.I.S., only 1,646 inhabitants were connected to the system. In Bistreț, there are 4,164 inhabitants and only half of them had access to the water supply system in 2023.

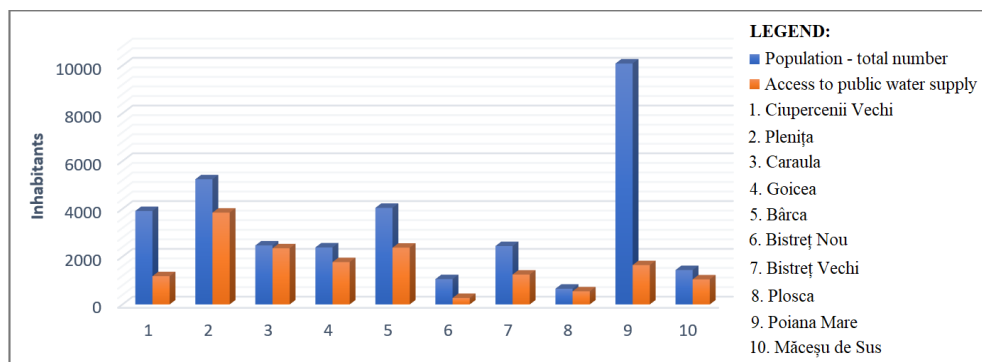


Fig. 5 Number of inhabitants with access to water supply network
(Source: OWC-Water Register, 2023)

According to the National Institute of Statistics, only 14 administrative-territorial units in Băilești Plain area were connected to a public sewer system, namely Punghina, Vânători, and Salcia in Mehedinți County and Cetate, Plenița,

Caraula, Calafat, Poiana Mare, Băilești, Perișor, Bistreț, Bârca, Măceșu de Jos, and Segarcea in Dolj County (Fig. 6). The distribution of sewer systems is not uniform across the plain and does not follow a clear implementation logic, but rather, it depends on local public administrations that have initiated development processes.

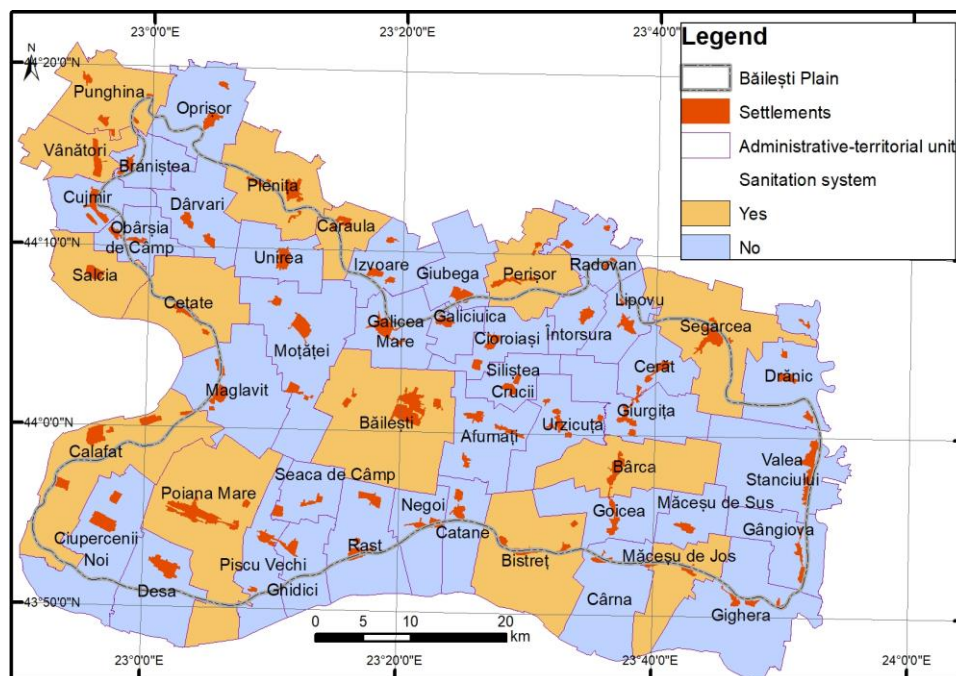


Fig. 6 Sewage system in Băilești Plain

(Source: NIS, 2023)

In 2023 (Table 2), the percentage of the urban population connected to the sewer system was modest, as follows (Fig. 7): in Calafat, there were registered 13,660 inhabitants connected to the sewer system (77.47% of the total population), in Segarcea 5,249 inhabitants (65.96% of the total population) and in Băilești 7,720 inhabitants (40.38% of the total population) had access to the sewer system. In Băilești, the works from the Master Plan (POS MEDIU I) rapidly increased the connection rate of the municipality's population to the sewer system to 95% by 2024. In Segarcea, the CL13 project aims to expand the sewer network by 37 km and add 883 new connections by early 2025.

In rural areas, the steps to connect households to the sewer system are slow, with large discrepancies between localities being registered at the level of 2023 (Fig. 8): in Măceșu de Sus 1,883 inhabitants (82% of the total population) had access to the sewer system, while in Bârca 2,192 inhabitants (54% of the total population) had access to the sewage system. There are even smaller percentages, as in the case of Plenița, where 1,520 inhabitants (which represents 23.85% of the total population) had access to the sewage system. In Poiana Mare, the number of residents connected

to the sewer system is higher, 1,807, but the percentage of the total population is low (17.9%). Ciupercenii Vechi and Goicea had very low percentages of connections to the sewer systems.

Table 2 Main ATUs connected to sewer system within Băilești Plain

A.T.U.	Population connected to the sewer system	Sewer networks (km)	Wastewater treatment plants (Number and capacity)	Pumping stations
Băilești	7,720	79.47	1 SE Rastu Nou-30,000 l.e.	6
Calafat	13,660	58.48	1 SE Calafat-30,000 l.e.	2
Segarcea	5,249	39.29 and 8.14 collector	1 SE Cerăt -8,000 l.e.	3
Ciupercenii Vechi	1,107	10.87 and 3.71 collector	1 SE Calafat -30,000 l.e.	3
Plenița	1,250	27.65	1 SE Caraula – 8,000 l.e.	0
Caraula	441	15.95	1 SE Caraula – 8,000 l.e.	6
Goicea	1,095	32.41	1 SE Goicea-2,500 l.e.	20
Bârca	2,192	35.73	1 SE Bârca -3,500 l.e.	36
Bistreț	1,530	30,.19	1 SE Bistrețu Vechi-3,000 l.e.	17
Poiana Mare	1,807	39.12	1 SE Calafat-30,000 l.e.	4
Măceșu de Sus	1,183	10.2	1 SE Măceșu de Jos	11

(Source: OWC, Water Register, 2023)

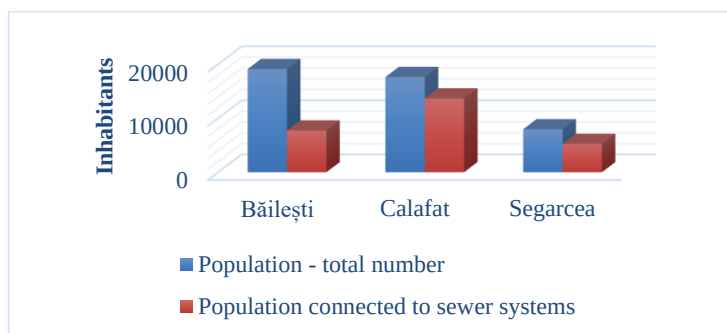


Fig. 7 Number of urban inhabitants with access to the sewer system

(Source: OWC, Water Register, 2023)

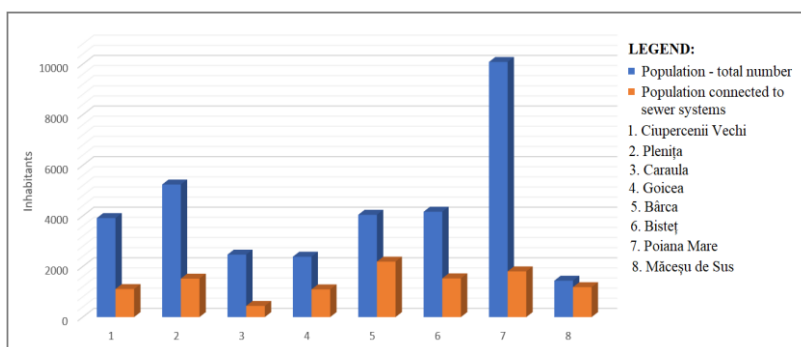


Fig. 8 Number of rural inhabitants with access to the sewer system

(Source: OWC, Water Register, 2023)

4. CONCLUSIONS

In 2023, out of the 50 ATUs that partially or entirely overlap with Băilești Plain, 17 did not have potable water supply infrastructure and a sewer network. The drinking water distribution network totals 900 km, with the most extensive networks in Calafat (93.5 km), Băilești (72.6 km), and Poiana Mare (40.8 km). In the remaining localities, the network varies between 5 and 40 km, depending on the size of the locality, with the smallest water distribution networks found in Vânători and Negoi.

Băilești Plain has a population of 180.000, out of which 40.000 people do not have access to centralized water supply systems. The Oltenia Water Company is responsible for implementing water and sewer networks through regional projects funded by the Ministry of Investments and European Projects. Investments have been made in several ATUs, but the population service level has not yet reached 100%. The largest disparities are in rural areas, ranging from 16.31% in Poiana Mare to 95% in Caraula. The sewage network, which falls under the Large Infrastructure Operational Program, has an even lower implementation rate.

Aligning the localities in Băilești Plain with the requirements of the National and County Strategies regarding technical and urban infrastructure development projects (S.O.1.1. in Mehedinți and Dolj Counties Development Strategy) under the coordination of the Oltenia Water Company is a slow process. Often, the set deadlines and feasibility studies for implementation expire, and the process is restarted entirely. Despite these challenges, the process must be expedited to avoid wasteful spending and improve the population's standard of living.

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