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## Shortage Sanitation Services in the Outskirts of Baghdad and its Environmental Impacts

**Abstract-** This study focuses on evaluation of the reality of wastewater services in the areas of outskirts of Baghdad which the responsibility of their implementation rests on the province of Baghdad and the ministry of construction and housing and general municipalities/ the General Directorate of Sewerage GDS, and to suggest the possibility to improve these services in light of the plans developed by the concerned authorities and the proportion of disability in the services suffered by those areas. The study concluded that the completion of the stopped project because of the financial crisis will raise the proportion of serves population to approximately 71.4%, and the construction of new projects will raise the proportion to approximately 100%.

**Keywords-** wastewater, services, projects, treatment plant, network

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### 1. Introduction

Wastewater services are one of the most important basic technical services of any community and a major component of the technical infrastructure [1]. Wastewater treatment development is the most visible in the 20th century; where sewage has been considered a potential health risk and nuisance in urban areas [2]. The main goals of a complete sanitation system are to protect human health and the environment [3]. This system needs financial and institutional resources to construct, in the same time; there are many challenges towards wastewater management in developing countries; which can be overcome by suitable planning and policy implementation [4].

### 2. Area of study

The area of outskirts of Baghdad is about 4350 km<sup>2</sup> as shown in Figure 1. According to the statistics of Iraq 2009-2030 [6], the

population of urban areas of outskirts of Baghdad is illustrated in Table 1.

### 3. Population by Served Wastewater Services

Under the high pressure of population growth, the world faces a lot of challenges in various sectors, including wastewater management [7]. Wastewater has to be dealt with an appropriate way to avoid negative impacts on the environmental media and to mitigate the risk of affecting human health [8]. Wastewater flowrates are derived from an analysis of population data and estimated per capita wastewater flowrates [9].

#### 1. Present situation

From the information obtained from Baghdad directorate of sewerage, the percentages of the served population by wastewater services are shown in Table 2.



Figure 1: Outskirts of Baghdad [5]

Table 1: Population of urban areas in Baghdad 2018

District	Sub district	Population
Al-Istiqlal	Al-Rashdiah	11,492
	Al-Zuhoor	221,226
Al-Kadhimiah	Al-Taji	56,594
Al-Mahmoodiah	Center of district	105,594
	Al-Yousfiah	16,173
	Al-Lateefiah	20,173
	Al-Rasheed	16,866
Abu Gharib	Center of district	112,709
	Al-Nasr wa Al-Salam	66,199
Al-Tarmiah	Center of district	37,027
	Al-Mishahdah	-
	Al-Abayechy	-
Al-Mada'in	Center of district	29,404
	Al-Jisr	72,376
	Al-Wihdah	115,394
Total		881,227

Table 2: Served population in outskirts of Baghdad

District	Sub district	Percentage of service %
Al-Istiqlal	Al-Rashdiah	0
	Al-Zuhoor	0
Al-Kadhimiah	Al-Taji	0
Al-Mahmoodiah	Center of district	100
	Al-Yousfiah	0
	Al-Lateefiah	0
	Al-Rasheed	0
Abu Gharib	Center of district	0
	Al-Nasr wa Al-Salam	0
Al-Tarmiah	Center of district	0
	Al-Mishahdah	0
	Al-Abayechy	0
Al-Mada'in	Center of district	100
	Al-Jisr	0
	Al-Wihdah	0
	Al-Nahrwan	0
	Al-Ta'ameem	0

The percentages above are estimated according to the discharge of working treatment plants of wastewater in this area, as the average per capita domestic loading rate can be expected to vary between 190 and 1000 Lpd [10]. It is considered

equal to 250 Lpd 0.25 m<sup>3</sup>/d, which is according to the regulation of the General Directorate of Sewerage (GDS). Table 3 shows the constructed plants and their discharge.

**Table 3: Discharge of treatment plants**

Treatment plant	Design discharge M <sup>3</sup> / day	Actual discharge M <sup>3</sup> / day	Served population according to the actual discharge
Al-Mada'in	19870	14000	56000
Al-Mahmoodiah	44000	6300	25200

Source: Baghdad Directorate of Sewerage

## II. Medium plans

Based on the previous information, the percentage of the served population in the outskirts of Baghdad will be 9.2% which means that the disability in services estimated as 90.9% and it is a very high percentage, which in turn leads to the deterioration of the environmental situation of those areas. This requires the development of medium and long-term plans to increase the proportion of served people with sewage services. There are several projects listed within the investment budget plan of the Ministry of Construction, Housing, and Public Municipalities, which were directed during the years 2010-2012 and stopped due to the financial crisis in Iraq during the years 2015-2017. The completion of these projects will lead to an increase in the population served to approximately 41%. Table 4 shows the details of those projects. Other projects listed within the plan for the development of regions by the province of Baghdad were directed and stopped later for the same reason which their completion will lead to increase the percentage of service to approximately 71.4%. These details are illustrated in Table 5.

## III. Long-Term plans

There are some projects whose designs were completed by the province of Baghdad within its plan for the development of regions but they were not implemented because of the financial crisis in Iraq. The implementation of these projects will increase the proportion of the population served to approximately 100% after taking into account the completion of medium-term projects. Table 6 shows the details of those projects.

## IV. Effect of sanitation system lack on population

The effects of poor urban sanitary conditions and waste management on the well-being of city residents are often expressed in health and environmental terms [11]. The main problem of sanitation service lack is the illegal discharge of wastewater to the surface human-made channels, which lead to environmental pollution, human health and spread of diseases, or illegal discharge to existing rainwater network systems, which leads to water pollution as it is discharged directly to the river. To assess the impact of nonexistence of wastewater treatment projects or 'no action' alternative, a simple checklist is applied by means of 3-Dimensional Leopold matrix [12,13]. The magnitude of the impact is represented as low, moderate, and high depending on the results of the survey conducted for 200 individuals from the outskirts of Baghdad as shown in Table 7.

**Table 4: Investment projects of medium-term plans**

Treatment plant	Design discharge M <sup>3</sup> / day	Served population according to discharge
Al-Husayniah	65000	260000
Al-Rasheed	6000	24000

Source: The General Directorate of Sewerage

**Table 5: Development projects of medium-term plans**

Treatment plant	Design discharge M <sup>3</sup> / day	Served population according to discharge
Al-Yousfiah	14000	56000
Al-Lateefiah	14000	56000
Al-Tarmiah	17000	68000
Al-Jisr	21000	84000

Source: Baghdad Directorate of Sewerage

**Table 6: Projects of long-term plans**

Treatment plant	Design discharge M <sup>3</sup> / day	Served population according to discharge
Al-Nahrwan	50000	200000
Hay-aljwadain	34141	136564
Al-Ta'ameem	4040	16160
Abu-Ghraib	41754	167016

### 3. Results and Discussion

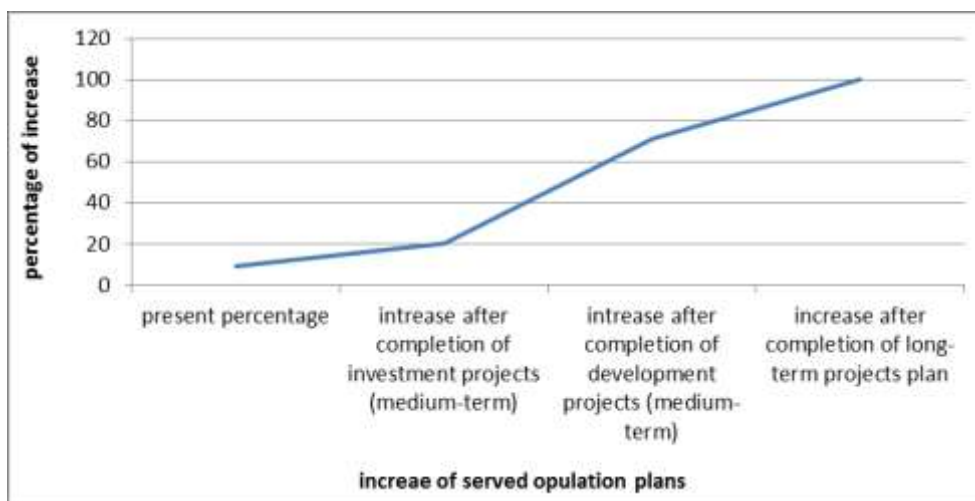
As a result of what mentioned before in term planning, Figure 2 shows the increase in the

proportion of the served population in case of completion medium and long-term plans.

**Table 7: Environmental impact assessment of nonexistence projects**

Environment	Environmental parameters	The impact magnitude of nonexistence of wastewater treatment projects		
		Low	Moderate	High
Physio-chemical	Surface water quality deterioration			*
	Increase of Surface water quantity	*		
	Ground water quality deterioration			*
	Increase of Ground water quantity			*
	Air pollution and odors		*	
	Soil pollution			*
Biological	Aquatic plants			*
	Aquatic animals			*
	Deterioration of Flora	*		
	Deterioration of Fauna		*	
	Impact on Human Health			*
	Increase of water-borne diseases			*
	Wastewater discharge problems			*
Socio-economical	Population growth		*	
	Agriculture development	*		
	Employment		*	
	Development plans			*
	Marketing of products	*		
	Migration		*	

\* Low (1-3), Moderate (4-6), High (7-10)



**Figure 2: The Increase in the population served**

It is necessary to have strategic plans to get out of the financial crisis, which will, in turn, lead to the completion of projects stalled and start the implementation of new projects. The consideration of service projects is one of the

priorities of the country's strategic plans being reflected in the increase of financial allocations of these projects within the budget allocated to them, and there is an opportunity to provide services through investment and participation

between the public and private sectors in addition to the possibility of obtaining grants from international bodies for this purpose.

#### 4. Conclusion

The lack of sewage services has negative effects on the urban environment and human health, as well as its impact on the social and urban development of these cities and their populations. The deterioration in these services will have a great economic and social impact.

#### 5. Recommendations

The prioritization of the services sector, including the sanitation sector, will improve the service reality of the outskirts of Baghdad in addition to the need to develop strategies to provide funds to complete the planned projects.

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