



Spatial Variation In The Number Of Residents Served By Drinking Water Services In Al-Hashimiya District For The Period 2010-2023

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Abstract

Water controls the distribution of the population and their various economic activities, especially since the study area witnessed a significant increase in population growth rates, which led to an increase in the demand for potable water as a result of the high rates of its consumption by citizens. This is what worked to increase interest in this service aspect, as it is a legitimate and legal right that must be provided to citizens. .

The study includes three axes: the first axis represents the theoretical framework represented by the research problem, its hypothesis, and the research methodology, while the second axis focuses on the spatial distribution of drinking water projects during the period (2010-2023). While the third axis focused on the spatial distribution of drinking water complexes during the period (2010-2023), while the fourth axis included the spatial variation in the number of residents served with drinking water during the period (2010-2023), as well as the results, recommendations, and sources of the study.

The study revealed that there was a clear difference in the numbers of those served during the year 2010 between one district and another. The largest number of those served was in the (Al-Madhatiya) district, at a rate of (42.09%), and less in the (Al-Tali'ah) district, at a rate of (10.58%). A difference was also evident in the numbers of those served during the year. 2023 Between one area and another, the largest number of employees reached the (Al-Madhatiya) sub-district at a rate of (34.1%) and the least in the (Al-Taliah) sub-district at a rate of (11.2%).(

The introduction:

Water has attracted human attention and thinking from ancient times until today. Water was not only an important element necessary for the beginning and continuation of life, but rather a major factor that controls human existence. It is also the basic element in human growth and development throughout the ages, as humans use it in various aspects and areas of life that are accustomed to them. It is beneficial, and the population's need for water increases with the increase in

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their number and scientific development. Therefore, it is necessary to know the number of drinking water filtration stations and the number of people benefiting from them.

-1 Theoretical framework

-1-1 The problem of the study

Choosing the study problem is the first and basic step in any scientific research because it serves as the basis upon which subsequent steps in the research are based. The problem of the current study is centered on answering the following questions:

1. Is there a spatial and temporal variation in the number of residents served by drinking water projects?
2. Does the geographical distribution of drinking water projects and complexes differ in the study area?

-2-1 Study hypothesis:

The hypothesis is a preliminary answer to the problem to be studied and is represented by the following:

-1-2-1 The number of residents served by drinking water projects varies spatially and temporally.

-2-2-1 Does the geographical distribution of drinking water projects and complexes differ in the study area?

-3-1 The importance of the study:

The study reveals the spatial and temporal variation during the period (2010-2023) in the numbers of people served by drinking water services, and what is the difference in those numbers during the years (2010) and (2023) by shedding light on the number of projects and water complexes in the study area to know the progress and development of services. waters

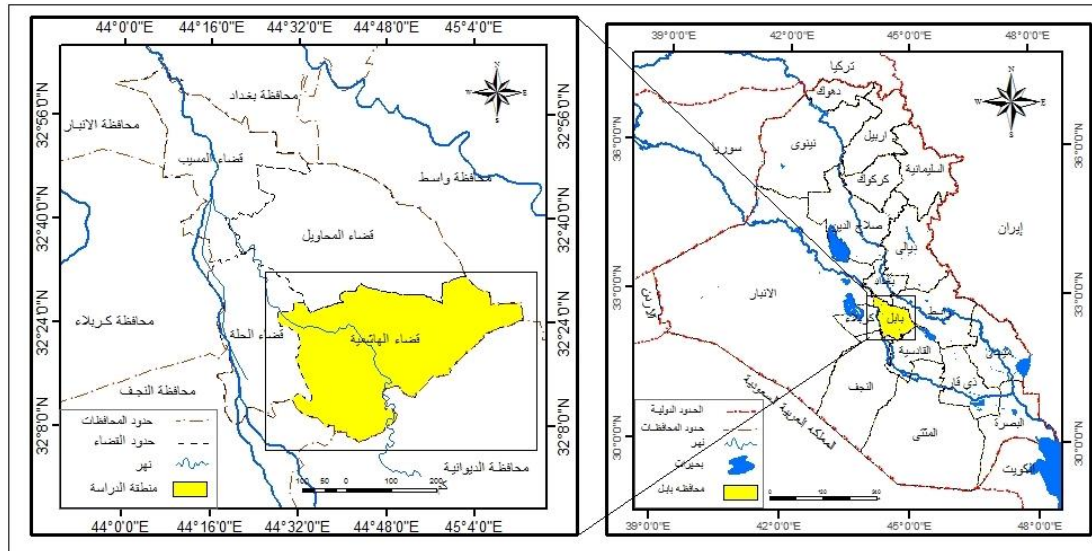
-4-1 Boundaries of the study area:

Which is located in the central part of Iraq, in the middle of the alluvial plain, between latitudes (36-532-7-532) to the north and longitudes (30-544-12-545) to the east. It is bordered to the north-east by Al-Mahawil District, to the north-west by Al-Hilla District, while to the south-west it is bordered by Najaf Governorate, and to the south-east it is bordered by Al-Qadisiyah Governorate, map (1.(

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The Hashimiya district includes five districts: the center of the Hashimiya district, with an area of (101 km²), Al-Madhatiya, with an area of (427 km²), Al-Shamali, with an area of (498 km²), Al-Tali'ah, with an area of (293 km²), and Al-Qasim, with an area of (327 km²), map. (2.)

Map (1) The geographical location of Babil Governorate in relation to Iraq for the year 2021.

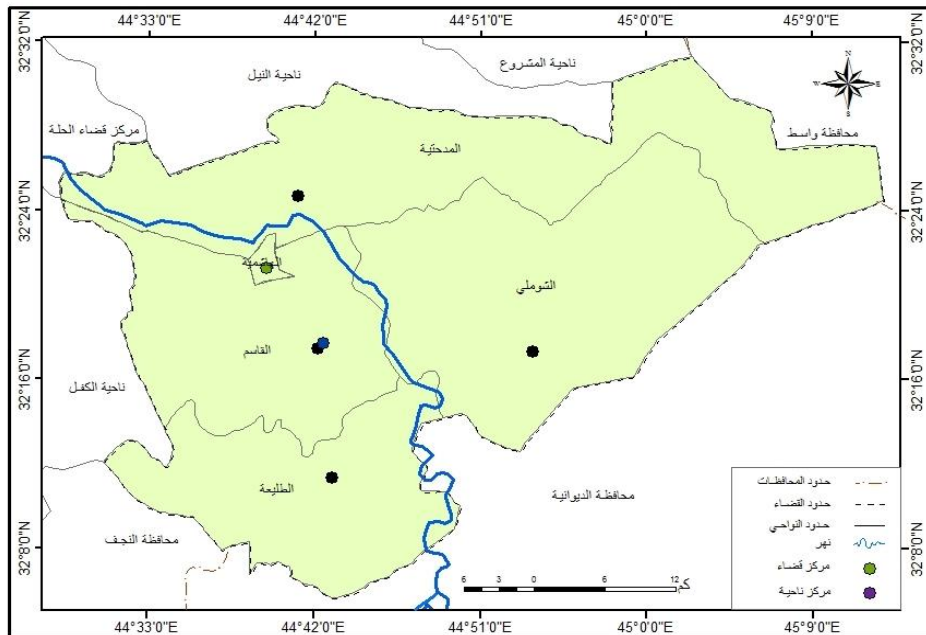


Source based on:

- 1 Republic of Iraq, General Authority for Survey, Map Production Department, Administrative Map of Iraq, scale 1/1000000, 2021.
- 2 Digital Elevation Model DEM
- 3 GIS program outputs

Map (2) Administrative units in the study area

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Source: Based on Table (1), the DEM digital elevation model, and the outputs of the GIS program

Based on the Republic of Iraq, General Authority for Survey, Map Production Department, Administrative Map of Babil Governorate, on a scale of 1/1000000, 2021.

2- Spatial distribution of drinking water projects during the period (2010-2023)

These are large filtration stations and are usually concentrated in the city center and are close to water sources with high drainage, where water is drawn from different sources, whether its source is from a well, lake, or river. In our study, water is drawn from the approved river in Babil Governorate. After the withdrawal process, a number of passes pass through it. Stages in order to remove plankton and raise it to be suitable for human use, such as the filtering stage and then sterilization and pumping through pipes to human settlements and rural and urban residential areas (1). It is also known that the water project is a group of interconnected stations that begin by drawing water from various sources (river, sea, Well, collection basin) going through the stages of filtration and sterilization and then pumping the water directly to large cities or through booster stations . (2)

The project occupies a large area due to its requirement for a number of facilities and services for its workers, in addition to the future expansion spaces that the project needs. Its area is also related to its design production capacity. The design life of the project is estimated at 25 years, and the number of operating

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hours is 20 days. It requires periodic maintenance on a weekly, monthly, and annual basis (3)

It is clear from Table (1) and Map (3) that the study area witnessed a clear spatial and temporal difference in the number of drinking water projects. During the year (2010) there were (4) projects, represented by the Al-Hashimiya Water Project. This project is located in the Al-Hashimiya Center on the Shatt Al-Hilla. South of Babil Governorate, its area is about two dunums. It began operating in 1973, with a capacity of 240 m³/hour. This project serves the center of Al-Hashimiya and the areas between the center of Al-Hashimiya district and the district of Al-Madhatiya, and the Al-Husayn Al-Madhatiya water project, which was established in 1963 in the district of Al-Madhatiya, with a capacity of (540) m³/hour and a design capacity of (10,800) m³/ Today, the project area is 16,200 square meters, and the Shomali Water Project, which is located in the Shomali district, was established in 1979 with a capacity of 120 m³/hour and a design capacity of 2,400 m³/day (4).

As for the year 2023, Table (1), it is distinguished by the increase of one water project in addition to the previous projects, which is the Unified Hashemite Medhatiya Water Project Project, which is located on the right bank of the Shatt al-Hilla in the south of Babil Governorate. This project is considered one of the most important and largest projects in the south of the governorate, with an area of 25 dunums. (5)

Table (1) Geographical distribution of drinking water projects in Babil Governorate for the years 2010 and 2023

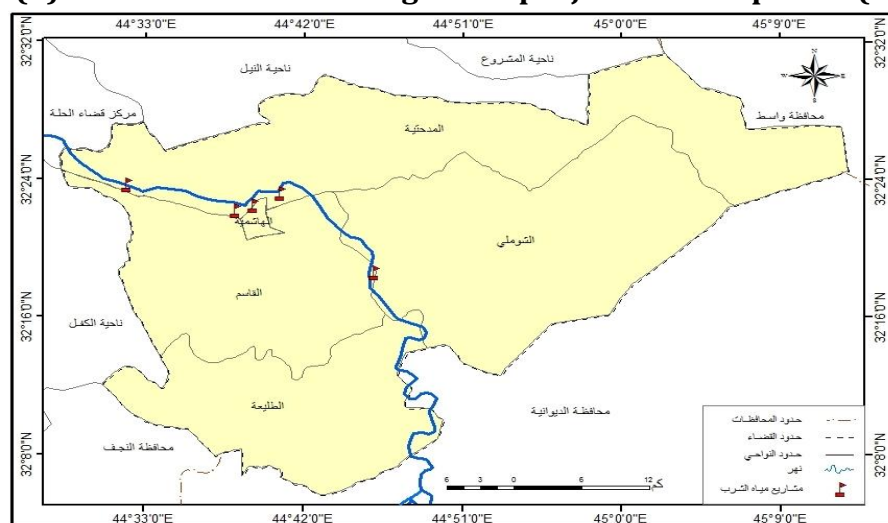
The areas it serves	Its geographical location	Project name for 2023	Project name for 2010
District Center - Abu Saabar area - the areas between Al-Madhatiya and Al-Hashimiyya	Hashemite	Al-Hashimiya Water Project	Al-Hashimiya Water Project
Al-Hashimiya District Center - Al-Qasim - Al-Taliah District - Al-Hamzah Al-Gharbi District - Al-Shamli District	Al-Hashemi Center	The Hashemite-Madhatiya Unified Water Project	-----

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Medhathiya district center	Medhatia	Medhathiya Water Project	Medhathiya Water Project
Al-Husayn, Yabrumana, Al-Jamiyyat, Al-Fahnrah, Al-Zaydiyyah, Al-Daghariyat, West Birman, part of Al-Dablah, and Umm Jiryan	Medhatia	Al-Husayn Al-Madhatiya Water Project	Al-Husayn Al-Madhatiya Water Project
Albu Tarboush - Albu Falih - Albu Khidr - Albu Ward - Albu Sanad Albumah - Albu Mashaan - Albu Kawam - Albu Abd - Albu Jabr - Albu Talal - Albu Wawi - Albu Dama - Albu Jib - Albu Khalaf	Shomali	Shomali Water Project	Shomali Water Project

Source: The researcher's work based on the Water Directorate in Babil Governorate, Planning and Follow-up Division, unpublished data, 2023.

Map (3) Distribution of drinking water projects for the period (2010-2023)



Source: The researcher's work based on the Water Directorate in Babil Governorate, Planning and Follow-up Division, unpublished data, 2023.

2- Spatial distribution of drinking water complexes during the period (2010-2023)

It is a mini project, that is, small-sized filtration units that go through the same stages as the water project. They are a galvanized iron structure for the speed of their installation, meaning they are ready-made. They are used in relatively small villages and districts (6) and take water from different sources, as is the case in **Miaad Abbas Barhi Khalil Spatial Variation In The Number Of Residents Served By Drinking Water Services In Al-Hashimiya District For The Period 2010-2023**

the project. The complex consists of a withdrawal well or Any water source, sedimentation basins, filtration basins, water storage basins, and pumps to push drinking water to residential units and human settlements, with a production capacity not exceeding 500 cubic meters/hour, and the number of operating hours is 12 hours per day. (7)

It appears from Table (2) that the number of water complexes in 2010 reached (48 complexes), while in 2023 their number reached (96 complexes), distributed among the administrative units in the study area. In the center of the Hashemite District, the number of complexes increased during the year 2010 to (4 complexes), while in In 2023, the number of complexes for purifying drinking water reached (7) Table (11). As for Al-Qasim district: The number of complexes in 2010 reached (11) complexes, while in 2023 it reached (17) complexes. While we find the number of complexes in Al-Madhatiya district in 2010 (8), and in 2023, filtration complexes were established. The number of drinking water complexes in Al-Madhatiya district reached (18). In addition to other complexes in Al-Shumali district: their number in 2010 reached (18). In 2023, the number of drinking water complexes in Al-Shumali district reached (42) complexes, and in Al-Taliah district, the number of drinking water complexes in 2010 reached (7) complexes, and in 2023 the number of drinking water complexes reached (12) complexes, map (4).

Table (2) Spatial distribution of drinking water complexes during the period (2010-2023)

Administrative unit	Number of water complexes general2010	Number of water complexes general2023
Al-Hashimiya District Center	4	7
Al-Qasim	11	17
Medhatia	8	18
Al-Shamali	18	42
Vanguard	7	12
sum	48	96

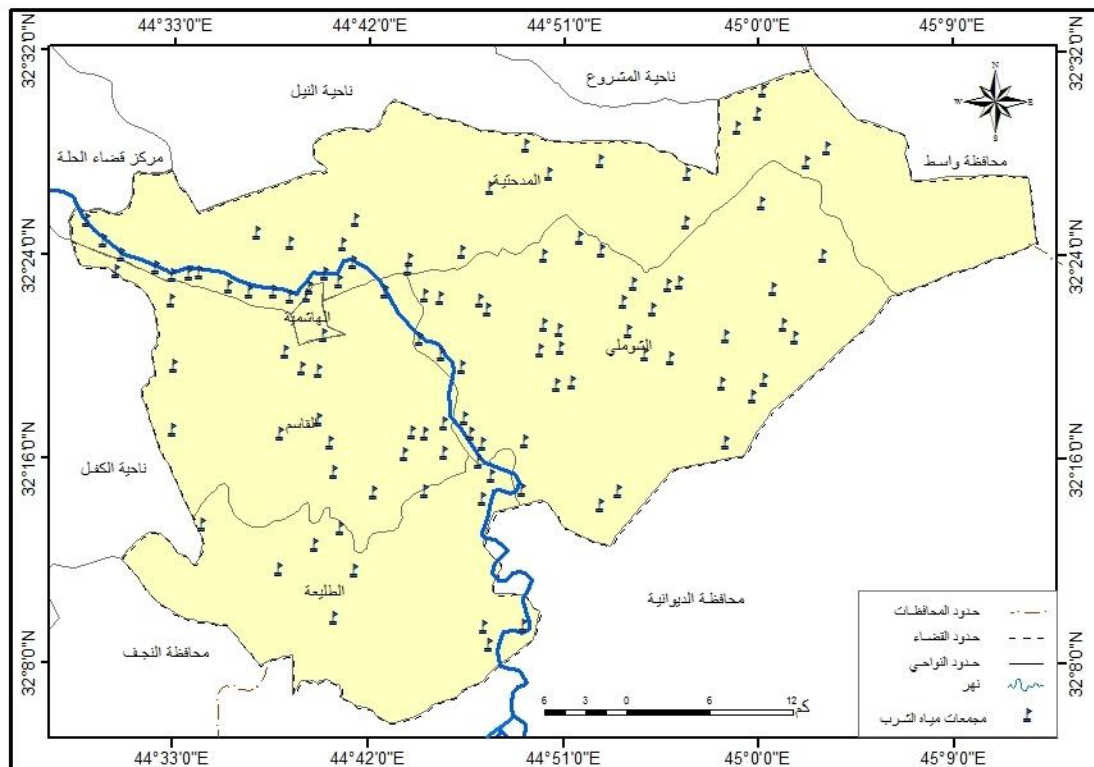
Republic of Iraq, Ministry of Municipalities and Public Works, Babylon Water Directorate, unpublished data, 2023.

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2- Spatial variation in the number of residents served with drinking water during the period (2010-2023)

It can be seen from Map (5) Table (3) that the number of people served with drinking water reached (202,954 people) during the year (2010), distributed across the areas of the study area. If (Al-Madhatiya) district had the highest number of people served with drinking water, the number of population served reached (85,424. /people) with a percentage of (42.09%), while the second place included (Al-Shamali) with a percentage of (20.06%), while the fourth place included (Al-Qasim) and the number of people served in it reached (30,007 /people) with a percentage of (14.79%), while we find that the fourth place went to (Qadha Center and Al-Taliah District), reaching (25,342 and 21,463 people) with a percentage of (12.49 and 10.58%) for each of them, respectively.

Map(4) Spatial distribution of drinking water catchments



Republic of Iraq, Ministry of Municipalities and Public Works, Babylon Water Directorate, unpublished data, 2023.

During the year (2023), the number of people served with drinking water reached (287,878 people). If the district (Al-Madhatiya and Al-Shumali) had the highest number of people served with drinking water, the number of people served

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reached (98,239 and 77,803 people), with a rate of (34.1 and 27%). As for the rank The second place included (the Hashemite Judicial Center), which amounted to (40,154 people), with a percentage of (13.9%). As for the fourth place, it included (Al-Qasim), and the number of people served in it reached (39,573 people), with a percentage of (13.7%). While we find that the fourth place went to (Al-Tali'ah.)) to reach (32,109/inhabitant), at a rate of (11.2%).

It follows from this that there is an increase in the number of people served with drinking water, according to the data attached in Table (3), resulting from the increase in population numbers, which was accompanied by an increase in the number of projects and complexes for purifying drinking water.

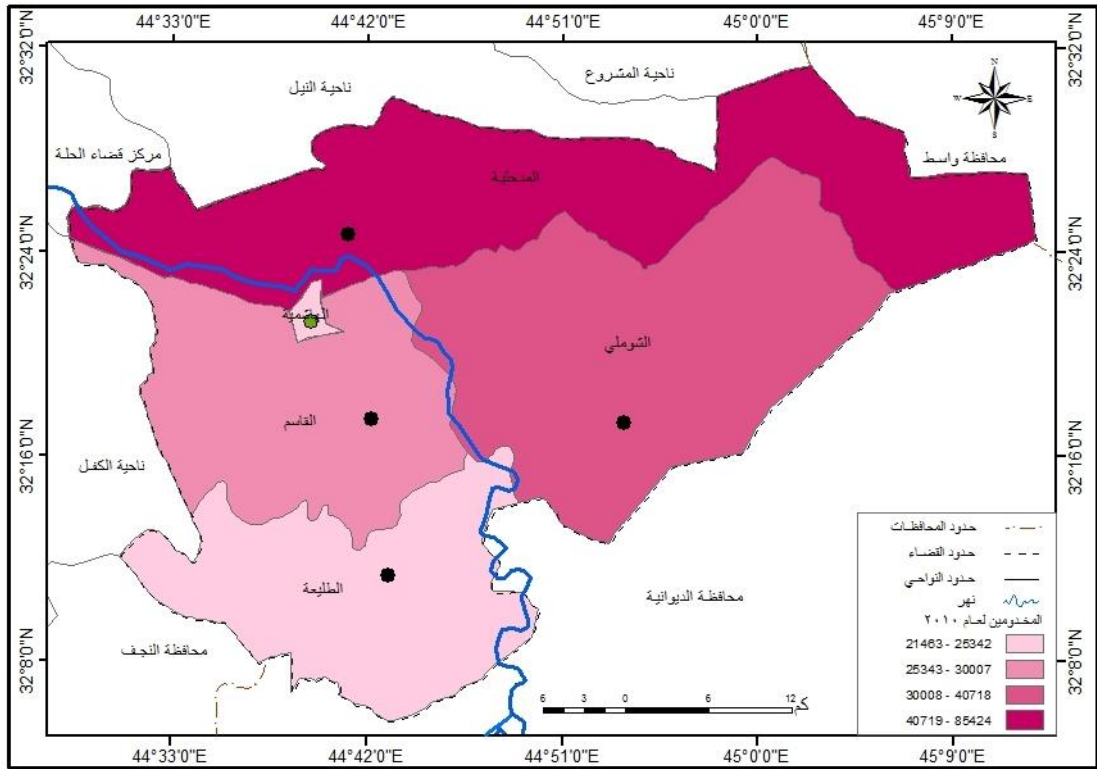
Table (3) Number of population served with drinking water during the period (2010-2023)

Administrative unit	Number of population served in 2010	% percentage	Number of population served in 2023	percentage %
Al-Hashimiya District Center	25342	12.49	40154	13.9
Al-Qasim	30007	14.79	39573	13.7
Medhatia	85424	42.09	98239	34.1
Al-Shamali	40718	20.06	77803	27
Vanguard	21463	10.58	32109	11.2
sum	202954	100	287878	100

Republic of Iraq, Ministry of Municipalities and Public Works, Babylon Water Directorate, unpublished data, 2023.

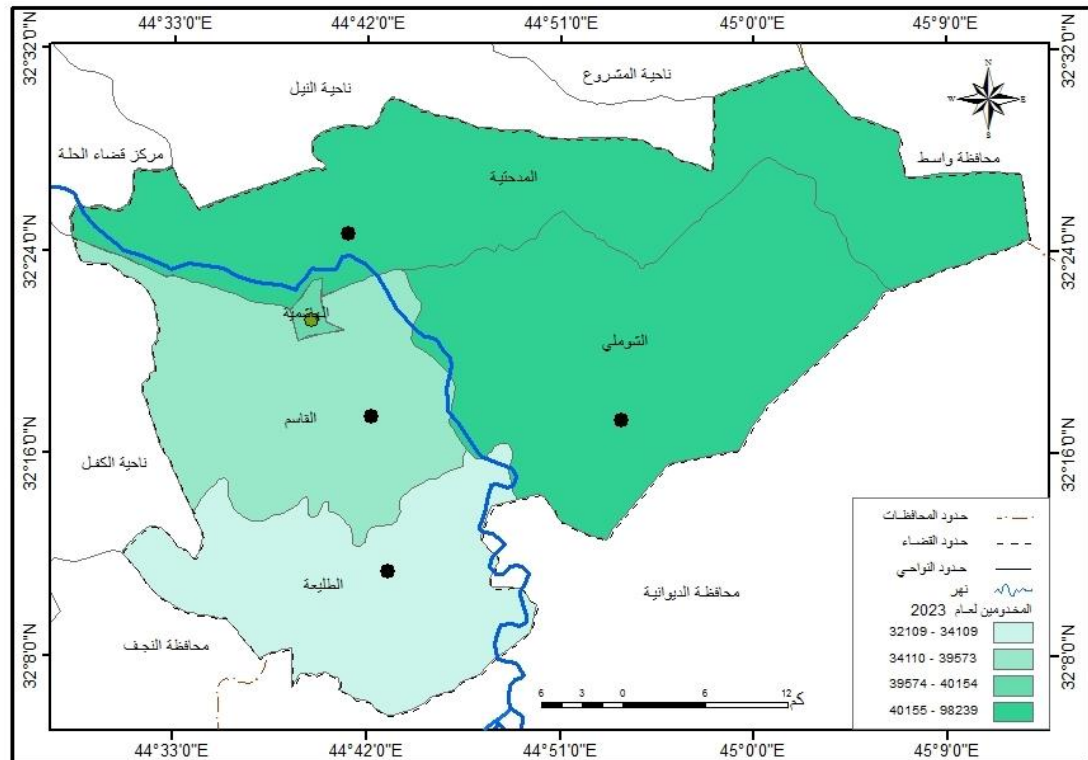
Map(5) Number of population served with drinking water during the year (2010)

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Source: Based on Table (3)

Map (6) Number of population served with drinking water during the year (2023)



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Source: Based on Table (3)

Conclusions

1- The number of drinking water projects in 2010 reached (4), while the number of these projects increased during the year 2023 to reach (5). As for water complexes, we also find them increasing, as their number was in 2010 and became (48 in 2023) 96).

2- There is a clear discrepancy in the numbers of those served during the year 2010 from one district to another. The largest number of those served was in the (Al-Madhatiya) district, at a rate of (42.09%), and less in the (Al-Tali'ah) district, at a rate of (10.58%).

3- The number of people served during the year 2023 varies from one district to another. The largest number of people served was in the (Al-Madhatiya) district, at a rate of (34.1%), and less in the (Al-Tali'ah) district, at a rate of (11.2%).

Recommendations

1- Work to establish projects and complexes to filter drinking water in the study area in a way that is sufficient for the population

2- Establishing an integrated data base that includes water filtration plants and facilitating the process of obtaining this data so that it can be explained in the form of easy-to-read maps.

3- Encouraging students to pursue studies that are concerned with studying services and monitoring their development and the extent to which they keep pace with the development of the population.

Sources and footnotes

(1) Strengthening the technical capabilities of actors and committees in the field of water, sanitation and hygiene, as well as local government agencies, Water and Environmental Sanitation Department, Oxfam, Mosul, Iraq, p. 40.

(2) Nada Hadi Zayer, Water Statistics in Iraq - Report submitted to ESCWA for the conference held in Cairo - Ministry of Planning and Humanitarian Cooperation, Central Bureau of Statistics, 2007, p. 7

(3) Interview with Muhammad Saleh Hamoud, operator of the Al Qasim project, dated. 1/2/2023

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(4) Republic of Iraq, Ministry of Municipalities and Public Works, Babylon Water Directorate, unpublished data, 2021

(5) Republic of Iraq, Ministry of Municipalities and Public Works, Babylon Water Directorate, unpublished data, 2021

(6) Nada Hadi Zayer, Water Statistics in Iraq, previous source.

(7)Interview with an official