

## Privatization of Sanitation and Desalination Projects in Palestine

Ziad A. Mimi & Amer Marei

To cite this article: Ziad A. Mimi & Amer Marei (2002) Privatization of Sanitation and Desalination Projects in Palestine, *Water International*, 27:2, 219-224, DOI: [10.1080/02508060208686995](https://doi.org/10.1080/02508060208686995)

To link to this article: <https://doi.org/10.1080/02508060208686995>



Published online: 22 Jan 2009.



Submit your article to this journal [↗](#)



Article views: 100



View related articles [↗](#)

## Privatization of Sanitation and Desalination Projects in Palestine

**Ziad A. Mimi**, Member IWRA, Birzeit University, West Bank via Palestinian Authority  
and **Amer Marei**, Al-Quds University, West Bank via Palestinian Authority

**Abstract:** *The present problems that are related to water and sanitation in Palestine are many and varied, and the disparity between water supply and demand is growing with time due to the rapid population growth and aridity. Desalination has the potential to supply unlimited quantities of high-quality freshwater to Palestinian Communities. On the other hand, the situation of the sewerage system in the cities is extremely critical, and there are no sewerage systems in the rural areas. There is an urgent need for substantial improvements and extensions to the sewerage systems and treatment plants. The available funds for the Palestinian Water Authority (PWA) and other municipalities to implement wastewater and desalination projects are limited. As a result, it is important to fully explore the use of public-private partnerships that utilize sector resources to finance such projects. The objective of this study is to understand incentives for privatization of water supply and sanitation services, with more emphasis on the households' Affordability and Willingness-to-Pay (AWTP) for improved water and sanitation services. The results show that people in Palestine bear the burden of high water supply and sanitation costs. Privatization of the water and sanitation sector will guarantee sustainable development of these sectors under limited financial resources and dependency on external funds.*

**Keywords:** *Water and sanitation, planning, privatization, AWTP, desalination, Palestine.*

### Introduction

Palestine is composed of two separate areas, the Gaza Strip and the West Bank. The eastern boundaries of the West Bank are the Jordan River and the Dead Sea, the western, northern, and southern are Israel. There are two clearly defined climatic seasons, a wet winter and a dry summer. Annual average rainfall in the West Bank is approximately 450 mm. Temperatures are relatively high and vary within the Palestinian Territories. The Jordan River system is the only surface water resource in the West Bank. There are two aquifers shared by Palestine and Israel: the Mountain Aquifer and (in Gaza) the Coastal Aquifer. One of the main concerns of the Palestinian people is to have sufficient water to assure their economic and social development both now and in the future. Palestine, along with other countries in the region have very limited water resources and future population projections place severe demands on already fragile reserves. Furthermore, Palestine is facing a series of wastewater and sanitation related problems.

The available funds for the Palestinian Water Authority (PWA) and other municipalities to implement water and wastewater projects are limited. As a result, it is important to fully explore other approaches to meet funding needs. One approach to consider is the use of public-private part-

nerships that utilize sector resources to finance water and wastewater treatment needs. This paper is intended as a recommendation for municipalities and private companies that are interested in obtaining an introductory understanding of incentives for privatization of water supply and sanitation services.

### Existing Sewerage Systems

The PWA was launched in 1995 with the aim to develop modern sewerage systems for each major urban center in a planned and systematic manner. Under this program many sewerage master plans and different studies were prepared with the help of international agencies. However, the available funds to implement these comprehensive master plans are limited. The shortage of funds, the lack of manpower and expertise, and the rapid urbanization put a heavy burden on the PWA and other municipalities throughout the country.

Sewerage in Palestine has been a neglected issue. The existing treatment plants have been designed upon assumptions of the sewerage production and organic load. They are poorly operated and maintained, and the effluent is not better than the influent in most of the cases. Raw or partially treated wastewater is discharged into the wadis where during winter, it mixes with the non-pe-

rennial rivers, and during summer, it mixes with natural springs flowing in the wadis. Except for one detergent factory in Rammallah, the wastewater of slaughterhouses, chemical factories, hospitals, etc. is disposed of in the sewerage system without previous treatment (MOPIC, 1998).

The situation of the sewerage system in the cities is extremely critical. Approximately 65 percent of the houses in the major cities are connected to the sewerage system. In the areas that are not connected to the sewerage network, wastewater is discharged into percolating pits and, to a lesser extent, into septic tanks. The septic tanks are emptied by vacuum trucks and disposed of either in the treatment plant or just in the wadis. Table 1 gives an estimate of the urban wastewater production and gives basic data of the existing treatment plants. Table 2 gives an overview of the sanitary disposal systems in the different communities in the West Bank.

There is an urgent need for substantial improvements and extensions to the sewerage systems. The World Bank (1993) which calls for investments totaling \$200 million has prepared a preliminary investment plan for the wastewater sector. Neither the exact amount nor the appropriate sequencing is well established. Therefore, there is an urgent need to begin developing the data needed: an analytic capacity, the willingness to pay for improved sanitation, and a mechanism to assess potential investments and establish priorities among them.

### Sustainable Long-term Water Supply for Palestine

Palestine will experience a serious deficit of water and the shortage will be  $271 \times 10^6 \text{ m}^3$  for the year 2020 (CDM, 1997). There are numerous studies and plans for expanding water resource supplies through various schemes including water transfers from other basins and desalination. These schemes are expensive in most cases and also face daunting logistical and political barriers. Mimi (1999) developed a set of possible scenarios that offer realistic, conceptual plans to achieve sustainable long-term water supply for Palestine. One of the scenarios assumes

**Table 2.** Percentage of Sanitary Disposal Systems in Different Communities in the West Bank

<i>Community</i>	<i>Sewerage System</i>	<i>Percolating Pits</i>	<i>"In Open Field"</i>
Urban	65	35.7	-
Rural	3.8	94.2	2.0
Refugee Camps	23.6	69.2	7.2

Source: MOPIC (1998)

that the future freshwater deficits would be filled by desalination facilities of sea or brackish water and wastewater reuse projects.

Desalination has always been considered by water planners in Palestine as a serious potential option for improving the quality and increasing the quantity of the country's limited water resources. Hoffman (1992) and CDM (1997) discussed potential applications for desalination in the area. There is approximately a 400 m difference in the elevations of the Red Sea and the Dead Sea, and it is technologically feasible to exploit the elevation difference to produce hydropower by making water flow from the Red Sea to the Dead Sea. The power could be used in any manner, including desalination of seawater. Gross and Zahazi (1985) suggested the Mediterranean Sea-Dead Sea scheme, which is similar in concept to the Red Sea-Dead Sea proposal. CDM (1997) discussed potential desalination of the Eastern Aquifer that is one division of the Mountain aquifer. (The average safe yield of Eastern Aquifer is about 94 Mcm/yr of freshwater and 78 Mcm/yr of brackish water). Unfortunately, these schemes are expensive, increase water price in most cases, and also face daunting logistical and political barriers.

The cost of desalinated water ranges widely, depending on the quality of the source water, the type of technology used in the desalination process, and the cost of energy. The cost of desalinated seawater may reach US\$0.6 to US\$0.8/m<sup>3</sup> while the unit cost of brackish water desalination is between \$0.3 and \$0.4/m<sup>3</sup> (Hoffman, 1992).

**Table 1.** Urban Wastewater Production and Sanitary Status in the Major Cities

<i>City</i>	<i>Population</i>	<i>Percentage Connected</i>	<i>Wastewater Production (m<sup>3</sup>/d)</i>	<i>Type of Treatment Plant</i>	<i>Remarks</i>
Jenin	23,800	60	570	Aerated Lagoon	Overloaded
Tulkarem	35,145	65	1370	Ponds	Overloaded
Qalqilya	28,280	50	1270	Non	-
Nablus	102,460	70	7890	Non	-
Ramallah	20,560	70	1150	Aerated Lagoon	Needs rehabilitation
Al-Bireh	33,540	60	1610	Activated Sludge	Under construction
Bethlehem	21,700	85	1845	Non	-
Hebron	94,760	55	1825	Ponds	Not Working

Source: MOPIC (1998)

### Present Expenditures on Water Supply and Sanitation

The purpose of this research is not to provide a detailed financial feasibility of investments in improved sanitation and water projects, but rather to compare the present household expenditures on water and sanitation with the expected future expenditures due to possible future desalination and sanitation projects. Table 3 summarizes the present expenditures on water and sanitation in the West Bank. Although the table is self explanatory, the following comments clarify some of the specific entries.

The average household in the West Bank spends from 2.6 to 12.2 percent of their income on water and sanitation, although both services are inadequate and unsatisfactory. People in West Bank are actually paying from US\$0.66 to 4.38/m<sup>3</sup> for water supply without reliable sources and in most cases more than desalination costs. Moreover, people are paying from US\$34 to US\$109/year for sanitation services with high environmental and health risks.

A large contingent valuation survey was conducted in Rammallah District to estimate the Ability and Willingness to Pay (AWTP) for water and sewerage services. Over 300 randomly selected households throughout the district were interviewed. The survey questionnaire had four parts. The first part consisted of several questions about demographic characteristics of the respondent and his or her household. The second part contained questions about the

socio-economic characteristics of the household, including such items as education, income, and ownership of assets. The third part included questions about the household's existing water and sanitation situation: the type of facilities used, monthly expenditures, and the household's satisfaction with its existing sanitation facilities. The final part contained questions about AWTP.

At this point it is worth revealing the following summary of the main findings of the contingent survey.

The results show conclusively that AWTP information from the survey is related to: household income, prior knowledge of the sewer system, years of education of the respondent, how much the respondent's household spends on its existing sanitation system, and how satisfied the respondent is with his household's existing sanitation system. Households with higher incomes bid significantly more for improved services than households with lower income. Respondents who were paying more and who were dissatisfied with their existing service bid more than respondents who were paying less and were satisfied. More educated respondents bid more than less educated respondents. About 70 percent of the households are willing to pay to get connected to the sewerage network to ensure a better or more reliable service. Ninety-five percent of the households said that their present expenditures on water are high and only five percent are willing to pay more than what they pay now. People will pay the real cost of water, if they receive reliable service. Currently, people in rural areas, who often receive no water and sanitation services,

**Table 3.** Estimates of the Economic Burdens on Households to Pay for Current Water Supply and Sanitation in the West Bank<sup>1</sup>

Community Class	Current Water Consumption (l/c/d)	Average Income (US\$/c/y)	Water Supply Costs (\$/c/y)			Total Spent on Water Supply (\$/m <sup>3</sup> )	Sanitation Costs (\$/c/y)		Total Spent on Water and Sanitation (\$/c/y)	% of Income Spent
			Piped Network	Cistern	Vendors (Trucking)		Sewerage Network	Cesspit		
			12	-	-	0.66	-	31	43	5.1
			12	-	-	0.66	22	-	33	4.0
Rural			-	20	20	1.11	-	31	51	6.0
<3,000	30-70	850	6	20	20	1.44	-	31	57	6.7
Inhabitants			-	-	-	4.05	-	31	104	12.2
			6	20	20	2.55	-	31	77	9.1
			12	-	-	0.66	-	33	45	4.5
			12	-	-	0.66	22	-	34	3.4
Semi-urban			-	20	20	1.11	-	33	53	5.3
3,000-	30-70	1,000	6	20	20	1.44	-	33	59	5.9
15,000			-	-	-	4.05	-	33	106	10.6
Inhabitants			6	20	20	4.38	-	33	79	7.9
			26	-	-	1.01	17	-	43	2.6
			26	-	-	1.01	-	60	86	5.2
Urban			13	20	20	0.90	-	60	93	5.6
>15,000	50-90	1,650	13	-	-	2.50	-	60	124	7.5
Inhabitants			9	20	20	1.92	-	60	109	6.6
			9	20	20	1.92	17	-	66	4.0

<sup>1</sup>The design period for cisterns and cesspits are assumed 10 years, and for sewerage systems 20 years. Some additional costs were added to include plumbing costs, emptying and maintenance costs for cesspits. Pumping costs and maintenance costs were included for cisterns. For sewerage systems, in addition to construction costs O&M were included. Source: After Abu Madi (1999).

pay many times the municipal rates to private water vendors and to empty their cesspit.

### Policy Options and the Appeal of Privatization

How can information on present expenditures on water supply and sanitation and a households' willingness to pay be used to improve the current practices of water and sanitation planning? It is important as a first step to call for private companies to study all possible scenarios and conduct a detailed financial feasibility to invest in sanitation and water projects. By providing cost estimates for sewerage system and comparing these costs with what people are willing to pay for them, it can be seen that the cost may be greater than a households' willingness to pay and that public subsidies may be required. The obvious questions are what level of subsidy should be provided given the financial constraints facing municipal authorities? How should the subsidies be distributed?

The available funds for the Palestinian Water Authority (PWA) and other municipalities to implement water supply and wastewater projects are limited. As a result, it is important to fully explore all approaches to meet funding needs. One approach to consider is the use of public-private partnerships that utilize sector resources to finance such projects. The private sector has the potential to be a significant partner in the development of water and wastewater infrastructure. The private sector in Palestine has ready access to financial markets, and has invested successfully in telecommunications and electricity sectors.

There is concern that the governments in developing countries suffer from the following drawbacks: eroding credibility, reduced reliability, questionable accountability, absence of professional management, absence of autonomy to manage, poor operational performance, and consumer totally neglected (Ambikar, 1992; Pilly, 1994). Given this background the question arises: is privatization the answer? Some of the positive points of privatization could be enumerated as follows (EPA, 1999):

- **Increased efficiency:** Private companies may be able to operate facilities more efficiently while meeting permit limits. The private companies often will employ innovative operation and maintenance methods and equipment that require significant capital investment. The private sector is also able to draw on substantial experience in the operation of treatment facilities and take advantage of wholesale prices of supplies and materials needed for a facility's successful operation. The private company can frequently use its management expertise to stabilize user fees for the period of the privatization management.
- **Cost reduction:** Often the opportunity to realize cost saving is the primary reason that local governments are attracted to privatization. In many cases, private ownership/operation make sense because it lowers

costs. Capital cost savings can be substantial when the private partners use advanced technology coupled with streamlined procurement and construction practices.

- **Environmental benefits:** Some government facilities may have problems complying with discharge permit limits because of needed capital improvements, maintenance costs that exceed budgetary allocations, or difficulty in maintaining skilled personnel. Where local governments have had difficulty meeting permit limits, privatization may result in real environmental benefits, to ensure efficient operation and compliance with facility discharge permit requirements.
- **Access to capital and capital improvement:** One of the major benefits of privatization is that it provides access to private sector capital. This may be an attractive feature of privatization for communities with limited access to capital markets. However, as with public financing, the use of private capital will require that user fees be adjusted to recoup the capital investment plus interest.

In general, cross subsidy is not available in the private sector while certain services demand high investment coupled with motive of the private sector to make profits. The services may not be available at affordable rates or affordable levels or both. The results of this research show that it will not be very difficult for the government to convince the people that they should pay for services through private agencies and that their rates are reasonable with subsidy rates.

### How to Privatize?

Any proposal for privatization should include the proposed user fee rate structure and arrangements for increases in the future. There are both financial and non-financial factors that affect the decision to privatize and these factors should be analyzed. Financial factors address issues of cost savings, user fees, capital costs, capital improvement, economic impacts and performance, and liability. The non-financial factors include regulatory compliance, local control, public accountability, personal impacts, capital improvements, and overall administration complexity of the transaction.

A changeover to privatization may not always mean the end of problems. Perhaps the nature of the problems would change or the problems would become less critical. Several negative points are evident in privatization (Alawni, 1996): major changeover at one stretch may not be acceptable or palatable; local employment opportunities will reduce giving rise to frustration among people who hope for government employment; politicians may not welcome the change, particularly in the service sector; control on water resources and optimal utilization would continue to be a problem; and control would be necessary to ensure that a private entity does not emphasize only the profit-

making aspects and neglect provisions of satisfactory services.

Considering the opposing points of privatization, it seems apparent that if privatization is accepted in principle as a goal in developing countries like Palestine, it may be possible to reach it in stages through “hopping methods” without giving private entities a free hand. Attempts should first be made to run our present organizations in a “business like” manner rather than “as a business.” Privatization should be attempted in a gradual way with consistent policy and improvements and should be introduced in light of experiences and public response in order to achieve ultimate goal in a time frame of perhaps 10 to 15 years.

A broad range of institutional alternatives exists for private sector participation in the water sector. The options fall along a continuum between the extremes of almost completely public sector responsibility (e.g., management and service contracts) through joint responsibility (e.g., concessions, leases, joint public-private arrangements) to completely private responsibility (divestiture) as shown in Figure 1. Obviously, these options are different, they may overlap or be combined. Three broad models can be distinguished, however, through which the private sector can participate in the water sector: full privatization or divestiture, fixed-term franchises and similar arrangements, and other forms of private sector participation (Lee and Jouravlev, 1997).

Transferring responsibility from public to private entities is traditionally unpopular and should not take place overnight. The first step in privatization is to commercialize operations, as most European public utilities have done successfully. The Palestinian authorities in Gaza Strip are preparing a performance-based management-operating

contract to improve the drinking water supply and wastewater treatment and disposal systems. Lebanon is also moving towards contracting private operators for water utilities.

In order to encourage the most effective involvement of the private sector in water and sanitation projects, three main recommendations are proposed (Martine, 1996):

- Ensure greater involvement in the process of Private Sector Participation (PSP): The private sector needs to be involved at the earliest possible stage in privatization processes. Advising on Term of References for projects will allow customized programs, adapted to the individual client’s needs.
- Adopt a “value-engineering” approach: This means working towards a clients’ needs, not wants, ensuring that solutions are appropriate to the level of local skills and level of training and avoiding over-engineered solutions.
- Allow maximum dialogue between participants: Involve the major players who can focus on economically viable solutions more effectively.

## Conclusions

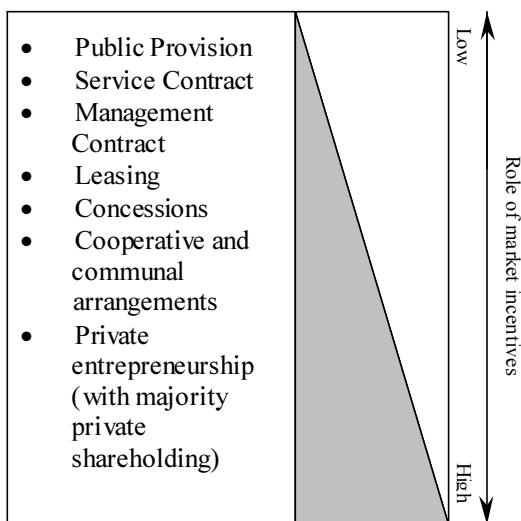
Desalination has always been considered by water planners in Palestine as a serious potential option for improving the quality and increasing the quantity of the country’s limited water resources. The cost of desalinated water is high but in most cases is less than what Palestinians currently pay. People will pay the real cost of water, if they receive reliable service.

People in Palestine shoulder high water supply and sanitation costs. Privatization of the water and sanitation sector will guarantee a sustainable development of these sectors under limited financial resources and dependency on external funds. About 70 percent of the households are willing to pay to get connected to sewerage network to ensure a better or more reliable service.

AWTP in Rammallah District is related to household income, prior knowledge of the sewer system, years of education of the respondent, how much the respondent’s household spends on the existing sanitation system, and how satisfied the respondent is with his household’s existing sanitation system.

The PWA should seriously think of privatization and use its governance power to introduce and implement policies complementary to private sector working for efficient and economic service levels and work as a facilitator rather than an agent. PWA should follow the “hopping methods” approach. Privatization if introduced immediately is not likely to succeed. The PWA should encourage private sector by framing a suitable taxation policy.

From a policy perspective, the results of the study indicate that conventional sewerage is simply not affordable to the vast majority of the households in Palestine



**Figure 1.** Types of Institutional forms by degree of public and private sector responsibility. Source: Kessides (1993).

without massive government subsidies. In retrospect this is perhaps not so surprising. What was less apparent before conducting this research, however, was the widespread acceptance of sewer system, the approximate levels of subsidy, the present high expenditure on sanitation with high environmental and health risks, and the fact that most households were willing to pay for improved sanitation.

### About the Authors



**Dr. Ziad Mimi** is an Assistant Professor of Civil Engineering at Birzeit University, West Bank via Palestinian Authority. He has a M.Sc. in hydraulics from University of Jordan and Ph.D in water resources management from University of Loughborough at United Kingdom. His research focuses on

issues relating demand management, transboundary water resources, and water policy. He can be reached at [ziadmimi@yahoo.com](mailto:ziadmimi@yahoo.com).

**Dr. Amer Marei** is an Assistant Professor of Applied Earth and Environmental Sciences at Al-Quds University, West Bank via Palestinian Authority. He has a M.Sc. in Geology from University of Jordan and Ph.D from University of Muenster. He can be reached at [marei@planet.edu](mailto:marei@planet.edu).

*Discussions open until December 1, 2002.*

### References

- Abu Madi, M. 1999. *Incentives and Constraints for Sanitation and Wastewater Reuse Strategies in Irrigation in Palestine*. PhD Research Proposal, IHE – Delft, The Netherlands.
- Alawni, A. 1996. *Role of Government, NGOs and Private Bodies*. Proceedings of the 22 WEDC Conference on Reaching the Unreached Challenges for the 21st Century. J. Pickford et al., eds. New Delhi, 9–13 September: 79–81.
- Ambikar, J. 1992. *Privatization of Engineering Maintenance Service*. Proceedings of the 18<sup>th</sup> WEDC Conference on Water, Environment and Management. J. Pickford et al., eds. Nepal, 30 August – 3 September: 79–81.
- CDM (Camp Dresser and McKee International Inc.). 1997. *Comprehensive Planning Framework for Palestinian Water Resources Development: Task 4*. Rammallah.
- EPA. 1999. *Guidance on the Privatization of Federally Funded Wastewater Treatment Facilities*. Draft Report. USA.
- Gross, A. and J. Zahavi. 1985. "Evaluating Alternative Investment Programs for the Mediterranean-Dead Sea Project." *Water Resources Research* 21, No. 7: 905–916.
- Hoffman, D. 1992. *Potential Applications for Desalination in the Area*. Proceedings of the First Israeli-Palestinian International Academic Conference on Water. J. Issac and H. Shuval, eds. Zurich, 10–13 December: 315–328.
- Kessides, C. 1993. *Institutional Options for the Provision of Infrastructure*. World Bank Discussion Paper, No. 212, Washington, DC, USA: The World Bank.
- Lee, T. and A. Jouravlev. 1997. *Private Participation in the Provision of Water Services*. Paris.
- Martine, L. 1996. *Private Sector Participation in Water Projects*. Proceedings of the International Conference on Water Policy. P. Howsam and R.C. Carter, eds. Cranfield University, Silsoe, Bedfordshire, 23–24 September: 293–300.
- Mimi, Z. 1999. *Water Resources and Water Demand Management for Arid and Semi-Arid Areas*. Ph.D. Thesis, Loughborough University of Technology, Loughborough.
- MOPIC (Ministry of Planning and International Cooperation). 1998. *Regional Plan for the West Bank Governorate – Water and Wastewater Existing Situation*. Palestine.
- Pilly, M. 1994. *Privatization of Sewerage Services in Malaysia*. Proceedings of the 20<sup>th</sup> WEDC Conference on Affordable Water Supply and Sanitation. J. Pickford et al., eds. Colombo, 22–26 August: 17–18.
- World Bank. 1993. *Developing the Occupied Territories – An Investment in Peace*. Volume 5. Washington, DC, USA: The World Bank.