SWIM and H2020 Support Mechanism
"Water supply and distribution mapping in the South Mediterranean Region (SWIM H2020 SM project countries)"

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V1	Water supply and distribution mapping in the South Mediterranean Region	Israel: SWIM-H2020 SM Team The rest of the project countries: Fadi DOUMANI	Suzan TAHA (SWIM-H2020 SM Key Water Expert)

THE SWIM AND H2020 SUPPORT MECHANISM PROJECT (2016-2019)

The SWIM-H2020 SM is a Regional Technical Support Program that includes the following Partner Countries (PCs): Algeria, Egypt, Israel, Jordan, Lebanon, Libya, Morocco, Palestine, [Syria] and Tunisia. However, in order to ensure the coherence and effectiveness of Union financing or to foster regional co-operation, eligibility of specific actions will be extended to the Western Balkan countries (Albania, Bosnia Herzegovina and Montenegro), Turkey and Mauritania. The Program is funded by the European Neighborhood Instrument (ENI) South/Environment. It ensures the continuation of EU's regional support to ENP South countries in the fields of water management, marine pollution prevention and adds value to other important EU-funded regional programs in related fields, in particular the SWITCH-Med program, and the Clima South program, as well as to projects under the EU bilateral programming, where environment and water are identified as priority sectors for the EU co-operation. It complements and provides operational partnerships and links with the projects labelled by the Union for the Mediterranean, project preparation facilities in particular MESHIP phase II and with the next phase of the ENPI-SEIS project on environmental information systems, whereas its work plan will be coherent with, and supportive of, the Barcelona Convention and its Mediterranean Action Plan.

The overall objective of the Program is to contribute to reduced marine pollution and a more sustainable use of scarce water resources. The Technical Assistance services are grouped in 6 work packages: WP1. Expert facility,WP2. Peer-to-peer experience sharing and dialogue, WP3. Training activities, WP4. Communication and visibility, WP5. Capitalizing the lessons learnt, good practices and success stories and WP6. Support activities.

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Disclaimer:

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EXCHANGE RATES

Currency	US$ 1 per Local Currency as of end 2018	€ 1 per Local Currency as of end 2018
Algeria: DA	118.08	135.076
Egypt: EP	17.858	20.426
Israel: IS	3.7575	4.2979
Jordan: JD	0.7090	0.8109
Lebanon: LP	1,507.50	1,724.27
Morocco: DM	9.532	10.903
Palestine: IS	3.7575	4.2979
Tunisia: DT	2.922	3.342
EU: €	0.875	1.143

Source: OANDA website: <www.oanda.com>.

ABBREVIATIONS

General	
AfD	Agence française de Développement
AfDB	African Development Bank
AICS	Agenzia Italiana per la Cooperazione allo Sviluppo
BOO	Build, Operate and Own
BOT	Build, Operate and Transfer
CAPEX	Capital Expenditures
DB	Design and Build
DBO	Design, Build and Operate
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EIB	European Investment Bank
ENI	European Neighbourhood Instrument
EPC	Engineering, Procurement, and Construction
EU	European Union
FAO	Food and Agriculture Organisation
GDP	Gross Domestic Product
GIS	Geographical Information System
GiZ	Gesellschaft für Internationale Zusammenarbeit
GWP-Med	Global Water Partnership – Mediterranean
HH	Household
JMP	WHO-UNICEF Joint Monitoring Program
IFC	International Finance Corporation
IFI	International Financial Institution
KfW	Kreditanstalt für Wiederaufbau
MC	Management Contract
m^3	Cubic meter

MED EUWI	Mediterranean Component of the EU Water Initiative
NRW	Non-Revenue Water
OECD	Organisation for Economic Co-operation and Development
OMEX	Operations and Maintenance Expenditures
PAPIAF	Public-Private Infrastructure Advisory Facility
PBC	Performance-based Contract
PC	Partner Country
PPP	Public-Private Partnership
UfM	Union for the Mediterranean
UfW	Unaccounted for Water
UNFCCC	United Nations Framework Convention on Climate Change
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
VAT	Value-added Tax
WHO	World Health Organisation
WW	Waste Water
WWTP	Waste Water Treatment Plant
Algeria	
ABH	Agence de Bassin Hydrographique
ADE	Algérienne des Eaux
AGIRE	Agence Nationale de Gestion Intégrée des Ressources en Eau
ANBT	Agence Nationale des Barrages et des Transferts
ANRH	Agence Nationale des Ressources Hydrauliques
ARAPE	Autorité de Régulation des Services Publics de l'Eau
CNED	Caisse Nationale d'Équipement pour le Développement
CAE	Compagnie Algérienne de l'Energie
CEEG	Compagnie de l'Engineering de l'Electricité et du Gaz
CNCRE	Conseil National Consultatif des Ressources en Eau

DA	Dinar Algérien
DREW	Direction des Ressources en Eau
FNE	Fonds National de l'Eau
FNI	Fonds National d'Investissement
MREE	Ministère des Ressources en Eau et de l'Environnement
ONA	Office Nationale de l'Assainissement
ONID	Office National de l'Irrigation et du Drainage
SEAAL	Société des Eaux et de l'Assainissement d'Alger
SEACO	Société de l'Eau et de l'Assainissement de Constantine
SEATA	Société de l'Eau et de l'Assainissement de Tarf et Annaba
SEM	Société des Eaux de Marseille
SEOR	Société de l'Eau et de l'Assainissement d'Oran
Egypt	
AC	Affiliated Companies
CAPWW	Construction Authority for Potable Water and Waste Water
EEAA	Egyptian Environmental Affairs Agency
EP	Egyptian Pound
EWRA	Egyptian Water and Waste Water Regulatory Agency
HCW	High Committee for Water
HCWW	Holding Company for Water and Waste Water
MALR	Ministry of Agriculture and Land Reclamation
MHUUC	Ministry of Housing, Utilities and Urban Communities
MOF	Ministry of Finance
MOH	Ministry of Health
MSEA	Ministry of State for Environmental Affairs
MWRI	Ministry of Water Resources and Irrigation
NOPWASD	National Organization for Potable Water and Sanitary Drainage
NUCA	New Urban Communities Authority
NWRP	National Water Resources Plan

PMU	Project Management Unit
WUA	Water Users' Association
Israel	
MEWR	Ministry of Energy and Water Resources
MOEP	Ministry of Environmental Protection
MOF	Ministry of Finance
MOH	Ministry of Health
MOI	Ministry of Interior
WA	Water Authority
WAC	Water Authority Council
WSC	Water and Sewer Corporation
Jordan	
ASEZA	Aqaba Special Economic Zone Authority
AWC	Aqaba Water Company
JD	Jordanian Dinar
JWC	Jordan Water Company also known as Miyahuna
MOE	Ministry of Environment
MOF	Ministry of Finance
MOH	Ministry of Health
MOPIC	Ministry of Planning and International Cooperation
MWI	Ministry of Water and Irrigation
NWAC	National Water Advisor Council
PMU	Project Management Unit
PPPU	Public-Private Partnership Unit
RWC	Royal Water Commission
WAJ	Water Authority of Jordan
WUA	Water Users' Association
YWC	Yarmouk Water Company
Lebanon	

BMLWE	Beirut and Mount Lebanon Water Establishment
BWE	Beqaa Water Establishment
CDR	Council for Development and Reconstruction
CEDRE	Conférence Economique pour le Développement par les Réformes avec les Entreprises
HCP&PPP	High Council for Privatization and Public-Private Partnership
LP	Lebanese Pound
LWA	Litani Water Authority
NWE	North Water Establishment
MOA	Lebanon Ministry of Agriculture
MOE	Ministry of Environment
MOEW	Ministry of Energy and Water
MOPH	Ministry of Public Health
SWE	South Water Establishment
WE	Water Establishment
Morocco	
ABH	Agence de Bassin Hydraulique
CIP	Comité Interministériel des Prix
CSEC	Conseil Supérieur de l'Eau et du Climat
DEA	Direction de l'Eau et de l'Assainissement
DGH	Direction Générale de l'Hydraulique
DM	Dirham Marocain
DPEP	Département des Entreprises Publiques et de la Privatisation
DRSC	Direction des Régies et Services Concédés
MdI	Ministère de l'Intérieur
MEF	Ministère de l'Economie et des Finances
MEMEE	Ministère de l'Energie, des Mines, de l'Eau et de l'Environnement
MGAG	Ministère des Affaires Générales et de la Gouvernance
ONEE	Office National de l'Electricité et de l'Eau Potable
RD	Régies directes

RAI	Régies autonomes intercommunales
SOER	Société des Eaux de l'Oum ErRbia
Palestine	
CMWU	Coastal Municipalities Water Utility
EQA	Environmental Quality Authority
IS	Israeli Shekel
JCSPD	Joint Council for Services, Planning and Development
JWA	Jerusalem Water Undertaking
JWC	Joint Water Committee
JWSC	Joint Water Service Council
MOA	Ministry of Agriculture
MOF	Ministry of Finance
MOH	Ministry of Health
MOLG	Ministry of Local Government
MOPAD	Ministry of Planning and Development
MOPWH	Ministry of Public Work and Housing
MWD	Municipal Water Department
NRWU	North Region Water Utility
NWC	National Water Company
PWA	Palestinian Water Authority
RWU	Regional Water Utilities
VC	Village Council
WSRC	Water Sector Regulatory Council
WSSA	Water Supply and Sanitation Authority
Tunisia	
ANPE	Agence Nationale pour la Protection de l'Environnement
BPEH	Bureau la Planification et des Equilibres Hydrauliques
CNE	Conseil National de l'Eau
CRDA	Commissions Régionales pour le Développement Agricole

DGBGTH	Direction Générale des Barrages et des Grands Travaux Hydrauliques
DGGREE	Direction Générale du Génie Rural et de l'Exploitation des Eaux
DGPPP	Direction Générale du PPP
DT	Dinar Tunisien
GEG	Ghdir El Golla
IGPPP	Instance Générale des Partenariats Public Privé
MARHP	Ministère de l'Agriculture, des Ressources Hydrauliques et de la Pêche
MEDD	Ministère de l'Environnement et du Développement Durable
MEF	Ministère de l'Economie et des Finances
ONAS	Office National de l'Assainissement
PdG	Présidence du Gouvernement
SECADENORD	Société d'Exploitation du Canal et Adductions des Eaux du Nord
SONEDE	Société Nationale d'Exploitation et Distribution des Eaux
USC	Unité de Suivi des Concessions

2 BACKGROUND INFORMATION

Within the framework of the EU funded SWIM-H2020 SM, the project requested that mapping of the current status in water supply and distribution in the project countries (Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestine, and Tunisia), is undertaken focusing on the economic and institutional models followed in water management in the countries. The study is to take into consideration the recommendations of the Union for the Mediterranean (UfM) Financial Strategy of the water agenda.

2.1 OBJECTIVE AND SCOPE

2.1.1 Objective

The activity aims to map the current supply and distribution status in the water sector in the South Mediterranean countries (SWIM-H2020 SM partner countries) with a view to compare the economic and institutional models on water management with a special focus on governance and regulatory framework.

2.1.2 Scope

The present activity provides a mapping of the current status in water supply and distribution in the project countries: Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestine, and Tunisia. Moreover, it focuses on the economic and institutional models followed in water management in the countries. Finally, it takes into consideration the recommendations of the UfM Financial Strategy of the Water Agenda.

The UfM Water Agenda includes 5 themes: (i) Water-Energy-Food-Ecosystems Nexus; (ii) Water-Employment-Migration (WEM); (iii) Water, Supply and Sanitation (WASH); (iv) Climate Change Adaptation and Water;[1] and more recently; (v) the Financial Strategy which calls for building an accountable and transparent enabling environment for the water sector.[2]

Furthermore, the Water Agenda seeks to further enhance regional cooperation on water and to implement sustainable and integrated water management policies throughout the region by: “promoting sustainable economic and social development and have significant employment benefits; help in tackling climate change impacts and increasing climate and disaster-resilience; in meeting environmental and water quality objectives; in tackling migration challenges, amongst and inside countries and in ensuring access to safe drinking water as a fundamental human right, particularly for the most vulnerable, as we continue to promote gender mainstreaming, focus on youth, transparency and improved accountability in the water sector”.

[1] GWP-Med website: www.gwpmed.org.
[2] UfM website: <www.ufm.org>.

This assignment is a background document to help formulate the Financial Strategy. The scope of work consists of 6 tasks. Each Country will constitute a section of the report with the 6 tasks listed below constituting subsections of the report:

1) Identification of the main water sector utilities (water supply, sewerage (sanitation) system, and waste water treatment) present in each country.
2) Organisation of the water and waste water sector and presentation of its ownership status (with a focus on water distribution and sewage collection).
3) Basis for water and waste water pricing and tariff setting followed by each country (financial, economic, environmental, social), (the type of tariff structure (flat rate vs. volumetric tariff, combined), the tariff level across users (residential, industrial, commercial or public buildings), as applicable, etc.), the tariff adjustment process and how water tariff and subsidies are managed to ensure the sustainability of the water sector.
4) Identification of water and waste water sector utilities remuneration models (Tariffs, Taxes, Transfers), in each country to bridge the financial gaps and increase revenues.
5) Water distribution: how is it regulated in the countries (the level at which it is organized - Central, Regional or Municipal, based on water right?).
6) Comparative Analysis between the countries .

3 METHODOLOGICAL PROCESS

The methodological guidelines will follow the OECD “Mind the Gaps, Bridge the Gaps” that was developed as an analytical framework and tools for policymakers to identify and bridge governance challenges that affect all countries regardless of their institutional setting, water availability or degree of decentralization. The OECD guidelines allow understanding and addressing the main gaps that prevent policy makers to putting the water sector on a sustainable footing. However, the OECD “Mind the Gap, Bridge the Gaps” approach is judiciously used to only analysing the first five scoped themes in terms of determining the setup of the domestic water sector and highlighting some of the gaps.

There is not a one-size-fits-all solution to water challenges worldwide, but rather a large diversity of situations within and across countries. Therefore, the water supply analysis will pay attention to territorial specificities and context.

All information used in this mapping exercise is based on studies and information readily available from the national institutions’ websites, EMWIS water knowledge platform, FAO AQUASTAT, OECD, PAPIAF, SWIM-SM I and SWIM-Horizon 2020 SM, UNDP, WHO-UNICEF, World Bank and occasionally other institutions such as OXFAM. Moreover, international database such as IBNET Database, IBNET Tariff and Global Water Market are used.

4 ALGERIA

The urban and demographic growth as well as desertification have aggravated the water stress in Algeria which will increasingly be exacerbated by climate change in the future: 1,500 m^3 in 1962 against 294 m^3 in 2014 of available resource per capita or a reduction by a factor of 5 in 43 years.[3] The most recent statistics from FAO AQUASTAT estimate the average total renewable water resources at 11.67 billion of m^3 for the 2013-17 period that is inequitably distributed across the country with a total withdrawal of 8.42 billion of m^3 with the following breakdown: 59% for agricultural use; 36% for domestic use; and 5% for industrial use. Water use is supplemented by more than 0.6 billion of m^3 through desalination whereas there are no figures about direct use of both agricultural drainage water and treated municipal waste water. Still, domestic demand alone reached about 3 billion m^3 in 2017.

4.1 WATER AND WASTE WATER SECTOR UTILITIES, PPP AND SERVICE LEVELS

4.1.1 Utilities' Services

There are two national distinct water and waste water utilities in charge of the domestic water and waste water services. Yet, both utilities signed management contracts with international operators to manage large coastal cities.

At the national level, the water and waste water utilities include:

- The Algérienne des Eaux (ADE or Algerian Water Company), the national water holding company, which is the bulk water supplier and the main water utility overseeing its subsidiary utilities all over the country. ADE procured few Desalination Stations and water treatment plants through Engineering, Procurement, and Construction (EPC) contracts with usually a 2-year management contract that, if need be, is renewed.[4] ADE serves more than 24 million people nationwide and runs 4 Desalination Stations (about 752,000 m^3/day, i.e., more than 274 million m^3/year).
- The Office National de l'Assainissement (ONA or National Waste Water Utility) is the national sanitation holding company.[5] ONA procured waste water treatment plants (WWTPs) through Design-Build-Operate (DBO) and EPC contracts with a 2 year contract management that, if need be, is renewed. ONA serves more than 24.3 million people nationwide. It operates 109 WWTPs with an installed capacity of 1.2 million m^3/day, i.e., 438 million m^3/year).

At the local level, the water and waste water utilities run through international Management Contracts (MCs) include (see below for more details):

[3] FAO AQUSAT website : <www.fao.org/nr/water/aquastat/data/query/index.html?lang=en>.
[4] ADE website: <www.ade.dz>.
[5] ONA website: <ona-dz.org>.

- The Société des Eaux et de l'Assainissement d'Alger (SEAAL or Water and Waste Water Utility of Algiers).
- The Société de l'Eau et de l'Assainissement de Constantine (SEACO or Water and Waste Water Utility of Constantine).
- The Société de l'Eau et de l'Assainissement d'Oran (SEOR or Water and Waste Water Utility of Oran).
- The Société de l'Eau et de l'Assainissement de Tarf et Annaba (SEATA or Water and Waste Water Utility of Tarf and Annaba).

About 20% of municipalities directly manage water distribution services; they tend to be mostly small and in remote areas. The government's goal is to eventually transfer them to ADE. However, a schedule for the transfer was not made public.

4.1.2 Public-Private Partnership

Algeria does not have a PPP Law, the Caisse Nationale d'Équipement pour le Développement (CNED or National Fund for Development Equipment) acts as a PPP Unit (Art. 5 of the Executive Decree No. 04-162 of June 5, 2004). Moreover, the Regulatory Authority for public procurement is an advisory body that takes care of PPP proposals, studies and information.

The 4 MCs are detailed below:

- SEAAL is the water and waste water utility covering the provinces of Algiers (the capital) and Tipasa.[6] The utility is owned by ADE (70%) and ONA (30%). Three Desalination Stations (605,000, 540,000 and 150,000 m^3/day) are operated by SEAAL which procured Desalination Stations through EPC contracts. SEAAL has been managed by Suez since 2006 where the contract was renewed in 2018 for 3 more years.[7]
- SEACO is the water and waste water utility covering the province of Constantine.[8] The utility is owned by ADE and ONA (no shareholding breakdown is available) and is under private management contract since 2007 by Aguas de Barcelona from Spain, a subsidiary of Suez. It runs one Desalination Station with a capacity of 262,000 m^3/day.
- SEOR is the water and waste water utility covering the province of Oran.[9] The utility is owned by ADE and ONA (no shareholding breakdown is available) and is under private management contract since 2008 by the Société des Eaux de Marseille (SEM) of France, a 50/50 subsidiary of Suez and Veolia. It runs two Desalination Stations (560,000 and 250,000 m^3/day).
- SEATA is the water and waste water utility covering the province of Annaba.[10] The utility is owned by ADE and ONA (no shareholding breakdown is available) and was under private management contract from 2007 to 2011 by Gelsenwasser. The contract was cancelled due to slow procurement procedures according to Gelsenwasser and lack of required experience according to the Government of Algeria. Operations were transferred back to ADE and ONA.

[6] SEAAL website: <www.seaal.dz>.
[7] Suez website: <www.suez.com/en/our-offering/Success-stories/Our-references/Algiers-water-management-and-customer-relations>.
[8] SEAAL website: <www.seaal.dz>.
[9] SEOR website: <www.seor.dz>.
[10] SEATA website: <www.seata.dz>.

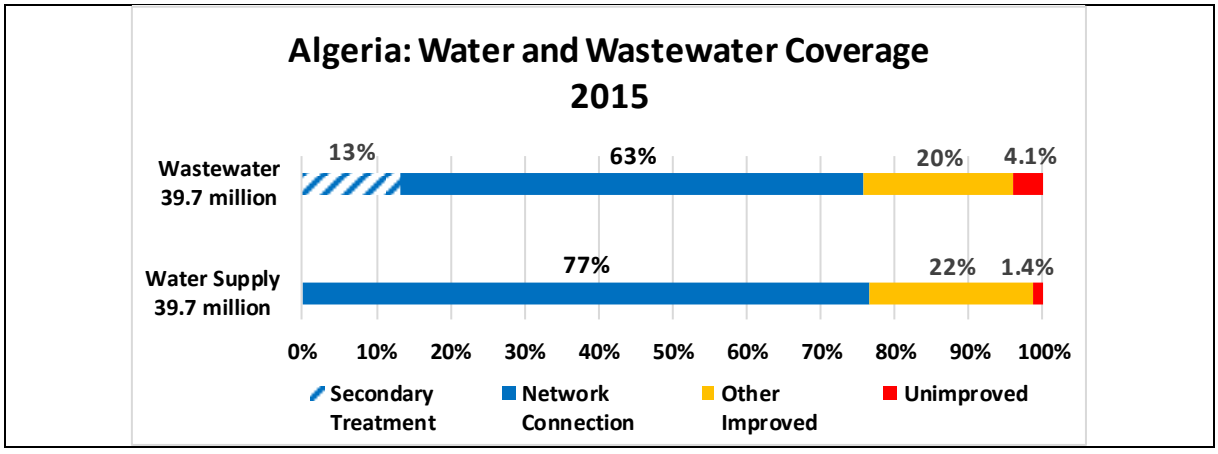
Exceptionally, some public companies are engaged in commissioning Desalination Stations:

- The Companie Algérienne de l'Energie (CAE or Algerian Energy Company) is a public company in charge of developing large Desalination Stations in Algeria where CAE owns a minority stake in 10 Desalination Stations on BOT basis and 3 new ones that were in the pipeline but are currently shelved.[11] CAE stakeholders are national oil company Sonatrach and national gas company Sonelgaz and excess desalinated water is sold to ADE under the take or pay regime.
- The Compagnie de l'Engineering de l'Electricité et du Gaz (CEEG or Electricity and Gas Engineering Company), which is a subsidiary of Sonelgaz, is a public company responsible for contracting and supervising works and is about to tender for the first time 2 Desalination Stations.[12] Excess water could possibly be transferred to ADE under the take or pay regime.

4.1.3 Service Levels

With regards to water and waste water coverage service typologies, the population having limited access to sanitation reached 4.1% of the total population and remains an issue especially in the rural areas in 2015, whereas the population having limited access to clean water reached 1.4% based on the data provided by the WHO-UNICEF Joint Monitoring Program (JMP).[13] Moreover, treated sewage to secondary level covering 13% of the population remains marginal (Figure 4.1). However, ONA provides totally different figures for sanitation coverage with the sewage of 86% of the population being connected against 76% as reported by JMP and the sewage of 42% of the population receiving secondary treatment (109 in operations) against 13% as reported by JMP. Irrespective of the treated waste water volume, sludge management remains a poorly managed issue (Figure 4.1).

Figure 4-1: Algeria Water and Waste Water Coverage



Source: Author based on JMP 2017.

[11] CAE website: <www.aec.dz>.
[12] CEEG website: <www.ceeg.dz>.
[13] WHO-UNICEF Joint Monitoring Program. WASH database: <https://washdata.org/data>.

4.2 WATER AND WASTE WATER SECTOR ORGANISATION AND OWNERSHIP

Algeria's Water Law No. 5-12 of 2005:[14] sets the institutional framework of the water sector; allows concessions for water and waste water services; and sets out the guiding principles for water and waste water tariffs. Algeria has a large number of water and waste water stakeholders where the Ministère des Ressources en Eau et de l'Environnement (MREE or Ministry of Water Resources and the Environment) is the overarching institution at the national level in charge of the water sector at large and responsible for: planning. policy and regulation; water resource development; water drinking quality; and environmental regulation. Except for the CAE and the CEEG that operate on the fringes of the water sector by commissioning and financing Desalination Stations, a number of institutions including utilities, agencies, an office, a department and a regulator are under the aegis of MREE and constitute the backbone of the water sector at large. The Conseil National Consultatif des Ressources en Eau (CNCRE or National Consultation Council on Water Resources) provides high-level collaboration between water institutions.

The main water and waste water stakeholders include:

- The national water utility (ADE) is responsible for water drinking quality, Desalination Stations, bulk water services and water distribution whereas the national waste water (ONA) utility is responsible for waste water collection, drainage and treatment. The 4 municipal utilities (SEAAL, SEACO and SEOR) owned by ADE and ONA assume the same responsibilities. Except for the 20% of municipalities directly managing water distribution services, the remaining municipalities are directly managed by ADE.
- National agencies with the following responsibilities:
    - (Agence Nationale de Gestion Intégrée des Ressources en Eau --AGIRE) is the integrated water resources management agency to oversee and pool the work of the Agences de Bassin Hydrographique (ABH)
    - ABH or Water Basin Agencies where Law No. 83-17 of 16 July 1983 and supplemented by Ordinance No. 96-13 of 15 June 1996 introduced integrated management of water resources and established five watershed agencies and five watershed committees with administrative and multisector member representation;
    - Agence Nationale des Barrages et des Transferts –ANBT is the dam and transfer agency that develops, oversees and manages more than 80 dams (9 km^3 in capacity) and water transfers (North-South 5,000 km transfer with 600 million m^3/year and a south-south 760 km transfer with 100 million m^3/year); and
    - Agence Nationale des Ressources Hydrauliques --ANRH) is the natural resource agency that assesses, maps and surveys water resources as well as maps irrigation potential.

[14] Texte de Loi website: <www.droit-afrique.com/upload/doc/algerie/Algerie-Loi-2005-12-eau.pdf>.

- A national office is responsible for developing, overseeing and managing drainage and irrigation systems as well promoting efficient irrigation technologies and selling water to agricultural users (Office National de l'Irrigation et du Drainage --ONID).
- A national department is responsible for overseeing local water resources, planning for future water needs and commissioning water and waste water infrastructure (Direction des Ressources en Eau --DREW).
- The Autorité de Régulation des Services Publics de l'Eau (ARAPE or national water public service regulation authority) is responsible for controlling drinking water quality and regulating water and waste water tariffs. However, the regulation authority is under the MREE tutelage which constitutes a conflict of interest.

4.3 BASIS FOR WATER AND WASTE WATER PRICING AND TARIFF SETTING

In addition to the Algeria's Water Law No. 5-12 of 2005 that sets out the guiding principles for water and waste water tariffs, the Executive Decree No. 5-13 on water and waste water tariffs of 2005 set water and waste water tariffs.[15]

Tariffs are set by MREE while ARAPE as a regulator has almost no say in water and waste water tariff setting as they have been frozen since 2005. The depreciation of the local currency triggered inflationary pressures that have affected water investments and operations. Despite the fact that Parliamentarians as well as ADE and ONA executives challenged the government to increase tariffs, the 2014 and 2018 MREE announcements of an imminent increase in tariffs were abandoned for social and possibly political reasons.

Water and waste water tariffs include a variable element and other charges that are differentiated by geographical zone. The tariff is also differentiated by category of activities: households, public institutions/artisans and industries. Two charges are: (i) meant to incentivize water savings (4% for the northern Wilayas and 2% for the southern Wilayas); and (ii) a 3 Dinar Algérien (DA) per m3 consumed for the management of public facilities for the production, transportation and distribution of drinking water. A 7% value-added tax is also added to the total tariff that is paid quarterly.

Volumetric Water tariff has a Water base tariff rate differentiated by region to be multiplied by a progressive Multiplier Coefficient per category of activity which gives the right signal to consumers to reduce their consumption. The structure of the tariffs per quarter are as follows:[16]

Territorial Zone with a water base rate of 6.30 DA include Algiers, Oran, Constantine Wilayas covered: Algiers, Médéa, Tipaza, Boumerdès, Tizi-Ouzou, Bouira, Bordj Bou Arréridj, Me Sila, Béjaïa and Sétif. Oran, Aïn-Northwestern, Mostaganem, Mascara, Sidi Bel Abbès, Saida, Ni'mah and El Bayadh. Constantine, Jijel, Mila, Batna, Khenchela, Biskra, Annaba, El Tarf, Skikda, Sou Ahras, Guelma, Tebessa and Oum El Bouaghi. The Water tariffs are as follows:

1. Category I: Households

[15] ABH website: < https://abhahs-dz.com/>
[16] ADE website: <www.ade.entreprise-dz.com>.

- 1st tranche (up to 25 m^3/quarter): 6.3 DA/m^3
- 2nd tranche (from 26 to 55 m^3/quarter): 20.48 DA/m^3
- 3rd tranche (56 to 82 m^3/quarter): 34.65 DA/m^3
- 4th tranche (greater than 82 m^3/quarter): 40.95 DA/m^3

2. Category II:
   - Administrations (uniform/quarter): 30.25 DA/m^3
   - Artisans and services in the service sector (uniform/quarter): 30.25 DA/m^3
3. Category III
   - Industrial and tourism (uniform/quarter): 42.25 DA/m^3

Territorial Area with a water base rate of 6.10 DA include Chlef, Aïn-Defla, Relizan, Tiarat, Tissemsilt and Djelfa. The Water tariffs are as follows:

1. Category I: Households
   - 1st tranche (up to 25 m^3/quarter): 6.1 DA/m^3
   - 2nd tranche (from 26 to 55 m^3/quarter): 19.5 DA/m^3
   - 3rd tranche (56 to 82 m^3/quarter): 33.6 DA/m^3
   - 4th tranche (greater than 82 m^3/quarter): 39.7 DA/m^3
2. Category II:
   - Administrations (uniform/quarter): 33.6 DA/m^3
   - Artisans and services in the service sector (uniform/quarter): 33.6 DA/m^3
3. Category III
   - Industrial and tourism (uniform/quarter): 39.7 DA/m^3

Territorial Area with a water base rate of 5.80 DA include Ouargla, El Oued, Illizi, Laghouat, Ghardaia, Bechar, Tindouf, Adrar and Tamanrasset. The Water tariffs are as follows:

1. Category I: Households
   - 1st tranche (up to 25 m^3/quarter): 5.8 DA/m^3
   - 2nd tranche (from 26 to 55 m^3/quarter): 18.6 DA/m^3
   - 3rd tranche (56 to 82 m^3/quarter): 31.9 DA/m^3
   - 4th tranche (greater than 82 m^3/quarter): 37.7 DA/m^3
2. Category II:
   - Administrations (uniform/quarter): 31.9 DA/m^3
   - Artisans and services in the service sector (uniform/quarter): 31.9 DA/m^3
3. Category III
   - Industrial and tourism (uniform/quarter): 37.7 DA/m^3

Sanitation Tariffs per territorial zone are as follows:

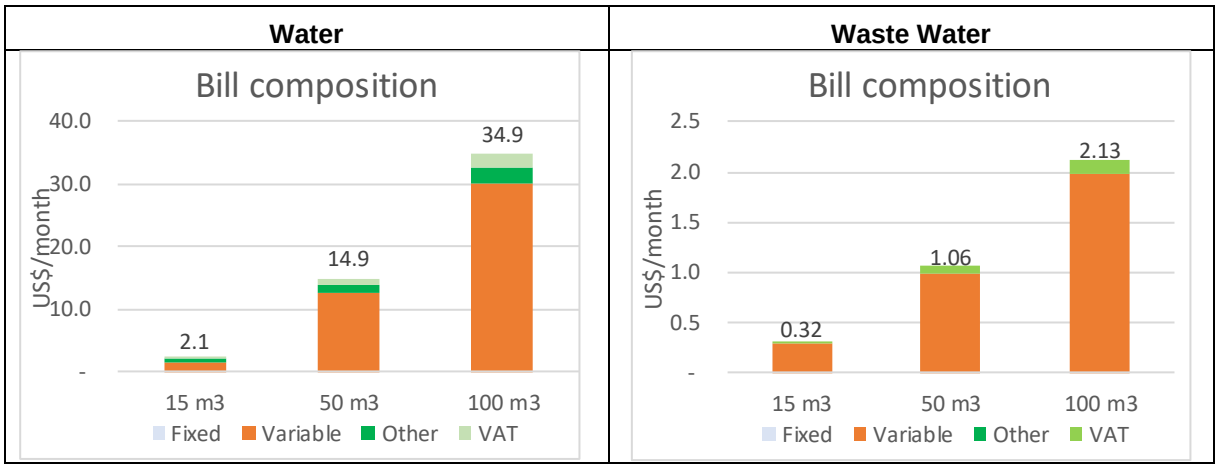
- Algiers, Oran, Constantine (uniform/quarter): 2.35 DA/m^3
- Chlef (uniform/quarter): 2.20 DA/m^3
- Ouargla (uniform/quarter): 2.10 DA/m^3

Yet, there is an additional pollution charge of 4% on industrial discharge that is collected by the ABHs (water basin agencies).

As an example, an ADE tariff for hypothetical households living in the north and consuming 15 m^3, 50 m^3 or 100 m^3 per month in 2018 amounts to a combined water and sanitation bill of US$ 2.4, 16.0 and

37.0 respectively. The quarter tariff grid was adjusted per month (Figure 4.2). The equivalent tariff per m^3 is as follows (US$/$m^3$): 0.16, 0.32 and 0.37 respectively.

Figure 4-2: Water and Waste Water Bill per Month as Collected by ADE in 2018



Source: Author based on above cited Tariffs.

The 1st tranche of the tariff should be affordable by lower income households. The 2005 rates are however too low to cover operational costs for water and waste water (1/6th for 15 m^3 per month of water tariff) which makes it difficult to ensure financial and environmental sustainability as households tend to consume more. This could in turn have a positive effect on economic competitiveness although externalities are a hidden economic cost that should eventually be paid by society. Finally, the availability of water per capita and waste water services has a positive effect on the well-being of the population.

4.4 WATER AND WASTE WATER SECTOR UTILITIES REMUNERATION MODELS

4.4.1 Utilities' Status

ADE is a public company owned by the government that supplies bulk water and is the main water utility at the local level. ADE owns all the utility assets that are under ADE jurisdiction.

ONA is a public company owned by the government and is the main operator of waste water utilities at the local level that collect and often treat waste water. ONA owns all the utility assets that are under ONA jurisdiction.

MCs awarded jointly by ADE and ONA to 3 international companies manage water and waste water services in 3 major cities. ADE and ONA own the assets and the MCs are renewed every 3 or more years.

Municipalities (about 20%) own and manage their water and waste water services.

4.4.2 Utilities' OMEX Financing

While the Water Law calls for tariffs to cover operations and maintenance, it allows the government to intervene to cover the water and waste water services' gap. This has been the case for all types of utilities serving municipalities as the government heavily subsidizes the sector through a compensation mechanism known as *subvention d'équilibre* that ranges from 17.5% for well-managed utilities such as MCs to around 40% for poorly managed utilities.

The detail information on MCs remunerations by the government is unavailable as the contracts were negotiated on a case by case basis although the cost recovery in terms of tariffs has tremendously improved reaching more than 80% for the 3 concessions. It is assumed that the *subvention d'équilibre* should compensate the three operators for the financial gap and a marginal profit. However, information about operator guaranties is not made public. Also, there is no information on the municipalities running their water system but it is usually a combination of the Central, regional governments (Wilayas) and local governments (collectivités locales) that bridge the operation financial gaps.

The water sector is pursuing an unsustainable path. Most importantly, the domestic allocation as reported by FAO AQUASTAT has by far the highest share in the region with 36% of total water use. About 60% of the water produced (equivalent to 1.8 billion m^3) is non-revenue water (NRW) according to ADE. The value of these losses amount to US$ 1.2 billion (at a production cost of 80 DA/m^3) which is higher than the investment needs per year. So, there is a huge opportunity to improve the sustainability of the sector, whereby sector adjustment should start with demand management before moving to water supply augmentation with Desalination Stations. There are 3 issues that need imperatively to be fixed to reach at least operation cost recovery although government subsidies are still needed until utilities can offset their deficits:

- **Low cost recovery** (tariff collection) which is usually associated with poor bill collection practices and amounts to 28% for uncollected bills except for the 3 concessions. Among various options that could be envisaged, smart collection through mobile phones could be one cheap and effective way to improving billing collection on a regular basis.
- **Unaccounted for water** as part of NRW where technical losses and losses related to illegal connections amount to 32% of total water production by end 2017 according to ADE. Prioritized investments are needed to reduce these losses and ADE has a target to reduce them to 20% of total water production by 2020. Suez, which is operating in Algiers, is already working at reducing unaccounted for water technical losses that should ideally be brought back to less than 10% to reach the US American Water Work Association benchmark of a utility whose distribution network is considered effective.[17]
- **Low tariffs** with domestic, service and industrial water is sold on average at 1/4, 1/3 and 1/2 of its production cost respectively (cost of water transfers are not included) and waste water treatment is charged a symbolic price (it should be at least 30 times more to break even and block tariff scales should be introduced similar to the water tariff), it does not create a rational use of the resource. Therefore, there is an inherent bias in water prices for all sectors including domestic water that is distorting water allocation and distribution and putting more burden on government finances. Usually, equitable water pricing seems to be an effective way to

[17] American Water Works Association website: <www.awwa.org>.

encourage users to adapt their consumption to their needs and to buy water rights at a market (real) price[18] which could in turn help the government re-evaluate its water policies, future water investments at all levels and future water allocations and distribution systems.

4.4.3 Utilities' CAPEX Financing

In addition to budgetary appropriations to implement the Five Year Plan infrastructure investments (2015-19), the government used its own resources through three funding mechanisms to finance infrastructures:

- The Fonds National d'Investissement (FNI or National Investment Fund), established in 2009, is the main financial source for the financing of infrastructure projects. It is a public institution endowed with civil personality and financial autonomy to contribute to the financing of productive investments, and to the implementation of plans and investment programs in order to achieve the objectives of the Algerian economic development.
- The Fonds National de l'Eau (FNE or National Water Fund), established in 1995, is a financial source of funding for water mobilization and transfer systems, drinking water supply, sanitation and agricultural hydraulics and development investments as well as the acquisition of equipment, resulting from major technical incidents or unforeseeable water deficits. The FNI is also responsible for financing contributions in respect of extension, renewal and equipment investments, as well as endowments for the benefit of the ARAPE, the Water Utilities Regulatory authority. The FNI is replenished by central and regional (*collectivités territoriales*) budgetary transfers, grants and water (economy and quality charges) and waste water (mainly from industrial pollution) charges.
- CNED is a public institution of industrial and commercial nature created in 1959. The CNED mission is to monitor and evaluate the maturation of studies of large projects that exceed DA 20 billion or those whose socio-economic impact is significant. CNED also act as a PPP unit (see above).

In other words, the FIN and FNE make available the funding, and the CNED supports the evaluation, monitoring and technical and project management aspects to increase expenditure efficiencies.

4.4.4 Future Investment Needs

Algeria has been facing important challenges since the reduction of oil prices in 2014. The Vision 2035 of Algeria is being prepared and the draft highlighted the need to increase infrastructure services' efficiencies and infrastructure investments to match future demand and sustain growth. For the water and waste water sectors, investments equivalent to 0.5% of GDP per annum (0.3% for capital investments and 0.2% for operations and maintenance) are needed to achieve these targets. Based on the IMF 2019 GDP projections,[19] the needs amount to about US$ 1 billion in 2019 with US$ 600 million for capital investments and US$ 400 million operations and maintenance. Yet, the government is well

[18] Mozas, Morgan et Alexis Ghosn. 2013. *État des lieux du secteur de l'eau en Algérie*. IPEMED. Marseille.
[19] International Monetary Fund. 2018. *Algeria Article IV*. Washington, D.C.

aware that public funds cannot cover the investments as it will need additional sources of international and local funding such as private sector loans and equity participation, guaranties, bonds, etc.

The 2018 draft Vision 2035 aims to transform the government from a provider to a regulator to attract the needed private financing. Changes are already noticeable such as the investment Code update of June 2016 that confirmed the "rule of 49%/51%" ownership of local vs. foreign investments --compared to the old "rule of 51%/49%" ownership that scared away international investors-- and the obligation to comply with the rules of companies held mainly by foreign investors which are now governed by Section 66 of the Finance Act of 2016. Moreover, MCs have been successfully awarded in 3 cities. Build-Operate-Transfer have been awarded for WWTPs and Desalination Stations. Large Desalination Stations were built since the 1960s to initially supply fresh water to the oil and gas industries (Oran) and more recently domestic water projects were commissioned through 25-year BOTs where the shareholding of 9 out of 10 cases is in favour of private investors (51%) despite the old foreign rule law that was still in force (see above). For smaller water utility systems (desalination or water treatment), DBO (following the Presidential Decree No. 15-247 of September 2015 that updated the *Code des Marchés Publics*) and EPC with a 2-year renewable operation contracts have been awarded. Finally, the repatriation of foreign currency is also an issue that needs to be sorted out.

Economic prospects look better in the near future to attract investors but the government needs to pursue the reform to create an enabling environment that will attract more private investors to seek concessions and BOT contracts to run the water systems. Moreover, the government should establish a water guarantee fund and issue green and blue bonds to attract international and national (oil and gas industry) institutional investors interested in green-investments in line with their Extended Social Responsibility stance. This will help initiate a confidence building process between public and private sectors where the guarantee funds and bonds (see Box 4.1) could have a multiplier effect on private international and national investments.

Box 4-1:Green and Blue Bonds

With the increased scarcity of public financial resources and investable capital, coupled with negative impacts of climate change on resources, it is ever more crucial to incentivize countries to take on a transformative approach to catalysing investments, providing the leeway to more inclusive and sustainable development pathways. More than $50 billion in debt funding has been provided to issuers on the Green Bond market to finance projects that have positive environmental and/or climate benefits. WWTPs fall under this category especially if effluents are affecting pristine natural areas. This market has been driven by a large and growing investor base with a specific mandate to invest in sound investment propositions that also create clear social and environmental benefits. Issuance in this market is guided by the Green Bond Principles, which are best practice guidelines that highlight the importance of allocating funds to eligible projects, tracking proceeds, and providing periodic reporting on use of proceeds.

Source: adapted from World Bank website: <www.worldbank.org>.

4.5 WATER DISTRIBUTION: HOW IS IT REGULATED?

In addition to the Medjerda Basin water sharing between Algeria and Tunisia, water rights are enshrined in the 2005 Water Law in terms of citizen rights: *The supply of drinking water, in sufficient quantities for domestic needs and satisfactory hygiene, is a permanent objective of the State and a citizen's right".* However, water allocations per region and use across sectors in terms of water rights are not explicitly

cited in the water strategy but the government policy to allocate water across regions and sectors is based on water supply. (Box 4.2). Still, the level of bulk water distribution could be derived from water institutions prerogatives and attributions.

Box 4-2: Water Strategy

The government, which has taken important water reform steps since the early 2000s, introduced a new water policy and allocated important budgets to address water scarcity that was affecting the country and all sectors at all levels. The new water policy was thus structured around two strategic axes:

- The development of the hydraulic infrastructure to increase water mobilization: dams, transfers between watersheds to ensure equity and food security, sea-water and brackish Desalination Stations, WWTPs with the aim to reach full sewerage connection and treatment, etc.
- The institutional reform of the water sector that aims to promote better management of the resource through: the introducing of the Water Law of 2005; the setting up MREE in order to ensure an efficient management of water; an effort to centralize water and waste water operations under ADE and ONA; the creation of 5 Water Basin Agencies hence shifting from a compartmentalized sector management to a concerted management at the level of the hydrographic regions and the creation of the AGIRE in 2011 that allowed a mutualisation of the ABH financial means; the creation of public establishments of a commercial and industrial nature in order to guarantee the uniqueness of the management of the water cycle; and developing a National Water Plan to improve water planning until 2030.

Source: MREE website: <www.mree.gov.dz>.

Increased competition between different water uses (agricultural, domestic and industrial waters) and the interactions between water-energy-food nexus have prompted the government to move from a sectoral policy to an integrated water policy as there was a need to arbitrate the distribution between users (agricultural, domestic and industrial) which also raised the issue of water governance in the context of scarcity and competition. This was complemented with environmental policies (also under MREE) to help preserve the water resource quality.

In theory and based on the above review of the sector regulation, the water distribution system is well regulated:

- at the central level, MREE defines policies and coordinate central, regional and local bodies; AGIRE oversees water supply needs and allocation at the macro level; ANRH implement central decisions to regulate the water transfers and store water in dams across the country;
- at the regional level, ABH carry out hydrographic water management and water allocation planning; and
- at the local level, ADE to supply water to municipalities at the local level except for 20% of municipalities that are notably supplied by ABHs so that municipal water customers get their water right share; ONA collecting and treating waste water effluents.

Yet, due to the delays in implementing planned and needed investments and fixing OMEX, the government at the central level is performing more and more arbitration as industrial use and domestic use are being prioritized to the detriment of agriculture use and especially, hydroelectric energy use (considered as a buffer as it is being substituted by fossil fuel and renewable energy generation), although the ABHs should theoretically play this role at the regional level but lacks financial independence (most of the budget is transferred from the central government) and decision-making prerogatives.

In practice, important decisions are made on political grounds rather than economical grounds and are taken at the higher echelon of government at the central level like for instance the freezing of water

tariffs that usually should be adjusted by an independent regulator: ARAPE which is under the MREE tutelage. This highly centralized decision-making process and heavily subsidized sector is distorting the water market and preventing a market-clearing price for water.

5 EGYPT

Egypt receives more than 95% of its fresh water resources from the Nile River. The most recent statistics from FAO AQUASTAT estimate the average total renewable water resources at 58.3 billion of m^3 for the 2013-17 period where Egypt's annual share of the river water of 55.5 billion of m^3 per year is determined by international agreements.[20] This amount is supplemented by rain harvesting (1.3 billion of m^3), Desalination Stations (50 million of m^3), reused drainage water (7.4 billion of m^3), treated waste water reuse (0.7 billion of m^3),[21] non-renewable aquifers (0.9 billion of m^3) and renewable aquifers (1.65 billion of m^3). Yet, these supplemental figures are estimates and cannot be verified.[22] Water use is as follows: 86% for agricultural use; 12% for domestic use; and 3% for industrial use. Domestic demand alone reached 6.6 billion of m^3 in 2017. Still, the United Nations predicts that by 2025, Egypt may reach the level of "absolute water crisis" of less than 500 m^3 per capita, which will significantly affect agriculture, as it already accounts for 86% of its use.

The Nile is Egypt main water lifeline and is also an international river where water allocations among riparian countries is subject to frictions (despite the establishment of the Nile Basin Initiative (NBI) as an inter–governmental organization to address conflict through constructing large–scale irrigation and hydropower dams). In addition, it (a) is essential for agricultural (12 canals, waterways and drains where agriculture drainage is reused); (b) feeds the horizontal expansion to the two mega projects in Toshka and the Sinai supplied by the Nile as well as two others in the Western and Eastern Delta, where water needs will be supplemented with treated waste water from Greater Cairo, Alexandria and soon the New Industrial Cities in the desert, and the Canal Cities; (c) is used for current and future gravitational water transfers to *déversoirs* for the development of new desert settlements (South Valley Development); (d) provides domestic water for the population of more than 97.5 million in 2017[23] and industrial water; (e) produces hydroelectricity; having major infrastructures: the High dam that produces electricity as well as the Aswan dam and 8 other dams to regulate the water flow and store water along the river; (f) is used for fishing and as a river transport mode; and (g) is used as a recreational space. Incidentally, in addition to the NBI, there is also the Joint Authority for Study Development of the Nubian Sandstone Aquifer System that coordinates with riparian countries the sustainable management of this important transboundary and fossil water resource unlike the Ashkelon-Gaza-Sinai Aquifer (shared between Israel, Gaza and Egypt) where there is no water allocation agreement - although Egypt abstracts about 11% of the aquifer. Yet, Egypt needs to extend the domestic water and waste water treatment capacity as supply does not match demand due notably to a fast growing population and as sector investments were lagging behind.

[20] MWRI website: <www,mwri.gov.eg>.
[21] CEDARE website: <http://web.cedare.org/wp-content/uploads/2005/05/Egypt-Water-Sector-Monitoring-and-Evaluation-Rapid-Assessment-Report-Final.pdf>.
[22] NWRP website: <www.nwrpeg.net/index.php?option=com_content&view=article&id=63:water-challenges-of-egypt-iwrm&catid=34:news&Itemid=55 www.nwrpeg.net/index.php?option=com_content&view=article&id=63:water-challenges-of-egypt-iwrm&catid=34:news&Itemid=55>.
[23] World Bank WDI website: <www.worldbank.org>.

5.1 WATER AND WASTE WATER SECTOR UTILITIES, PPP AND SERVICE LEVELS

5.1.1 Utilities' Services

The government strategic objective is to improve water sector sustainability and achieve water security through the introduction of PPP, a new tariff structure and the widespread adoption of desalination technologies.

At the national level, the water and waste water utilities include:

- The Holding Company for Water and Waste Water (HCWW) which was established by Decree No. 135 of 2004 for centralized control and full asset ownership (100%) over 25 regional utility companies and the associated water and waste water infrastructure in 27 Governorates. All municipal utilities were transferred under HCWW as subsidiary companies that allowed them to have their own regulations and by-laws to operate on a commercial basis.

At the regional/local/municipal level, the Water and Waste Water utilities include the 25 regional utility companies or Affiliated Companies (AC) that were established as Egyptian joint-stock subsidiaries affiliated with the HCWW and subject to provisions of Public Business Sector Companies Law No. 203 of 1991. These ACs are the regional authorities responsible for public water and/or waste water services and billing in urban and rural areas that started to get created in the 1980s:[24]

1. Greater Cairo Drinking Water Company.
2. Greater Cairo Sewage Company.
3. Giza Drinking Water and Sewage Company.
4. Alexandria Drinking Water Company.
5. Alexandria Sewage Company.
6. Buheira Drinking Water and Sewage Company.
7. Dakhliya Drinking Water and Sewage Company.
8. Al Gharbia Drinking Water and Sewage Company.
9. As Sharkia Drinking Water and Sewage Company.
10. Kafr es Sheikh Drinking Water and Sewage Company.
11. Damietta Drinking Water and Sewage Company.
12. Fayoum Drinking Water and Sewage Company.
13. Beni Suef Drinking Water and Sewage Company.
14. Minieh Drinking Water and Sewage Company.
15. Aswan Drinking Water and Sewage Company.
16. Qena Drinking Water and Sewage Company.
17. Menoufia Drinking Water and Sewage Company.
18. Luxor Drinking Water and Sewage Company.
19. Matrouh Drinking Water and Sewage Company.
20. Assiut Drinking Water and Sewage Company.

[24] HCWW website: <www.hcww.com.eg>

21. North Sinai Drinking Water and Sewage Company.
22. Sohag Drinking Water and Sewage Company.
23. Red Sea Drinking Water and Sewage Company.
24. Qalyubia Drinking Water and Sewage Company.
25. Suez Canal Cities' Drinking Water and Sewage Company.

Also, the Suez Canal Authority exceptionally runs the Suez water supply system and 3 WWPTs in Port Said while a Consortium is managing New Cairo's WWTP extension (see below).

5.1.2 Public-Private Partnership

The government is seeking the public-private partnership (PPP), whose overarching responsibility falls under the Supreme Committee for Public Private Partnership Affairs, to bridge the water investment financing gap. The PPP choice was formalized in a policy in 2006 by creating a PPP Unit at the Ministry of Finance (MOF).

The PPP Unit lacked advisory capacity and therefore, the government sought the European Bank for Reconstruction and Development (EBRD)[25] help in 2017 to support the PPP Unit in designing, structuring and implementing PPP projects. This could open the door of the water market to private investment; should the country's perceived risk by private investors become manageable despite the continuous devaluation of the Egyptian Pound (EP).

To give the legal grounds for the government to liberalise the sector and introduce PPP to divest from public water utilities through public offerings, a new law governing the water and waste water sector was prepared by the Egyptian Water and Waste Water Regulatory Agency (EWRA) and was endorsed by the Cabinet in 2016 but still needs to be ratified by the Parliament. The draft law includes 7 articles: tariff; general provisions; regulator's prerogatives; licensing; concession agreement; penalties; and other provisions such as contract termination.

There are a number of privately funded small Desalination Stations and 3 reported and publicized cases where PPPs were considered in Egypt:

- Private developers have built desalination dedicated to tourist resorts or luxury vacation communities along the Red Sea and the Sinai. However, there are large discrepancies between the user tariff applied between public projects and these projects. Yet, opportunities for private sector participation seem to be more prominent in water (especially desalination) and waste water; largely out of the need to secure drinking water resources and preserve coastal touristic areas.
- Three major PPP contracts were awarded based on Law 67 of 2010 regulating the Partnership with the Private Sector in Infrastructure Projects, Services and Public Utilities.
    - The New Urban Communities Authority (NUCA)[26] responsible for creating new settlements far from the Nile Valley successfully negotiated the first water sector PPP in 2010 to build a large-scale WWTP in New Cairo on a BOT basis. In New Cairo, the 250,000 m^3 per day WWTP is a 20 year BOT type of investment signed in 2009 and is

[25] EBRD website: <www.ebrd.com/work-with-us/procurement/p-pn-67753-egypt-ministry-of-finance-ppp-unit-support.html>.
[26] NUCA website: <www.newcities.gov.eg/english/aboutUs/About_Authority/default.aspx>

underway since 2010. The initial WWTP investment is US$ 140,000 million and the overall envelop of the 20 year concession could reach US$ 482 million. The payment is based on a sewage treatment charge including a fixed payment coverage (investment, debt, return on equity and fixed operating cost) plus variable operating charge based on volume of treated sewage (m³). The duration is 20 years with 2 years for construction and 18 years for operations. The Consortium including Spanish Aqualia New Europe (50% share) and Egyptian Orascom Construction Industries SAE (50% share) won the tender launched by NUCA (see above) and are responsible for the design, construction, financing and operations. Finally, five international and national banks structured the loan.[27] However, it was not possible to obtain the name of the guarantor and terms of the exchange and other risk guarantees. The transaction structuring was supported by the World Bank private arm, the International Finance Corporation (IFC).

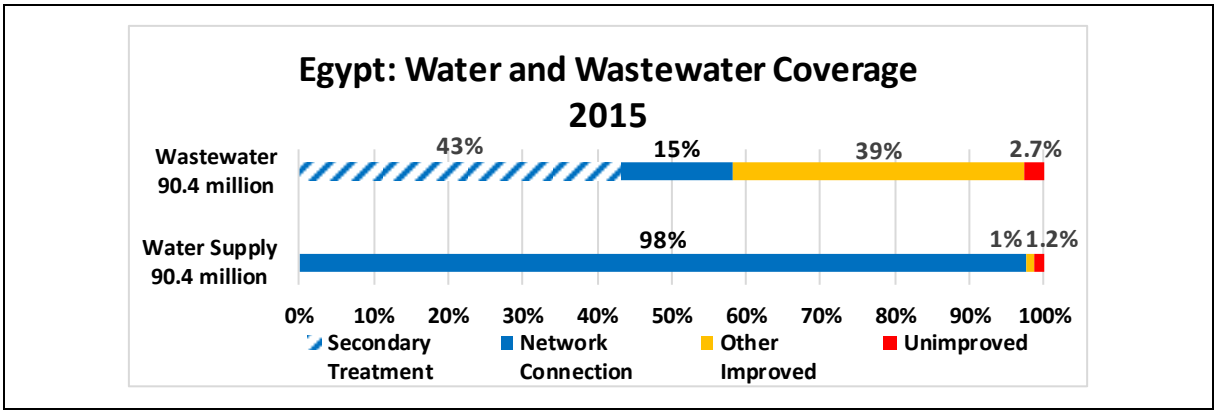
- The Ministry of Defence; also involved in water PPP operations, has commissioned a Desalination Station (150,000 m³/day) in El Alamein using a DBO type of contracts that was won by a Consortium including Aqualia New Europe and Orascom Construction Industries SAE. This contract is funded through the ministry's own budget. It is possible that the plant will also supply the Marsa Matruh (next to El Alamein) AC as the demand for water is increasing due to a growing tourism sector.
- As For the 2017 Abu Rawash WWTP (expansion from 1.2 million m³/day to 1.6 million m³/day with the addition of biological treatment) the initial agreement with the government included a 20 year BOT but the economic situation in Egypt and associated risks made the consortium change the contract to a simple BDO where the financing was to be assumed by the government and the tenders were won by a Consortium including Aqualia New Europe (Leader), Orascom Construction Industries SAE and the Construction Authority for Potable Water and Waste Water (CAPWW).[28]

5.1.3 Service Levels

Water and waste water coverage service typologies in 2015 are illustrated in Figure 5.1. Population having limited access to clean water and sanitation reached 1.2% and 2.7% of the total population respectively.

[27] Aqualia website: <www.aqualia.es>
[28] Water World website: <www.waterworld.com/articles/wwi/2017/09/fcc-wins-big-with-abu-rawash-waste water-expansion-in-egypt.html>

Figure 5-1: Egypt Water and Waste Water Coverage



Source: Author based on JMP 2017.

Both services are almost fully improved in 2015 based on the data provided by WHO-UNICEF Joint Monitoring Program (JMP).[29] Secondary treatment is among the highest in the region despite a moderate sewer coverage of 58%.

5.2 WATER AND WASTE WATER SECTOR ORGANISATION AND OWNERSHIP

There is currently a plethora of applicable laws governing the government's control of water resources and related installations that are continuously updated. Still, there are 2 major laws regulating the water sector: "Irrigation and Drainage Law No. 12 of 1984" that principally regulates irrigation, as well as water usage, management and distribution and the "Protection of the Nile River and Watercourses Law No. 48 of 1982" that enforces protection of the River Nile and its waterways from pollution as well as classifies waterways and regulates the discharge of waste water into them. Also, it is worth mentioning the "Water Discharge Law No. 9 of 2009 for the Protection of the Environment".

Only six stakeholders, who are at the helm of water management, will be reviewed where inter-ministerial coordination is assured by the Council of Cabinet and a High Committee for Water (HCW), which includes 8 ministries, and follows-up the implementation of the National Water Resources Plan:[30]

- The Ministry of Water Resources and Irrigation (MWRI) is responsible for all water resources: Nile River, waterways, drains and groundwater. It controls the quantity and the quality of the resource through its own monitoring networks and laboratories. MWRI established integrated water resources management districts and directorate. It also has the upper hand in irrigation infrastructure except for the last level, which is managed by Water Users' Association (WUA). Any intake to use the resource (surface and groundwater) is subject to a license. A number of authorities are under the MWRI tutelage with the most relevant one being the Public authority for the High dam and Aswan reservoir.

[29] WHO-UNICEF Joint Monitoring Program. WASH database: <https://washdata.org/data>.
[30] SWIM SM I website: <www.swim-sustain-water.net/fileadmin/resources/EG_NATIONAL_RAPPORT_.pdf>.

- The Ministry of Housing, Utilities and Urban Communities (MHUUC) provides the overall leadership for the water and waste water sector. MHUUC sets sector policy and coordinates the overall investment program for the sector and oversees a number of specialist agencies and public service companies including: EWRA, HCWW, National Organization for Potable Water and Sanitary Drainage (NOPWASD), and CAPWW. MHUUC established a Project Management Unit (PMU) by the Decree No. 154 of 2015, which is responsible for establishing the sector vision and key policies, including the National Water Supply and Sanitation Strategy, and overseeing their implementation.
- The MOF allocate capital investment grants for water and waste water sector investments, as well as OMEX subsidies. MOF houses also the PPP Unit (see above).
- The Ministry of State for Environmental Affairs (MSEA) is responsible for policy formulation and the preparation of plans for the protection of the environment, monitoring water quality and definition of natural protected areas. While the Egyptian Environmental Affairs Agency (EEAA) is the executive tool of the said Ministry.
- The Ministry of Health (MOH) undertakes monitoring of municipal water quality and is also involved in monitoring and regulating municipal effluent discharge.
- The Ministry of Water and Waste Water Utilities (MWWU) created recently in 2012 covers the whole sector of drinking water (enough supply of good quality) and waste water (discharge is treated and released and does affect human health and the environment). MWWU objective is to provide quality drinking water and waste water treatment is relying on a number of bodies under its tutelage to achieve its objectives:
    - The HCWW and ACs are under the status of Public Sector Companies. The mandates of the HCWW and ACs are to purify, distillate, transport, distribute and sell drinking water in addition to collecting, treating and safe disposing of waste water. HCWW monitors and provides technical assistance and training to the ACs. Also, HCWW ensures maintenance, operation and rehabilitation of infrastructures. Each AC works on the basis of five years Master Plans. HCWW covers the Egyptian territory except the cities of the Suez Canal area where Drinking water is managed by the Suez Canal Authority[31] and the waste water by the Governorate. Finally, HCWW also controls the quality of the drinking water and of the waste water.
    - EWRA, which was established by Decree No. 136 in 2004 and started operations in 2007, is responsible for supervising, monitoring, reviewing and regulating the technical and economic activities of all water and waste water utilities. EWRA controls the quality of services provided by the companies through specific indicators. EWRA has no regional representation but a new law has been prepared with a more decentralized approach and was submitted to Parliament.
    - The CAPWW and NOPWASD and are two organizations responsible for planning, design, investment and construction of water and waste water infrastructure. CAPWW is in charge of Great Cairo and Alexandria and NOPWASD for the rest of Egypt's territory except the Suez Canal area.

[31] Suez Canal Authority website: <www.suezcanal.gov.eg>.

Still, other stakeholders play a secondary role in the water sector: the Ministry of Agriculture and Land Reclamation is involved in water management at the farm level by increasing irrigation area as water availability permits; the Ministry of Defence invests in Desalination Stations; and the Ministry of Interior and Ministry of State for Local Development are involved in local development and rural areas and coordinate the improvement of rural sanitation by 2022 with MWRI.

5.3 BASIS FOR WATER AND WASTE WATER PRICING AND TARIFF SETTING

Companies in charge of drinking water and sanitation (HCWW and ACs) are not free to fix tariffs for services they provide. It is the government which approves rates as a function of socioeconomic and political criteria. EWRA is to provide recommendations on tariffs to the MWWU. Over the past years, this has resulted in low prices that did not cover the cost of the service or the operation of these organizations in the majority of cases (only one AC balances its budget). This situation caused a significant dependence of the ACs on the government and often financial difficulties related to insufficient contribution of the government. The pricing problem for drinking water and sanitation is an important and sensitive issue in a country like Egypt where centralized management is strongly anchored. However, it is advisable that at least the user pays for the service (i.e. the provision of drinking water, water for industrial processes or for producing crops in agriculture and treatment of waste water for the protection of the resource). Indeed, the tariffs for the household and economic activities were increased and restructured in 2014 and were increased on average by 40% between August 2017 and June 2018 alone to improve the operations of the ACs' in charge of water and waste water, as the government was trying to reduce a growing budgetary deficit.

The household tariffs of 2018 include a fixed element of EP 2.34[32] and a variable element for water while the waste water tariff is calculated based on a percentage of water consumption. The variable element is applied to the water consumption and does not seem to vary per utility. Similarly, the other public, business and industrial tariffs were also increased in 2018 and have higher variable tariff rates that are segregated by economic activity.

The **household Volumetric Water tariff**[33] is progressive for the three first block tariffs and selective for the 4th and 5th as they seem linked together for the calculation of water consumption of up to 40 m^3 and more:

- 1st tranche (up to 10 m^3/month): 0.65 EP/m^3
- 2nd tranche (from 11 to 20 m^3/ month): 1.6 EP/m^3
- 3rd tranche (21 to 30 m^3/month): 2.25 EP/m^3
- 4rd tranche (0 to 40 m^3/month): 2.75 EP/m^3
- 5th tranche (greater than 40 m^3/month): 3.15 EP/m^3

[32] It is unclear whether the tariffs' increase covers also the fixed element. The 2014 fixed element was considered below.
[33] Egyptian Gazette. May 2018. Cairo.

The **Waste Water tariff for households** is volumetric as it is function of the (volumetric) water tariff and represents 75% of the water tariff.

The **Volumetric Water tariff for economic activities** is as follows:[34]

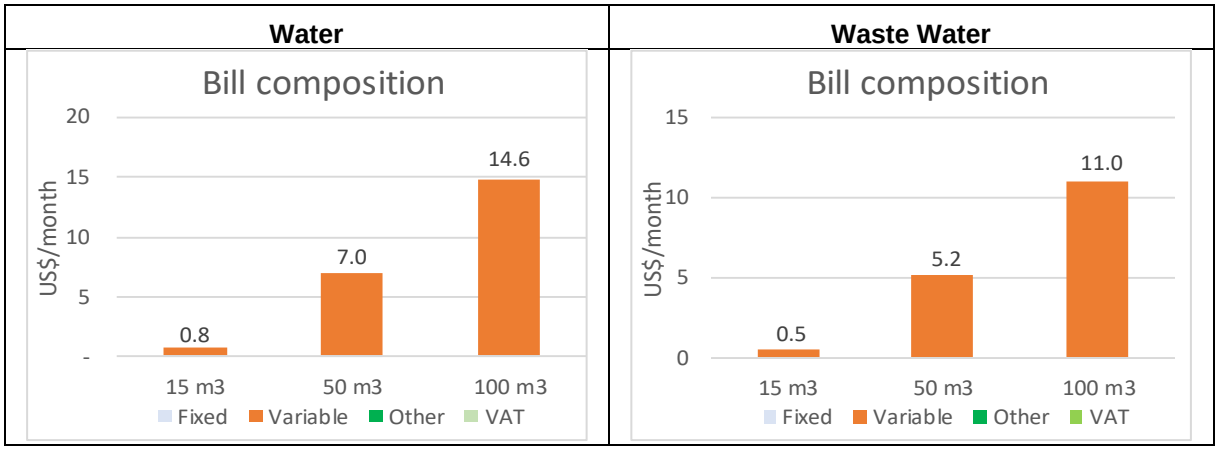
- Services sector: 2.0 EP/m^3
- Public sector: 2.2 EP/m^3
- Commercial sector: 2.4 EP/m^3
- Industrial sector: 3.35 EP/m^3
- Tourism sector: 3.4 EP/m^3
- Other sectors: 6.95 EP/m^3

The **Waste Water tariff for economic activities** is volumetric and represents 92% of the water tariff.

As an example, an AC water and waste water tariff for hypothetical households consuming 15 m^3, 50 m^3 or 100 m^3 per month in 2018 amounts to US$ 1.4, 12.2 and 25.7 respectively per month (Figure 5.2). The equivalent tariff per m^3 is as follows (US$/$m^3$): 0.09, 0.24 and 0.26 respectively.

The 1st tranche tariff seems affordable by lower income households. Still, the relatively low tariffs maintain Egypt's average consumption at an unsustainable 204 litres per capita per day with peaks reaching 576 litres in Cairo and 392 litres in Giza.[35] Moreover, despite the latest tariff increases, their levels are too low to cover the operational costs for water and waste water which makes it difficult to ensure financial and environmental sustainability as households tend to consume more as could be noticed in Cairo and Giza. This could in turn have a positive effect on economic competitiveness although externalities are a hidden economic cost that should eventually be paid by society. Finally, the availability of water per capita and waste water services has a positive effect on the well-being of the population.

Figure 5-2: Water and Waste Water Bill per Month for the Affiliated Companies in 2018



Source: Author based on Egyptian Gazette of May 2018.

[34] Ibid.
[35] World Bank and UK DfID. 2018. *Egypt: Enabling Private Investment and Commercial Financing in Infrastructure*. Washington, D.C.

5.4 WATER AND WASTE WATER SECTOR UTILITIES REMUNERATION MODELS

5.4.1 Utilities' Status

HCWW is a public company owned by the government and was created as the vehicle for commercialization of the 25 ACs in Egypt. HCWW own their assets and oversee their operations.

The 25 ACs have managerial autonomy and are mandated to provide drinking water and/or waste water services within their area of jurisdiction. The government policy is for ACs to become financially independent in the future. In the case of Cairo and Alexandria, 4 ACs manage the water and waste water separately whereas the ACs in all the other governorates manage both water and waste water.

5.4.2 Utilities' OMEX Financing

HCWW is a vehicle of financing and serves as a conduit for consolidating and distributing subsidies to ACs. Through the MOF, the government subsidized the HCWW to the tune of EP 2 billion (US$ 98 million) for the difference between all ACs' expenditures, valued at EP 17 billion (US$ 0.8 billion), and AC revenues, valued at EP 15 billion (US$ 0.7 billion) in December 2017. Still, by the end 2016, the government committed with the International Monetary Fund to an austerity plan and restructuring policies to obtain a US$ 12 billion loan due to poor economic prospects. In the same vein, the government launched in 2016 a five year plan aiming to lift water subsidies and offset HCWW expenditures. Although the policy is contentious among civil society, there are clear signs from the government that it is committed to liberalize the water market as it has already increased water tariffs 3 times in 5 years.

ACs carry out maintenance work and repairs using their own financial resources derived from new licenses (connection fee) and tariffs as well as subsidies provided by the central government through HCWW. Despite successive tariff hikes, ACs still cannot recover OMEX and still require government subsidies.

Water and especially waste water tariffs need additional adjustments but ACs still need to leverage their revenues by tackling Non-revenue Water (NRW) in terms of cost recovery (52% of the bills collected) to increase bill collection and reducing unaccounted for water (31% on average) to bring water leakage to an acceptable benchmark of 10%. Yet, ACs made tremendous efforts in improving cost recovery and in reducing unaccounted for water thanks to the 2007-2017 National Water Resources Plan (NWRP) of 2005.

5.4.3 Utilities' CAPEX Financing

ACs may build, operate, and maintain plants and networks to provide for potable water and safely dispose of waste water should they have available funds. However, few ACs could use their own funds for water and waste water investments and rely on budgetary appropriations with an annual budget set

by the government for the sector. As the investment planning arm of HWWC that receive funding from MOF, CAPWW and NOPWASD are responsible for planning and investment funds according to their geographical jurisdictions in line with the 2007-2017 NWRP. Usually, MOF allocate capital investment grants for water and waste water sector investments. However, the water and waste water sector saw their CAPEX reduced significantly since 2011 by the government. This has forced the sector to reconsider their ambitious investment plans and increasingly look to international sources of funding to bridge the gap through grants, loans and aid.

International Financial Institutions are providing grants, lending or about to lend to the sector: the African Development Bank (AfDB), various Arab donors, Danish, Dutch, EBRD, EIB, EU, Kreditanstalt für Wiederaufbau (KfW), United States Agency for International Development (USAID), World Bank, etc. Also, CAPWW participated for the first time as a shareholder of a consortium in a PPP contract (see above).

5.4.4 Future Investment Needs

According to the G20's Global Infrastructure Outlook, Egypt faces a significant infrastructure financing gap over the next 20 years, assuming current trends. During this period, Egypt could provide up to US$ 33 billion in financing, but requires US$ 82 billion to meet its needs, resulting in a US$ 49 billion water sector investment gap until 2040. For 2019 alone, the investments that could be provided amount to US$ 1.1 billion against US$ 2.5 billion that are required leaving a deficit of US$ 1.4 billion or 56%.[36]

The ultimate goal of the government is to attract private funding through various forms to divest the government from water and waste water services. The PPP policy is high on the government agenda. MWRI equitable allocation and regular distribution of water hold the key to the success of future concessions as any reduction or disruption of water supply faced by operators could have unwarranted consequences in terms of impeding the service to their client, reducing efficiencies, curtailing their profits and jeopardizing trust.

MWWU has the **sole responsibility of the ACs' production assets** but preparing the divestiture of these assets will be a lengthy and painful process. ACs' assets still need to be consolidated and adjusted when water and waste water companies are operating separately to attract concessionaires. Also, EWRA cannot fulfil its governance duties and fairly regulate the sector if it is still under the tutelage of the MWWU as it constitutes a conflict of interest. Finally, using bonds to finance ACs' activities is too early and can be considered after the full corporatization of the ACs.

5.5 WATER DISTRIBUTION: HOW IS IT REGULATED?

In addition to the Nile Basin water sharing agreement, the Nubian Sandstone Aquifer System sharing agreement between riparian countries, and the "no-agreement" regarding the Ashkelon-Gaza-Sinai Aquifer, the Citizen right to water is enshrined in Egypt's 2014 Constitution *"because water is essential to life, the public has access rights to clean fresh water."*

[36] G20 website: <https://outlook.gihub.org>.

However, water allocations per region and use across sectors in terms of water rights are not explicitly cited in the Water Strategy (Box 5.1) but the government policy to allocate water across regions and sectors is based on water supply. Still, the level of bulk water distribution could be derived from the water institutions' prerogatives and attributions.

Box 5-1: Water Strategies

Two major water strategies were formulated in Egypt by the MWWU which seems a bit confusing; with the first one sounding like an already partly (due to the economic downturn since 2011) implemented short-medium costed plan with donor co-financing whereas the second one is more of a prospective strategy in the making:

- The "National Water Resources Plan (NWRP) for 2007-2017" was developed in 2005 and has the economic and social development objectives to increase employment, improve equity in water distribution and farmers' income, and attain some minimum level of food self-sufficiency. The plan has the additional objectives of meeting water needs in all sectors in the future, protecting public health and the environment, recovery of operational and maintenance costs to enable better services, and institutional strengthening. Also, the plan tried to shift policy by adopting an Integrated Water Resource Management (IWRM) where demand-oriented and multi-sectoral approach were complemented by taking into account the sustainability of the natural system. Several pilot projects at different levels started from the tertiary level (mesqa level) up to the district level: Four IWRM pilots, Water Users' Associations (WUAs), Branch Canal Water Users Association (BCWUAs), 10 Consultative Water Boards (CWBs) at secondary canal level, etc. helped scale up these bottom up management approaches to the Nile River.
- The 2050 National Strategy for Development and Management of Water Resources, whose formulation has been ongoing for several years under different titles, is a vision to safeguard Egypt's demand from currently available water resources which include Egypt's share of the Nile Water, as well as the groundwater, and the non-conventional resources. A primarily focus is attributed to increasing sea water desalinization for drinking water purposes in the coastal areas, increasing the efficiency of water conveyance systems and water use, and implementing water reuse programs without relying on the additional increase of Egypt's share of the Nile Water. It is more ambitious than the NWRP and includes 6 main pillars: (i) Water resources development policies; (ii) Rationalization of water uses; (iii) Control of water resources pollution; (iv) Completion and rehabilitation of the water resource system; (v) Adaptation to climate change; and (vi) Improved water management.

Source: NWRP website: <www.nwrpeg.net/index.php?option=com_content&view=article&id=64:-the-national-water-resources-plan&catid=34:news&Itemid=55>; SWIM SM I: <www.swim-sustain-water.net/fileadmin/resources/EG_NATIONAL_RAPPORT_.pdf>.

One of the most NWRP salient achievements is that it helped improved the institutional clarity for the development and management of water resources as MWRI supplies water at all levels and MWWU and its subsidiaries determine the demand for domestic water at the governorate and AC level:

- The MWRI that manages the resources and preserves its quality in conjunction with the MSEA, mobilizes conventional and non-conventional water resources, clears the allocations and bulk distribution of water provided by water users and in coordination with the ministries representing the water users' various socioeconomic and sovereign activities, e.g., the Ministry of Agriculture and Land Reclamation (MALR) for the on-farm water management as irrigation falls under MWRI own prerogatives; the Ministry of Industry for industrial water use; the Ministry of Defence for army needs; obviously the MWWU for domestic use; and other relevant bodies.
- MWWU, that manages domestic water and where roles and responsibilities were better defined through its subsidiaries: the HCWW is the owner of utilities and balance the budgets of ACs at the governorate (governorate coverage) or local (large city coverage) levels which are responsible for day-to-day operations and maintenance - from treatment of the water received from MWRI to distribution and waste water treatment and release; CAPWW and NOPWASD leverage investments with donors or more recently with the private sector; and finally, EWRA is

the regulator in terms of technical and economic aspects of the whole utility sector but does not have subsidiaries as yet. However, EWRA has not fully assumed all its mandated authority and there are some overlap functions between HCWW and EWRA: except for monitoring compliance with technical standards, especially for service quality control and for protecting the environment, EWRA, as an economic regulator, still does not determine revenue requirements nor sets or adjusts tariffs, issue licenses, or sets standards or resolve disputes between customers and water supply and WWTP providers.

It is clear from the above that **MWRI** coordinates water planning with 8 other ministries through the HCW but centralizes the decision-making process, **controls this natural asset and allocate the resource as a wholesaler** based on: (i) sectoral demand from ministries other than the agricultural sector such as MWWU, MSEA, Ministry of Electricity and Renewable Energy, etc.; and (ii) bottom up users' demand for large irrigation schemes and MALR.

On the supply side, as 95% of Egypt water resources come from High Aswan Dam (55.5 billion m^3 per year), and since the dam is multi-annual storage asset, MWRI can afford to assume a fixed inflow per annum. So there is no rationing from the availability (supply) side. Only recently there has been a debate on rationing the use of fossils groundwater including the Nile Aquifer, the Nubian Sandstone Aquifer, the Moghra Aquifer between the West of the Nile Delta, the Qattara Depression, and coastal aquifers on the North-Western coast: mining it now versus saving more of it for future municipal and industrial uses.

On the demand side, municipal and industrial uses take priority in the inter-sectoral allocations, so the burden of shortage fall on irrigation and environmental flows. Irrigation uses 80% of total supply (42 billion m^3 per year), so the heaviest allocation duty is done by MWRI through coordinating with MALR. Spatially, it is allocated amongst irrigation directorates which are largely coterminous to the governorates. Temporally, the allocation is bi-weekly per 10 day crop water requirements.

6 ISRAEL

The urban and demographic growth as well as the arid and semi-arid climatic conditions have increased water demand in Israel which will increasingly be exacerbated by climate change in the future. The most recent statistics from FAO AQUASTAT estimate the average total renewable water resources at 1.78 billion of m^3 for the 2013-17 period[37] that is inequitably distributed across the country (winter rainfall occurs mainly in the north) with a total withdrawal of 1.95 billion of m^3 with the deficit between total renewable water resources extracted and water use being covered through desalination (expected to reach 600 million m^3 by 2020 and to account for about 50% of water needs) and treated waste water reuse (75% of 500 million m^3 treated to secondary or tertiary levels in 2015). Yet, through water conservation, desalination and reuse, Israel has been able not only to adapt to droughts but also to periods of water scarcity. Moreover, Israel is a leading country in terms of reusing treated wastewater (which is predominantly used for agricultural irrigation and industries), and of reclaiming flood flow.[38]

Agriculture accounts on average for 58% of total fresh water consumption, while its share in the total Gross Domestic Product (GDP) roughly exceeded 1.2% in 2017. Conversely, the average industrial value-added is 19% against 7% of water use and the services and domestic sector accounts for 70% of the value-added while not exceeding on average 35% of the total use in 2017.

6.1 WATER AND WASTE WATER SECTOR UTILITIES, PPP AND SERVICE LEVELS

6.1.1 Utilities' Services

Poor management, low maintenance of the local water and sewer networks by municipalities pushed the government to introduce the Water and Sewage Corporates Law of 2001 which called for the establishment of municipal Water and Sewage Corporations (WSCs) that are regulated and supervised by the Water Authority[39] (WA). Out of the 185 local authorities that require services to be incorporated as WSCs, 149 has already incorporated water and wastewater services and are serving 6.8 million consumers:

- At the regional level, 26 WSCs are serving 120 local authorities such as Hagichon that serves the population of Jerusalem (more than 850,000).
- At the local level, 29 WSCs are serving single local authorities with about 50,000 inhabitants while 65 local authorities, i.e., municipalities, are still responsible for their water and sewage services.

[37] FAO AQUSAT website : <www.fao.org/nr/water/aquastat/data/query/index.html?lang=en>.
[38] Fluence website: <www.fluencecorp.com/israel-leads-world-in-water-recycling/>.
[39] WA website: <www.water.gov.il/>.

The corporations are owned by one or several municipalities but function as business entities (limited corporations) where:

- The sole function of the WSC is to manage the water and sewage system.
- The WSCs are responsible for increased efficiency and investments in infrastructures.
- Under tariffs regulation, water and sewage service costs are meant to reflect real market prices.
- The WSCs use their own revenues for maintenance and development of the municipal water and waste water system including treatment.

The private sector produces desalinated water that is supplied to Mekoret, WSCs and municipalities (see below).

There is also 1,000 local small water suppliers for the rural sector.

6.1.2 Public-Private Partnership

Israel has no specific PPP law but PPP procurement is relatively advanced. Israel has a successful track record of PPP projects developed across a number of sectors by various procuring authorities as many desalination stations were implemented over the years. The PPP unit is based at the Ministry of Finance.

PPP are sought to: (i) produce and supply water in the areas not covered by Mekorot, the National Water Company; and (ii) construct and operate desalination plants on BOT or BOO basis.

Since 1998, 11 desalination plants have been built or under PPP contracts while 7 additional ones are in the pipeline. The total investment in desalination from the private sector is $1.9 billion and the total investment value of these projects is estimated at $5 billion. This includes transportation, construction and water treatment.

Most large desalination stations are powered with natural gas and were built using BOT, BOO and DBO contracts, notably:

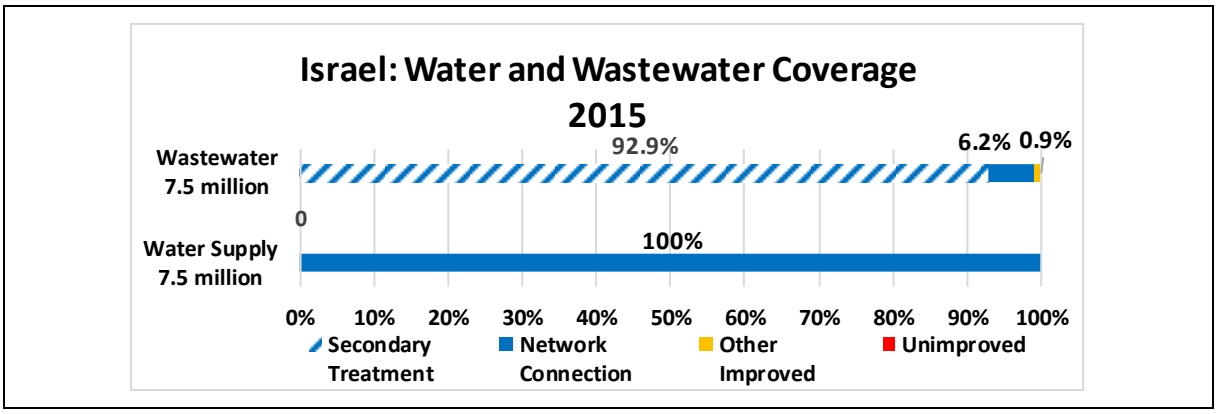
- Ashdod Desalination Station was tendered by Mekorot with a capacity of 320,000 m³/day in 2011 over a 25-year BOT.
- Ashkelon Desalination Station (Expansion) was tendered by Mekorot Veolia/IDE Technologies with a capacity of 62,000 m³/day in 2009 over a 20-year BOT.
- Hadera Desalination Station was tendered by IDE Technologies/Housing & Construction Holding Company with a capacity of 368,000 m³/day in 2007 over a 25-year BOT.
- Hadera Desalination Station (Expansion) was tendered by IDE Technologies/Housing & Construction Holding Company with a capacity of 88,000 m³/day in 2009 over a 24-year BOT.
- Kfar Masarik Desalination Station (Based on DBO) was tendered by Baran Group Ltd. with a capacity of 24,000 m³/day in 2011.
- Palmachim Desalination Station was tendered by Global Environmental Solutions/Tahal Group/Ocif Investment & Development/Middle East Pipes/Oceana Advanced Industries with a capacity of 82,190 m³/day in 2005 over a 25-year BOT.
- Palmachim Desalination Station (Expansion based on a BOO) was tendered by Global Environmental Solutions with a capacity of 150,000 m³/day in 2012 over 19 years.

- Soreq was tendered by IDE Technologies/Hutchison Water as a BOT with a capacity of 540,000 m³/day in 2011 over 25 years and is the country's largest.

6.1.3 Service Levels

Water and wastewater service typologies in 2015 are illustrated in Figure 6.1. Access to clean water (100% of the population) and improved sanitation (100% of the population) is universal in 2015 according to WHO-UNICEF Joint Monitoring Program (JMP).[40] Wastewater treatment is the highest in the Southern Mediterranean region with about 93% (Figure 6.1).

Figure 6-1: Israel Water and Waste Water Coverage



Source: Author based on JMP 2017.

6.2 WATER AND WASTE WATER SECTOR ORGANISATION AND OWNERSHIP

Israel has 4 water laws that govern all aspects of water use and reuse with the most important one being the Water Law No. 5719 of 1959 which considers water a national resource owned by the people and held in trust by the Government for the benefit of the people. Water resources include: springs, streams, rivers, lakes, reservoirs, either surface or ground water, natural or artificial, standing or flowing, including drainage water and sewage.

Israel has a very centralised water resources, water and waste water services management system where the Ministry of Energy and Water Resources (MEWR),[41] which is responsible for the supply of energy and management of natural resources, is the overarching institution at the national level in charge of the water sector at large.

At the national level:

- The MEWR oversees:

[40] WHO-UNICEF Joint Monitoring Program. WASH database: <https://washdata.org/data>.
[41] MEWR website: <www.energy-sea.gov.il>.

- The WA which is the government's executive branch in charge of water economy. It is responsible for the administration, operations and development (including preservation and restoration) of water resources, the development of new water resources, and oversight of water consumers and producers. Hence, this one-stop-shop plans, manages, develops, supplies, preserves and regulates. In fact, the government opted for a simple and transparent regulatory system that enables the development and operations of the water sector backed by a complex tariff system (see below). In certain cases, WA operates at the regional level. WSCs are regulated by the Office in charge for regulation that focuses on 3 main areas: (i) engineering, development and rehabilitation programs; (ii) financial, accounting and water bill charging; and (iii) customer service, society relationships, administration and human resources.
- The Water Authority Council (WAC) is responsible for the timely authorization of all decision-making and policy-setting made by the WA and associated ministries, namely the MEWR, the Ministry of Finance (MOF), Ministry of Interior (MOI), Ministry of Environmental Protection (MOEP) and Ministry of Health (MOH). The Council comprises 1 representative from each of the said ministries, 1 representative from the WA as well as 2 public interest group representatives. The WAC works together with the WA to regulate water resources and to provide short to long-term water requirements.
- Mekorot, a national water company created in 1937 is under the purview of both the MEWR and the MOF. Mekorot provides bulk water at the regional and local level to 4,800 water intermediaries by supplying 80% of drinking water needs and 70% of the country WSCs, municipalities, regional associations, agricultural settlements and industrial consumers. Also, Mekorot manages the National Water Carrier (NWC) which is a system of pipes, canals and a combined storage capacity of about 2 billion m^3 that mainly carries water from the Sea of Galilee (the main storage body), water reservoirs (with the Coastal Aquifer being the second main water storage facilities) and waste water reservoirs (Zalmon being the main one), and delivers water to most areas in the country and neighbouring countries. Hence, Mekorot provides water annually to its neighbours amounting to: (i) about 58 million m^3 to Palestine in 2013 of which 54 million m^3 to the West Bank and 4 million m^3 to Gaza Strip; and (ii) about 53 million m^3 to Jordan in 2013. In addition to the water and treated waste water transfer system, Mekorot operates 8 waste water treatment plants (WWTPs) (and the Dan Regional WWTP being the largest) that treats 40% of waste water, operates 34 brackish water and seawater desalination stations and induces rainfall through cloud seeding in the northern part of the country that is believed to increase rainfall by 10 to 15%.[42] Also, Mekorot buys water from PPP desalination stations. Conversely, Mekorot has two subsidiaries: (i) Mekorot Development and Enterprise which provides advisory and design services notably to municipalities and foreign utilities; and (ii) EMS Mekorot Projects which provides contracting services for notably water, waste water, desalination and water transfer.[43]

[42] Water Fanack website: <https://water.fanack.com>
[43] Mekorot website: <www.mekorot.co.il>.

- The MOF's Government Companies Authority[44] was established and operates in accordance with the Government Companies Law No. 5735 of 1975. The Authority is an auxiliary unit of the MOF and serves as the government headquarters for government companies that are undergoing either privatisation supervision or structural changes such as Mekorot.
- The MOI administered municipalities supplying water and waste water but this responsibility is gradually being passed on to the WA during the transition from the municipality to the WSC of the responsibility of providing water and waste water services.
- The MOEP[45] is responsible of the protection of natural resources and therefore water bodies, the protection and rehabilitation of ecosystems, prevention of public exposure to environmental risks, and the promotion of sustainable growth and development.
- The MOH[46] is responsible for drinking water quality assurance so that the public receives water that is safe for drinking by means of sanitary supervision of the water sources, of treatment facilities and of the supply systems of the various water suppliers. The necessary standards for sanitary quality assurance of drinking water are being continually updated, with the development of research and knowledge regarding the health effects of various components found in drinking water. Most standards formalized in drinking water quality regulations have changed over time in all countries of the world as the result of the invention of more accurate measurement methods and the discovery of hitherto unknown health effects.

At the regional level, Mekorot operates waste water treatment plants while WSCs provide water services to several local authorities (see above). WA could also operate as a regional water authority in certain cases.

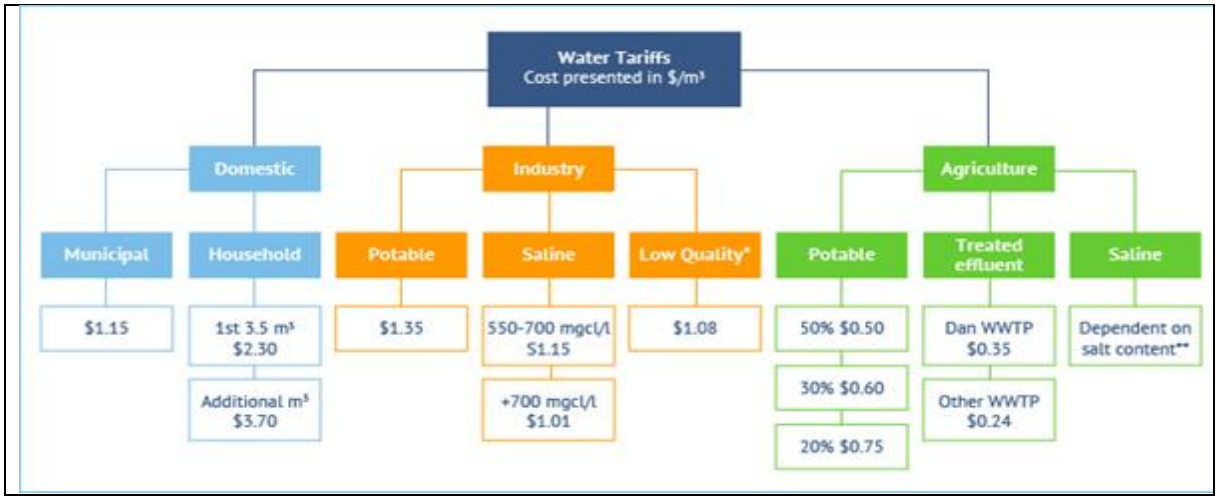
At the local level, there are three stakeholders responsible for water and wastewater services: WSCs, municipalities and small providers supplying rural areas (see above).

6.3 BASIS FOR WATER AND WASTE WATER PRICING AND TARIFF SETTING

Mekorot bulk water tariffs are set by the MEWR and MOF, approved by the Parliament's Financial Committee, and updated based on inflation, electricity rates and the average wage index. The rates are categorized by the different uses: domestic, consumption and services, industry and agriculture. Water tariffs for domestic, industrial and agricultural use include variation in tariff based on the quality of the water supplied; potable, saline, and treated waste water. It also allows to increase some elements during scarcity and drought periods. Figure 6.2 illustrates sectorial tariff setting net of VAT.

[44] Government Companies Authority website: <https://mof.gov.il/gca>.
[45] MOI website: <www.sviva.gov.il>.
[46] MOH website: <www.health.gov.il>.

Figure 6-2: Sectorial Water and Wastewater Tariffs in US$ per m^3 in 2012

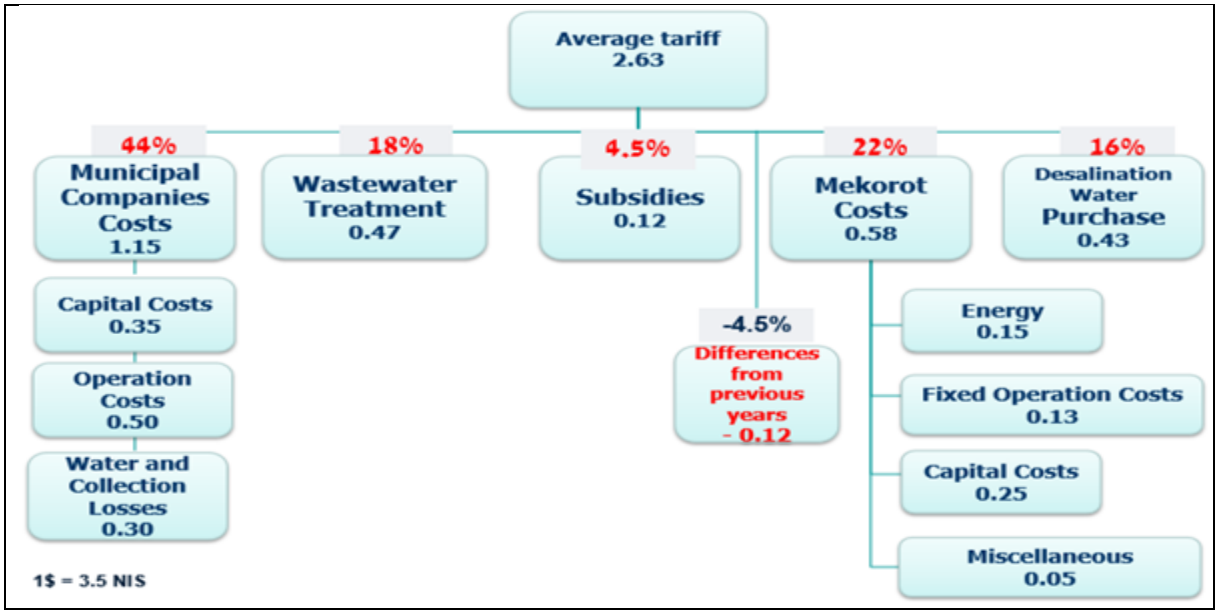


Source: WA website: <www.water.gov.il/>.

Water and waste water tariffs are set by the WA in conjunction with the WAC. Tariffs are based on progressive pricing, encourage conservation and foster cost recovery. The combined water and waste water tariffs have a variable element with 2 blocks. A 17% VAT is added to the tariff.

Still, the basis for setting tariffs is complex and allows for flexibility in terms of desalinated water and wastewater reuse quality. The average tariff is US$ 2.63 per m^3 net of VAT and US$ 3.08 per m^3 including VAT in 2015. The various elements and weight considered in setting the water and waste water tariffs are illustrated in Figure 6.3.

Figure 6-3: Water and Wastewater Elements in Setting Tariffs in US$ per m^3 in 2015



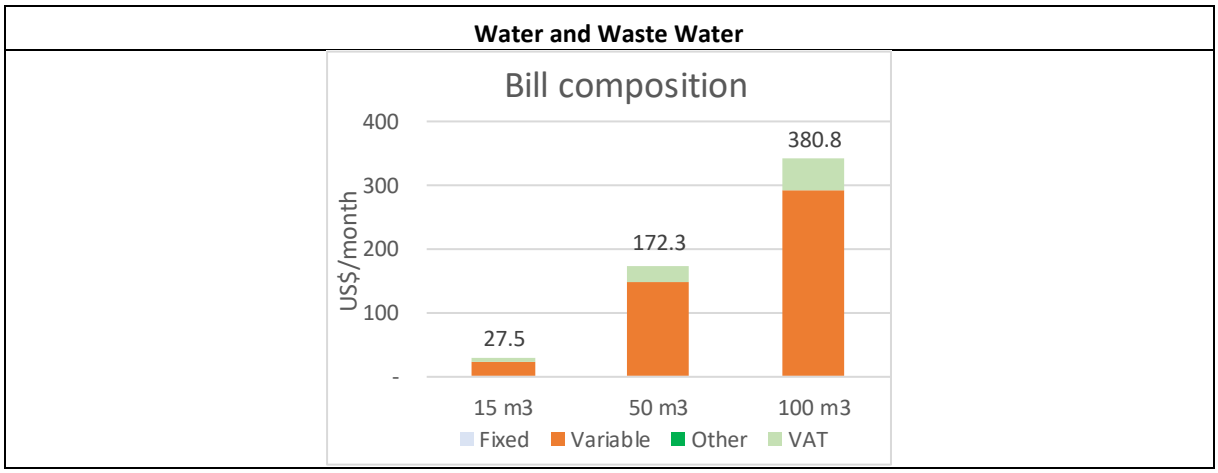
Source: WA website: <www.water.gov.il/>.

For instance, Tel Aviv's two-block combined water and wastewater tariff in 2018 is as follows:

- 1st block up to 14 m^3 per day: (IS/m^3) 5.88.
- 2nd block more than 14 per day: (IS/m^3) 11.07.

As an example, the hypothetical households living in Tel Aviv tariff and consuming 15 m^3, 50 m^3 or 100 m^3 per month in 2018 amounts to a combined water and sanitation bill of US$ 27.5, 172.3 and 380.8 respectively (Figure 6.4). The equivalent tariff per m^3 is as follows (US$/$m^3$): 1.8, 3.4 and 3.4 respectively.

Figure 6-4: Water and Waste Water Bill per Month as Collected in Tel Aviv in 2018



Source: Author based on above cited Tariffs.

The 1st tranche of the tariff is meant to be affordable by lower income households but is relatively high when compared to the other Southern Mediterranean countries. The rates do not quite cover the operational costs for water and waste water, as subsidy is still provided by the government. However the 2050 Water Sector Master Plan aims to ensure not only the recovery of operations and maintenance but also capital expenditures. Yet, the level of sewerage treatment and the efforts to maintain environmental flows tend to improve the ecosystem services' sustainability. Finally, the availability of water per capita and waste water services has a positive effect on the well-being of the population.

6.4 WATER AND WASTE WATER SECTOR UTILITIES REMUNERATION MODELS

6.4.1 Utilities' Status

Mekorot is a public company owned by the government that supplies water to all sectors: domestic, industrial and agriculture. Mekorot owns all the utility assets that are under its jurisdiction except BOT (till they are transferred) and BOO desalination stations that are run by private companies.

Fifty five WSCs provide services to 120 municipalities and are responsible for the assets' upkeep and improvements. Sixty five municipalities are still responsible for water and wastewater services, and own their own assets and are responsible for its upkeep.

6.4.2 Utilities' OMEX Financing

The full recovery of the costs of supplying water is an established policy principle (even if not yet a reality) including for the agricultural sector. The principle of covering all costs is also sought that should eventually cover the infrastructure capital cost needed for water supply and encourages water conservation. Moreover, OMEX is trying to be recouped by abiding by fairness or uniformity principle where all users of water in a given sector pay the same price, regardless of their location. Also, water scarcity and flexibility of prices for water that appropriately reflect this scarcity have provided a stimulus for innovation in water technologies and the emergence of an internationally competitive sector.

There are 3 issues that are already being addressed for the recovery of operation cost, although government subsidies are still needed until WSCs can offset their small deficits:

- **Cost recovery** (tariff collection) is higher in most WSCs than the municipalities which are still providing water.
- **Unaccounted for water (UfW)** technical losses amount to 9 to 10% of total water production which is almost the same as the 10% utility benchmark for an effective distribution network (as considered by the US American Water Work Association).[47] However, not all WSCs are within that range such as Yavne and Tuba-Zangariyye WSCs where UfW reached 16.9% and 25.1% respectively in 2013. Yet, most of the other WSCs made tremendous improvement on UfW to reach the 10% benchmark while UfW ranged between 5.9% (only one under 10%) and 33.3% when water and waste water services were still under municipal management before the introduction of WSCs. Presently, there are no figures for water and waste water services that are still managed by municipalities.
- **Tariffs** are volumetric for domestic and municipal use and structured to be adjusted for industrial and agricultural use based on the quality of brakish desalinated water and treated waste water (Figure 6.2) are used, and when the country is going through a drought or scarcity. Although water in considered a public good or technically a common good, some social and environmental advocates see that the transformation of water into a commodity is in contradiction with the legal denomination of water resources under the Water Law 5719 of 1959. Still, tariff variability allows the water market to arbitrate water distribution and use across the sectors as economic actors will use water optimally. This encourage users to adapt their consumption to their needs.

6.4.3 Utilities' CAPEX Financing

Mekorot is funded by budgetary appropriations as well as by its own resources to implement its Five Year Plan. Yet, the last Financial Summary that is available on Mekorot website is from 2008 which makes it difficult to analyse the current financial viability of the company. Still, Mekorot is increasingly using PPP contracts in terms of BOT and BOO to fund the needed water and waste water infrastructure. The water payment for these BOT and BOO desalination stations has a fixed element to ensure a return on capital investment regardless of the actual water consumed and a variable element that depends on

[47] American Water Works Association website: <www.awwa.org>.

the station's water delivered as well as the performance in terms of efficiency and water quality produced.[48]

Conversely, there is little public information on the financial performance of the WSCs and municipalities still providing water and waste water services although the government policies give the financial leverage for the WSCs to be responsible for future investments which will also open up PPP potential. Government policies also promote better assets' management, energy optimization, openness for technology, assimilation of new approaches and merging of small WSCs.

6.4.4 Future Investment Needs

The 2050 Water Sector Master Plan of 2012 is ambitious as it aims to increase the integration of the water system and decoupling it from the Palestinian water system. All the principles put in place in the 2000s such as integrating the water system by better linking water resources, desalination, water reuse, runoff and drainage capture to cover the future water needs while consolidating WSCs to increase their efficiency are being maintained to reaching the 2050 targets. The categories considered are illustrated in Table 6.1 with a total budget amounting to US$ 38.4 billion over the 2020-2050 period or a yearly average of US$ 1.3 billion. The plan, which includes the Red Sea-Dead Sea Conveyance project, will be easily funded as financial markets are pretty sophisticated in the country and the water sector will attract local and foreign private and institutional investors and even International Financial Institutions such as EIB and EBRD.

Table 6-5: 2050 Water Sector Master Plan Budget

Category	2020-2050	Annual
	US$ million	US$ million
Water savings	465.7	15.5
Desalination of seawater	2,371.30	79
Desalination of saline groundwater	-	-
Supply of water and developing the national system	7,057.90	235.3
Urban water and sewage corporations	7,997.30	266.6
Sewage activities by local authorities not connected to regional networks	2,232.90	74.4
Building and upgrading sewage treatment plants	2,837.00	94.6
Urban sewage corporations (Tel Aviv, Jerusalem, Haifa)	2,254.20	75.1
Reclamation of treated waste water	1,950.80	65
Water quality	1,375.90	45.9
Runoff and drainage management	3,294.70	109.8
Rehabilitation of streams	399.2	13.3
Advancing the water industry	133.1	4.4
Research and development	699.9	23.3
Unforeseen	5,370.60	179
Total	**38,440.50**	**1,281.30**

Source: WA website: <www.water.gov.il/>.

[48] Mekorot website: <www.mekorot.co.il>.

6.5 WATER DISTRIBUTION: HOW IS IT REGULATED?

Regarding the Jordan River, under the 1954 Main Plan proposed by US Ambassador Eric Johnston, the Jordan River and its tributaries water sharing is based on the authoritative but never ratified Johnston Plan between Lebanon, Syria, Israel, and Jordan including the West Bank.[49] Under this unofficial arrangement, the West Bank, which was part of Jordan at the time, was entitled to 100 million m^3 annually. Currently, neither Jordan nor the West Bank does extract any water from the Jordan River and Jordan and Israel reached an agreement on the sharing of water resources in 1994 through their Peace Treaty. Lebanon extraction does not exceed 10 million m^3 annually while Israel is the largest user with extractions ranging from 580 and 640 million m^3 depending on the yearly availability of water. Conversely, Israel provides water to Jordan (53 million m^3 in 2013) and Palestine (58 million m^3 in 2013).

Regarding the Palestinian Authority and Israel, the 1995 Oslo II Interim Accord temporarily allocated water resources to the Israeli government and the Palestinian Authority. Oslo II granted Israel control over approximately 80% of the water reserves in the West Bank for an initial 5-year period. The agreement, which is in effect till this day, did not account for long term changes in water distribution. The Palestinian Authority is pumping and getting from springs about 100 million m^3 per year on average while this status quo is giving Israel a free hand to supply water from the West Bank Northern and Southern aquifers to illegal settlements in the West Bank.

More specifically, regarding the Ashkelon-Gaza-Sinai Aquifer, there are no formal or informal agreements for water rights and the optimisation of use or protection of the aquifer. Political constraints currently make riparian cooperation over water resources in the Coastal Aquifer Basin unlikely, particularly between Israel and Palestine. Most of the abstraction in the basin originates from Israel (around 66% of total abstraction), while the Gaza Strip is responsible for 23% and Egypt has the lowest abstraction at about 11%.

At the national level, the Water Law No. 5719 of 1959 stipulates that every person is entitled to use water, as long as that use does not cause the salination or depletion of the water resource. Surface and ground water is considered a public good in Israel and therefore only the public sector is in charge of its management.

Increased competition between different water uses (agricultural, domestic and industrial waters) and the interactions between water-energy-food nexus have prompted the government to move from a sectorial policy to an integrated water policy since the 2000s, to introduce water market prices where the market is used as a clearing house to arbitrate the distribution among users (agricultural and industrial) and where the price factors in both the water quality and water scarcity. Moreover, agriculture and industries are already mainly supplied by reused treated waste water and saline (mainly brackish) water. Hence, there is already an ongoing policy of separating the distribution of water resources by use type.

In theory and based on the above review of the sector regulation, the water distribution system is well and centrally regulated:

[49] Wilby, Robert. 2010. *Climate Change Projections and Downscaling for Jordan, Lebanon and Syria.* Synthesis Report prepared for the World Bank.

- at the central level, WA and WAC define policies and regulate the water sector; Mekorot manages water resources and has developed an integrated dual water resource distribution system that is fed by renewable resources, desalinated water and treated waste water;
- at the regional and local levels, Mekorot also distributes water for domestic, agricultural and industrial uses that are arbitrated by market prices.

Box 6-1: 2050 Water Sector Master Plan

The overarching objective of the 2050 Water Sector Master Plan is to ensure the supply of water, provision of sewage services and the management of services, reusing treated wastewater and the management of drainage and runoff water – –with appropriate quality, quantity, reliability, and in an economically viable manner , for the sustainable benefit of all consumers.
The policies that will be pursued include:

- The establishment of a 'National Planning Council.
- The establishment of a national infrastructure coordination committee (water, gas, transportation, electricity).
- Reinforcement and structural change of the Water Authority, to enable it to carry out its role of being a regulator.
- Central issues which necessitate structural arrangement:
  - Urban water systems
  - Administering sewage water and treated wastewater systems
  - Administering runoff and drainage water
- A national program to assess the shortage of manpower in the various areas of the national water sector, and preparation of a program for manpower development.

Source: WA website: <www.water.gov.il/Hebrew/ProfessionalInfoAndData/2012/09-Israel-Water-Sector-Master-Plan-2050.pdf>.

The 2050 Water Sector Master Plan (Box 6.1) underscores the need to strengthen the arbitration of water needs and therefore distribution through the market with even higher water prices so that domestic consumption can be maintained constant over the next decades. To this end, the Plan aims to better regulate the water sector by considering the following stance:[50]

- National resources will be administered based on full cost recovery;
- The aim is to minimize costs and to charge water tariffs that are as reasonable as possible;
- Production levies and taxes should be allocated for developing the national water system;
- Efforts should be made to minimize cross-subsidization between the various sectors when fixing water tariffs;
- The planning of the WA's development program will be funded by water tariffs; and
- Mechanisms will be established to provide appropriate service to the public while ensuring balance between public and private interests.

[50] Source: WA website: <www.water.gov.il/>.

7 JORDAN

Jordan is a water scarce country and has 2 rivers (Jordan and Yarmouk rivers) shared with 2 neighbours with unequitable water sharing, while precipitation (rainfall volumes and rain evaporation are increasingly deviating from long term averages in 4 out of 6 years over the last decades) is already being affected by climate change and fossil water is already being tapped to supply the Capital. The most recent statistics from FAO AQUASTAT estimate the average total water resources at 0.937 billion m^3 for the 2013-17 period that is inequitably distributed across the country with a total withdrawal of 1.104 billion of m^3 broken down as follows: 52% for agricultural use; 44% for domestic use; and 3% for industrial use. The deficit is covered by water desalination but it was reduced since 2013 by the Disi Water Conveyance Project from the non-renewable Disi fossil aquifer to the capital Amman, which increases available resources by about 12%. Moreover, the water extracted and desalinated from the forthcoming Red Sea-Dead Sea canal will also increase Jordan water supply. Finally, the influx of more than 600,000 displaced Syrians since 2011 had put more strain on water resources especially in the north of the country where most of the formal and informal settlements occurred.

7.1 WATER AND WASTE WATER SECTOR UTILITIES, PPP AND SERVICE LEVELS

7.1.1 Utilities' Services

The Water Authority of Jordan (WAJ) is the only public service operator that covers 4 governorates while 3 subsidiaries cover the remaining governorates to improve water and waste water services' efficiency. WAJ was established as an autonomous corporate body with financial and administrative independence. As of today, the WAJ cumulates policy, regulatory and service provision functions, and is the asset owner for water systems.

WAJ directly manages water and waste water services in 4 governorates: Balqa, Al Karak, Maan and Al Tafila while 3 limited liability companies with full or majority powers and owned by WAJ cover the remaining governorates:

- The Aqaba Water Company (AWC) was established in 2004 as an autonomous public water company under the Companies Law of Jordan (1997). The AWC is in charge of water supply and sewerage services in the Aqaba governorate where WAJ holds 85% of the shares of the AWC and the Aqaba Special Economic Zone Authority (ASEZA) holds the remaining 15%. Commercialisation helped streamline cumbersome bureaucratic processes (e.g., for procurement); provided incentives for staff and management; decentralized technical and financial planning; strengthened customer orientation; and reduced long response times; with the result that Aqaba has lower non-revenue water and provides continuous water service through new and upgraded systems thanks notably to a USAID program.

- Fully owned by the WAJ, the Jordan Water Company (JWC) also known as Miyahuna was established in 2007 as a limited liability company under the Company Law of Jordan and has a MC for the Amman Governorate and provides equally water and waste water services for more than 2.6 million people. WAJ granted Miyahuna the right to manage water services in Amman with full ownership of operating revenues and of the resources generated from a 3% sewage tax. Miyahuna thus became responsible for the complete management of operations, maintenance, and investments related to the provision of water and sewage services in Amman.[51]
- the Northern Governorates Water Authority comprising the governorates of Mafraq, Jerash, Ajloun and Irbid was created in 2001. After a short MC experience, Yarmouk Water Company[52] (YWC) was brought back under WAJ management and provides more than 1.65 million people water and waste water services but with only about 40,000 inhabitants benefiting from a sewer system.

7.1.2 Public-Private Partnership

The Ministry of Finance (MOF) is responsible for the budget process, accounting of public debt, guarantees and liabilities and contains a PPP Unit (PPPU) for advisory services. The PPPU (PPPU) was established under the 2014 Public-Private Partnership Law and is supervised by the Public-Private Partnership Council, which was established under the same 2014 law and serves as the higher regulatory authority. The council is chaired by the Prime Minister and includes the Minister of Finance; the Minister of Industry, Trade and Supplies; Minister of Planning and International Cooperation (MOPIC); another minister named by the Prime Minister; the Governor of the Central Bank of Jordan; and the PPPU Director. PPPU seeks to organize and evaluate the participation of the private sector in the implementation of public projects effectively and efficiently and in accordance with the best international practices. PPPU: identifies technical requirements, standards and periodic reporting; review application, studies and submit them to the council; regulate standards and draft laws and regulation as needed; support contracting authorities in terms of technical assistance, obtain licenses, set periodic performance evaluation; and monitor all relevant documents that are maintained in a database.[53]

Although Jordan has a successful ongoing BOT and concession contracts with foreign operators for large transfer schemes, desalination stations and WWTPs, however, water and waste water services were consolidated under 3 autonomous water public companies where only two contracts were awarded to international operators that were not renewed:

- Amman. Back in 1999, WAJ agreed to a four-year performance-based MC for the Greater Amman Area with the French/Jordanian consortium of Suez Lyonnaise des Eaux/Arabtech Jardaneh and Montgomery Watson, for a total fee of US$ 8.8 million plus 5% of any profit in excess of anticipated annual profits. The Amman water MC was not renewed in 2007.

[51] PAPIAF website: <www.papiaf.org>.
[52] YWC website is not active: <yw.com.jo/>.
[53] PPPU website: <www.pppu.gov.jo/en-us/The-PPPU>.

- Yarmouk water and waste water services were incorporated into the YWC and were fully owned by WAJ in 2010. Veolia won the MC (available online in its draft form)[54] in 2011 that was terminated in 2012 based on mutual agreement due to compounding operational problems probably exacerbated by the influx of displaced Syrians to Northern Jordan that has started in 2011. The agreement was a Performance based-Contract (PBC) that involved management, maintenance and operations.

A PBC for Non-Revenue Water, i.e., commercial losses in the Madaba governorate was awarded to a local private firm. Finally, Jordan successfully structured BOT deals. Selected major projects involving private sector participation in BOT:

- As Samra WWTP over 25 years won by Suez/Morganti Group for 276,000 m^3/day in 2002;
- Al Kraymeh Desalination Station over 15 years won by Aquatreat Group for 2,400 m^3/day in 2007;
- Al Karameh Dam over 15 years won by Aquatreat Group for 11,800 m^3/day in 2008.
- Disi-Amman for bulk water services over 25 years won by Suez for 274,000 m^3/day in 2011; and
- As Samra WWTP over 25 years won by Suez/Morganti Group for 98,000 m^3/day in 2012 (Box 7.1).

Box 7-1: Structure of Jordan's As Samra BOT Contract

The Millennium Challenge Corporation funded US$ 93 million of the US$ 230 million cost of the As-Samra expansion project, with the Government of Jordan contributing US$ 20 million of the cost and private debt and equity sources handling the remaining US$ 110 million.

The Ministry of Water and Irrigation (MWI) signed a 25 year concession with the Samra WWTP Company Limited, a private company whose investors include Morganti, an American affiliate of the Consolidated Contractors Group, Infilco Degremont, an American company, and Suez Environment. The Arab Bank arranged a syndicate of nine local and IFIs to provide a loan with a term of up to 20 years.

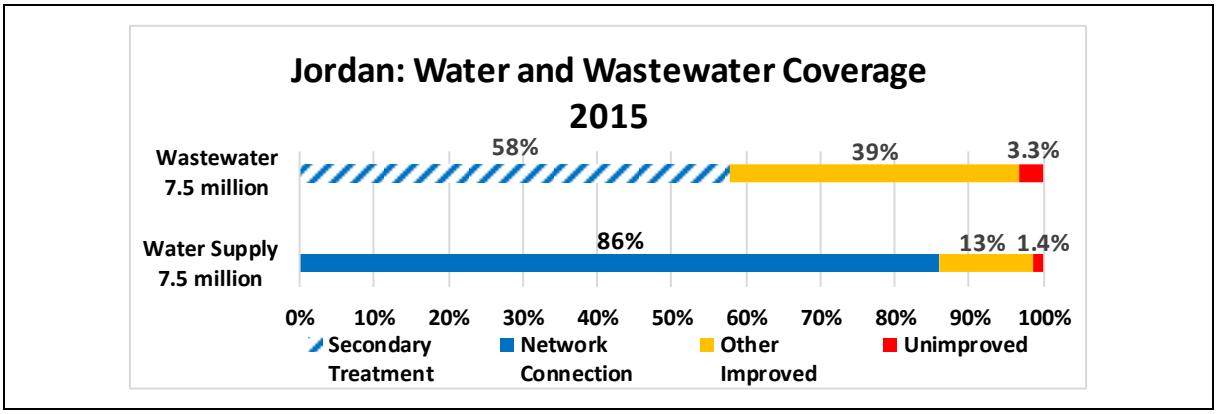
Source: MCC website: <https://assets.mcc.gov/content/uploads/2017/05/action-2012-002-1136-01-first-major-build-operate-transfer-project.pdf>.

7.1.3 Service Levels

Water and waste water coverage service typologies are illustrated in Figure 7.1. Population having limited access to clean water and sanitation reached 1.4% and 3.3% of the total population respectively in 2015. Water coverage seems contained whereas sanitation coverage remains an issue, especially in rural areas based on the data provided by WHO-UNICEF Joint Monitoring Program (JMP).[55] Jordan is one of the few countries in the region where the volume of waste water treated to secondary level comes entirely from the sewer.

[54] YWC and Veolia draft contract: <www.waj.gov.jo/sites/ar-jo/Documents/Yarmouk%20MC%20Prat%201.pdf>.
[55] WHO-UNICEF Joint Monitoring Program. WASH database: <https://washdata.org/data>.

Figure 7-1: Jordan Water and Waste Water Coverage



Source: Author based on JMP 2017.

7.2 WATER AND WASTE WATER SECTOR ORGANISATION AND OWNERSHIP

The water sector is under 2 consultative bodies: the Royal Water Commission (RWC), which develops and updates the National Water Strategy (current 2016-25) since 2008; and the National Water Advisory Council (NWAC) created in 2012, which is a high-level, inter-ministerial entity chaired by the Minister of Water and Irrigation (MWI) including ten ministries and secretary-generals and five members from the private sector and civil society. Yet, the day to day inter-ministerial coordination is assumed by the Ministry of Water and Irrigation (MWI).

There are 6 stakeholders involved in the water sector, e.g., the MWI including its two subsidiary organisations; the Water Authority of Jordan (WAJ) and the Jordan Valley Authority (JVA), the MOPIC for financing, the MOF for PPP, the Ministry of Health (MOH) for drinking water standards, the Ministry of Environment (MOE) for waste water standards:

- The MWI was established in 1992 and is responsible for formulating strategies (strategic planning of water and waste water services projects), policies and plans for the water sector in collaboration with its subsidiary organisations; WAJ, and JVA and the 3 water companies managing the water and waste water services in Jordan. With the help of Public-Private Infrastructure Advisory Facility (PPIAF), MWI supported since the late 1990s increased private sector participation to improve management, efficiency, and operation of water supply and distribution.
    - A Project Management Unit (PMU) was established within the WAJ in 1996 in the context of the implementation of the Amman MC. The PMU, which could become the future regulatory institution as considered in the 2016-55 Vision, has various functions related to the regulation of water supply and waste water utilities, the promotion of private sector participation in the water sector, and project planning and execution. It determines with WAJ the overall financing and revenue models for water and waste

water services and gauge stakeholders' engagement on the objectives and modalities of private sector participation in water and waste water services (see previous section).

- WAJ was established in 1983 as an autonomous, centralized corporate body with financial and administrative independence. It is responsible for public water supply and waste water services, as well as for water resources planning and monitoring, construction, operations and maintenance. WAJ directly manages development and services in 4 governorates, and created and owns 3 public utilities which are managed on a commercial basis:
  - ✓ 4 governorates.
  - ✓ Miyahuna covering the Amman Governorate.
  - ✓ AWC covering the Aqaba Governorate
  - ✓ YWC covering the Mafraq, Jerash, Ajloun and Irbid governorates

- The MOPIC is responsible for coordinating the overall development of Jordan and the country's investment plan. It plays an important role as the main facilitator between the donor community and the investment plan.
- MOH defines and enforce drinking water standard quality in conjunction with WAJ.
- MOE defines and enforce quality standards for waste water treatment in conjunction with WAJ.
- JVA was created in 1973 and is responsible for the development and utilization of water resources in the Jordan Valley for irrigated farming, municipal, industrial and tourism purposes. The JVA is also responsible for the dams and reservoirs in the country. More specifically, JVA provides: agricultural units with water; maintenance of agricultural units' intakes; install irrigation systems to novel agricultural units; test samples of water, sand, plant, fertilizer; strengthen its adopted essential values, namely the established Water User's Association (WUA) in the Jordan Valley to manage and distribute irrigation water with a view to increase efficiency of using water and avoid illegal trespasses.

7.3 BASIS FOR WATER AND WASTE WATER PRICING AND TARIFF SETTING

Tariff are set by WAJ's Board of Directors and the Council of Ministers (CM), based on the recommendations of the PMU. However, tariff changes also need the Parliament's approval. The water and waste water tariffs vary geographically and by distributor: authorities or operators. The water and waste water tariff has the same structure nationwide and includes a fixed element and a variable element: However, the fixed and variable elements vary by region, are different for water and waste water and vary by the customer's affiliation. A 16% value-added tax is also added to the total tariff. However, Jordan is the only country in this study that charges a higher tariff for non-residential customers.

The Water and Waste Water tariffs per month for the Governorates that are managed by companies are structured as follows in 2016:

- The **residential household Water tariff** includes a **Fixed Rate** to cover administrative costs which is cumbersome: there is a regressive rate of Jordanian Dinar (JD) 6.53 for consumption up to 18 m^3/quarter which reaches zero for consumption up to 72 m^3/quarter and then a progressive rate of JD 2 for water consumption 73 till 90 m^3 per quarter. The rate becomes again zero for consumption greater than 90 m^3 per quarter. The **variable rate** for households has 7 block tariffs per quarter and includes a social cost where only the fixed rate is paid, up to and including the consumption of 18 m^3 per quarter:
    - 1st tranche: ≤ 18 m^3: 0 JD/m^3
    - 2nd tranche: 19 < m^3 ≤ 36 m^3: 0.145 JD/m^3
    - 3nd tranche: 37 < m^3 ≤ 54 m^3: 0.5 JD/m^3
    - 4th tranche: 55 < m^3 ≤ 72 m^3: 0.935 JD/m^3
    - 5th tranche: 73 < m^3 ≤ 90 m^3: 1.15 JD/m^3
    - 6th tranche: 91 < m^3 ≤ 126 m^3: 1.61 JD/m^3
    - 7th tranche: > 126 m^3: 1.92 JD/m^3
- The **residential household Waste Water tariff** includes a **Fixed** Rate, which is also cumbersome, and a **variable** rate. The Waste Water variable rate for households has 7 block tariffs per quarter and the customer who only has a connection to the water network is exempt from paying the waste water tariff:
    - 1st tranche: ≤ 18 m^3: 0 JD/m^3
    - 2nd tranche: 19 < m^3 ≤ 36 m^3: 0.05 JD/m^3
    - 3nd tranche: 37 < m^3 ≤ 54 m^3: 0.29 JD/m^3
    - 4th tranche: 55 < m^3 ≤ 72 m^3: 0.57 JD/m^3
    - 5th tranche: 73 < m^3 ≤ 90 m^3: 0.08 JD/m^3
    - 6th tranche: 91 < m^3 ≤ 126 m^3: 0.93 JD/m^3
    - 7th tranche: > 126 m^3: 1.1 JD/m^3
- The **non-residential customers** have the following water and waste water tariff per quarter:
    - 1st tranche: 0 < m^3 ≤ 6 m^3: Fixed, 6 DJ; Variable, 1.3 DJ/m^3; and waste water. 0.805 DJ/m^3
    - 2nd tranche: ≥ 7 m^3: Fixed, 7.8 DJ; Variable, 1.3 DJ/m^3; and waste water, 0.8065 DJ/m^3

The **treated waste water reuse** has two variable rates although it was not possible to confirm if the 16% VAT is collected on top of the charge. Of the 151 million of m^3 treated waste water, 90% were reused in 2015.[56]

Treated waste water tariffs were set in 2009 and include:

- First variable element:
    - 0.01 JD/m^3 for irrigation purposes.
    - 0.05 JD/m^3 for industrial reuses including power generating and cooling.
    - free of charge for research and study purposes, under the condition that the water quantity does not exceed 200 m^3/day and a copy of the research results are to be submitted to WAJ.

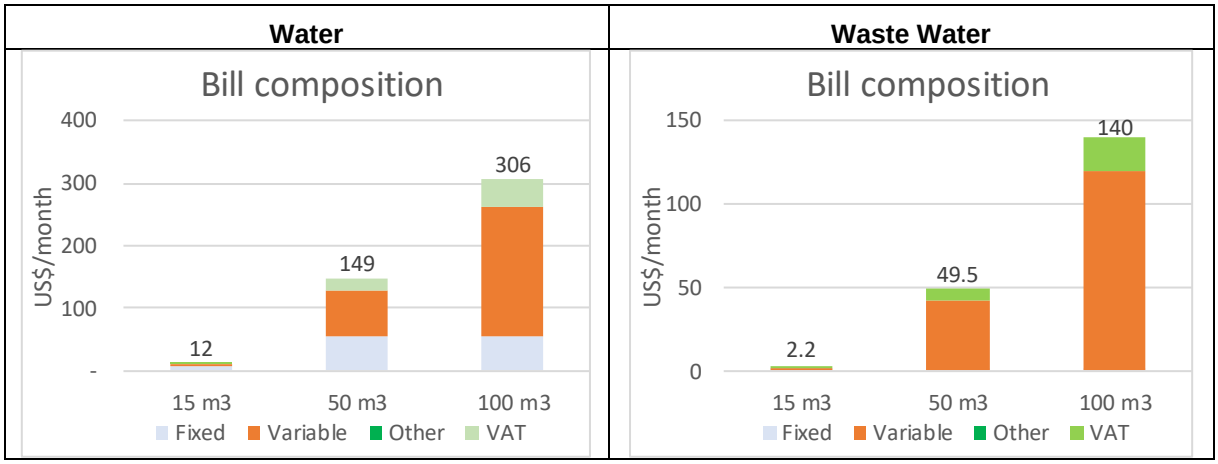
[56] MWI website: <www.mwi.gov.jo/sites/en-us/Hot%20Issues/Jordan%20Water%20Sector%20Facts%20and%20%20Figures%202015.pdf>.

- Second variable element:
  - Adding 0.01/m³ for the first element 3 categories as price of electricity.

As an example, a water and waste water tariff in Amman for hypothetical households consuming 15 m³, 50 m³ or 100 m³ per month in 2018 amounts to US$ 14.80, 198.3 and 445.2 respectively per month (Figure 7.2). The equivalent tariff per m³ is as follows (US$/m³): 0.93, 3.97 and 4.45 respectively.

The 1st tranche tariff seems difficultly affordable by lower income households. The 2016 rates are high enough to cover operational costs for water only which makes it difficult to ensure financial and environmental sustainability. If waste water treatment is below acceptable standards, it could induce environmental degradation whose economic cost would eventually be paid by society in terms of well-being, natural capital, productivity, tourism, etc.

Figure 7-2: Water and Waste Water Bill per Month in Amman in 2018



Source: Author based on Jordan Water Authority Tariffs.

7.4 WATER AND WASTE WATER SECTOR UTILITIES' REMUNERATION MODELS

7.4.1 Utilities' Status

WAJ is an autonomous corporate body with financial and administrative independence. WAJ owns all the assets under its jurisdiction except the assets under BOT contracts. WAJ is responsible for bulk water supply to municipal and industrial users (except in areas served by the JVA), and the development and operation of water supply and waste water systems.

WAJ is responsible for water and waste water development and operations in 4 governorates while it created fully or partially-owned 3 Water utilities as limited liability companies.

7.4.2 Utilities' OMEX Financing

WAJ and the 3 Water utilities water and waste water services in Jordan are financed by their own budgets. Tariffs and licenses are among the highest in the region and allow WAJ to cover most of its operating costs. Indeed, the WAJ 2016 actual budget for OMEX was balanced with DJ 98.7 million but grants represented a substantial share at 54% of revenues, tariffs 45.8% and licenses 0.3%.[57] A grant default in the future could bring WAJ accounts in the red. Therefore, WAJ and the 3 utilities must better tackle NRW (varying in 2014 between 28% to 73% in the different governorates)[58] by increasing the bills collection rate and reducing unaccounted for water including water leakage to an acceptable benchmark of 10%. This will help reduce the risk vis-à-vis a grant curtailment in the future.

7.4.3 Utilities' CAPEX Financing

WAJ is responsible for funding capital investments for its assets as well as the assets of the 3 utilities. In the late 2000s, WAJ was very creative in terms of financing its infrastructure (about JD 1 billion) where, beside receiving funds from the treasury (34%), grants from donors (27%), and foreign loans (3%), it issued WAJ bonds (36%) in local currency with a maturity of only 3 years that were government-guaranteed and with a yield ranging between 4% and 7% of interest. However, WAJ debt increased by 900% to JD 621 million in only five years[59] and WAJ had to be rescued from this financial burden where a package of grants and loans was provided by USAID, Germany and France.

WAJ is no longer issuing bonds as a financing mean and is more focusing on obtaining grants and loans from donors and attracting local and foreign investors in BOT contracts for conveyors, desalination stations, dams and WWTPs in total coordination with the Jordanian government, namely, the MOF (see above). WAJ actual capital budget including capital expenditures (JD 223 million or 43% of the capital budget) and domestic and foreign loan repayments was also balanced with JD 508.8 million in 2016.[60] However, the debt service is very high and necessitated an emergency loan of JD 68.8 million that was advanced by MOF.

The major financing for infrastructure is coming from the United States, the Gulf countries, Japan, Germany and the European Union, primarily through the European Investment Bank (EIB). Other donors are the United Nations (UN), the World Bank, the Islamic Development Bank, the Kuwait Fund for Arab Economic Development, the Saudi Fund for Development, the Abu Dhabi Fund, the Arab Fund for Economic and Social Development, Italy, France, Norway, South Korea, the Netherlands, Canada, Spain, Sweden, and China.

7.4.4 Future Investment Needs

According to the G20's Global Infrastructure Outlook, Jordan faces an important infrastructure financing gap over the next 20 years, assuming current trends. During this period, Jordan could provide up to US$

[57] WAJ Annual Report 2016.
[58] MWI website: <www.mwi.gov.jo/sites/en-us/Documents/Policies/Water%20Reallocation%20Policy.pdf>.
[59] Review of water policies in Jordan and recommendations for strategic priorities. USAID. April 2012.
[60] WAJ Annual Report 2016.

4 billion in financing, but requires US$ 5.8 billion to meet its needs, resulting in a US$ 1.8 billion water sector investment gap until 2040. For 2019 alone, the investments that could be provided amount to US$ 133 million against US$ 188 million that are required leaving a deficit of US$ 55 million or 29%.[61]

A new public investment management framework was adopted by the government in 2015 and should contribute to strengthening the design, assessment, prioritization and implementation of public investment and PPP projects. Relying on PPPs would help shift some capital expenditure away from the budget and accelerate projects by engaging the private sector.

7.5 WATER DISTRIBUTION: HOW IS IT REGULATED?

There are no water rights recognized internationally regarding the Jordan River riparian countries. However, under the 1954 Main Plan proposed by US Ambassador Eric Johnston, the Jordan River and its tributaries water sharing is based on the authoritative but never ratified Johnston Plan between Lebanon, Syria, Israel, and Jordan including the West Bank.[62] Under this unofficial arrangement, the West Bank, which was part of Jordan at the time, was entitled to 100 million m^3 annually. Currently, neither Jordan nor the West Bank extract any water from the Jordan River but they receive water from Israel: 53 and 58 million m^3 respectively per year. Lebanon extraction does not exceed 10 million m^3 annually while Israel is the larger user with extractions ranging from 580 and 640 million m^3 depending on the yearly availability of water. In terms of water governance, the Constitution of Jordan provides for equality before the law and equality of rights for all citizens without mentioning water rights *per se*.

Box 7-2: Water Strategy

The National Water Strategy builds on the vision that by 2025, Jordan Water sector will have: A resilient water sector; Access to safe, affordable and adequate water supply and sanitation for all Jordanians; Adequate waste water collection and treatment facilities for cities, small towns and major industries and mines are provided. Public health and the environment, in particular groundwater aquifers, are protected. Efficient and productive use of water including cost recovery; Responsible and efficient water management for all uses based on Integrated Water Resources Management (IWRM) principles including greater understanding and more effective management of groundwater and surface water; A skilled and sustainable water sector adapted to increased population and economic development; Innovative and efficient technologies, infrastructure and partnerships; A viable and targeted legal and regulatory framework; Well-resourced climate change adaptation plan; Well-resourced humanitarian WASH sector coordination system; and Sector alignment and synergy with relevant national priorities and development plans.

Source: JWA website: < www.mwi.gov.jo>.

However, water allocations per region and water use across sectors in terms of water rights are not explicitly cited in the water strategy (Box 7.2) but explicitly cited in MWI's 2016 policy document: water projections are based on water needs rather than water demand and starting 2025, water allocation for a nuclear power plant and oil shale was envisaged at the time of preparation of the strategy. Still, the priority for water use among competing sectors was set for the municipal sector, followed by (in the order of priority) the energy, tourism, industrial and agricultural sectors as the latter will benefit from the

[61] G20 website: <https://outlook.gihub.org>.
[62] Wilby, Robert. 2010. *Climate Change Projections and Downscaling for Jordan, Lebanon and Syria.* Synthesis Report prepared for the World Bank.

increasing treated waste water reuse availability.[63] Increased competition between different water uses (agricultural, domestic and industrial waters) and the interactions between water-energy-food nexus have prompted the government to move from a sectorial policy to an integrated water policy as there was a need to arbitrate the distribution between users (agricultural, domestic and industrial) which also raised the issue of water governance in the context of scarcity and competition.

In theory, the MWI is responsible for all of Jordan's centralized water and waste water systems, as well as for forming national water policy. All ministries should operate under the MWI's Water Strategy as a comprehensive attempt to balance water demand and supply. Moreover, the water distribution system is well regulated:

- at the central level, MWI coordinates planning and policy formulation with the central, regional and local bodies but WAJ provides 98% of the population with water from the centralized system, and handles 65 % of the country's waste water network;
- at the regional level, the 3 regional utilities receive bulk water from WAJ; and
- at the local level, the 3 regional Water companies supply water to the municipalities within their governorates, whereas WAJ supplies water to the other governorates' municipalities.

MWI officials are also responsible for enforcement of water quotas, an often perilous task that pits the prerogatives of the central government against the power of local tribes, whose influence allows them to tap groundwater with impunity.[64] Moreover, the displaced Syrians have dramatically altered the regional demand for water, where WAJ is no longer in full control of water resources and therefore distribution, especially in the northern area.

[63] MWI website: <www.mwi.gov.jo/sites/en-us/Documents/Policies/Water%20Reallocation%20Policy.pdf>.
[64] Denny, Elaine, Kristina Donnelly, Roland McKay, Geoffroy Ponte and Tetsuya Uetake. 2008. Sustainable Water Strategies for Jordan. University of Michigan. Ann Arbor.

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The 2010 Water Strategy calls for the integrated water resources that balances supply and demand by 2015. The political gridlock since 2011 has disrupted the implementation of the strategy that was exacerbated by the spill-overs and influx of more than 1.5 million displaced Syrians and Palestinians due to the conflict in Syria that have curtailed infrastructure and put additional strain on public services.

By 2018, the growing water supply gap during the dry season (May till September) became a pressing issue in the short to medium terms as the water deficit is growing over the 5-month critical period. As a result, household and industrial water deficit from public services is increasingly complemented by bottled water, wells (mainly illegal wells), and trucks with a parallel water bill representing 3 to 4 times the public service water bill.

The most recent statistics from FAO AQUASTAT estimate the average total renewable water resources at 4.5 billion of m^3 for the 2013-17 period that is inequitably distributed across the country with a total withdrawal of 1.31 billion of m^3 with the following breakdown: 60% for agricultural use; 29% for domestic use; and 11% for industrial use. Lebanon could suffer from chronic water shortages by as soon as 2020 and this gap will be exacerbated in the future with an increasing water demand due to demographic concentration and growth as well as climate change.

8.1 WATER AND WASTE WATER SECTOR UTILITIES, PPP AND SERVICE LEVELS

8.1.1 Utilities' Services

There are 5 utilities operating at the regional level over which the Ministry of Energy and Water (MOEW) exercises control, and works to enhance their performance. These 5 regional public institutions which work in the field of water, irrigation and waste water treatment, are the 4 Water Establishments (WEs) and the Litani River Authority (LRA):

- WEs are public institutions with an administrative and financial personality and autonomy that were established under Decree No. 221 of 2000. Each WE is governed by a Board consisting of six members and a president appointed by the Council of Ministers. The WEs operate according to their own bylaws and their accounts should be audited by an auditing firm. The WEs are subject to the supervision of the *Cour des Comptes*, which is the supreme body for auditing the use of public funds, and the Central Inspection Board, which makes sure that the public rules and regulations are abided with, but is not subject to the supervision of the Civil Service Council. The WEs are responsible for: (i) study, implementation, investment, maintenance, and renewal of water projects for the distribution of water and irrigation as well as collection, treatment and disposal of waste water in accordance with the general business plan for water and sanitation, or the prior approval of MOEW on the use of public water resources, the locations of water treatment plants and new outlets to discharge waste water; (ii) suggesting

tariffs for drinking water, waste water, industries and irrigation services taking into consideration the general social and economic conditions; and (iii) monitoring the quality of drinking and irrigation water at the connection level and waste water at the WWTP outfall. The WEs include:

- Beirut and Mount Lebanon Water Establishment[65] (BMLWE) is located in Beirut, supplies water to a population of 2.3 million (about 900,000 clients) to which should be added the foreign workers, the Palestinian refugees and the displaced Syrians, and has a bulk water deficit to supply regular drinking and irrigation water, whereas WWTP implementation is lagging behind in this geographical area except for few small WWTPs that were built in the mountains. Moreover, BMLWE is planning to build small Desalination Stations (one was constructed in Hadath in 2018 with a 5,000 m^3/day capacity (18.25 million m^3/year) with others in the pipeline) to bridge the water gap until both Beirut north conveyor is supplied with more water from Nahr Ibrahim watershed and Beirut south conveyor is operational. The latter will transfer water from Litani and Bisri watersheds.
- North Water Establishment[66] (NWE); located in Tripoli, is divided into 9 branches and supplies water to more than 110,000 households in the Northern region of Lebanon. NWE extract 170,000 m^3 daily from surface water and artesian wells.
- South Water Establishment[67] (SWE) is located in Tyre, is divided into 7 branches (Saida, Zahrani, Nabatieh, Tyre, Bint Jbeil, Jezzine and Marjayoun/Hasbayya) and provides water and sewage treatment services within the southern and Nabatiyah governorates supplying water to more than 170,000 households with a population of 800,000.
- The Bekaa Water Establishment (BWE)[68] is located in Zahleh, has 11 branches, and supplies water to an estimated population of 525,066 people (approximately 69% of the estimated total population within the service area), and to limited irrigation services in the areas of Yammouneh and Deir Al Ahmar. BWE is the weakest WE and is gradually taking over the management of irrigation, potable water and sewerage schemes except for the irrigation water in the Southern Bekaa and the South which is the LRA responsibility). Still, due to the technical, administrative and financial constraints, it is currently not able to fully undertake these tasks bestowed by the law. BWE is meant to have legal autonomy to select the most appropriate level of service delivery but it cannot yet operate on a commercial basis.
- In all 4 regions, few water services are still operated by water associations and municipalities but all these are gradually being brought under WE services since 2012 (Council of Ministers).

- Litani River Authority (LRA)[69] is a public institution with an administrative and financial personality and autonomy that was established in 1954 to develop the necessary domestic, irrigation and hydropower schemes for the Litani Basin, develop a national interconnected

[65] BML WE website: <www.ebml.gov.lb>.
[66] NEW website: <www.eeln.gov.lb>.
[67] SWE website: <https://slwe.gov.lb/>.
[68] BWE website: <bwe.gov.lb>.
[69] LRA website: <www.litani.gov.lb>.

power grid, and build electrical power stations and distribution networks in all Lebanese territory. In 1962 LRA responsibilities were expanded to include a water development plan for all the Litani/Awali basins and the area between the international Beirut-Damascus road and the southern Lebanese border. Moreover, Decree No. 14522 of 1970 still defines the amount of manageable water from the Litani System and its allocation for irrigation and domestic use in the southern Bekaa and on the "Western Foothills". Other decrees and decisions gave LRA other functions beyond the Litani watershed scope to: ensure water monitoring in all Lebanese rivers; examine, manage and exploit the irrigation water in Central and Northern Bekaa, including the Yammouneh and Wadi Massa-Yahfoufa project; study and implement the project of diverting the Hasbani River and the Wazzani spring (The Lebanese part of the Arab project of diverting the tributaries of Jordan River); study and implement some mountain lakes like the Kawashira lake in Akkar, the Kfarhouna lake in Jezzine and the Ballout lake in Northern Metn; study and scan the locations of dams in the northern Lebanese rivers; study the blueprint of the agriculture water plan for South Lebanon in collaboration with FAO; and conduct studies for the construction of the Bisri Dam along the Awali River in conjunction with the World Bank that is funding the water conveyor from the Bisri Dam to Beirut.

- The Council for Development and Reconstruction (CDR) that was created in 1977 as a fast-track one-stop-shop executing agency (see below) has awarded and supervised DBO contracts for most of the large WWTPs, where sometimes the sewer network was inadequate or non-existing bearing in mind that WEs do not have the capacity to manage them.

At the local level, the role and responsibilities of municipalities are ill defined because the WEs should be responsible for WWTPs. However, due to the WEs' lack of technical capacity and financing in certain regions, the management of few and small WWTPs are assumed by municipalities:

- Municipalities, which are under the tutelage of the Ministry of the Interior and Municipalities (MOIM), are responsible for preparing general plans for water, sanitation and solid waste projects, as well as the operation and maintenance of the dual sewer/drainage network and septic tank collection as well as for general matters concerning the protection of the environment and pollution control. Some municipalities still assume the management of some WWTPs although they are meant to be assumed by WEs as pertained in Law No. 221. Moreover, USAID programs funded some of these WWTPs in villages where the municipalities were put in charge of managing them contrary to the Lands' law.
- Local Committees were established for potable water and irrigation and sometimes joint-committees by Ministerial Decree from the MOEW, under the tutelage of the Regional WEs. Their responsibilities are the operation, maintenance, rehabilitation and renovation of the water and sewerage networks and equipment.

8.1.2 Public-Private Partnership

The PPP Law No. 48 was adopted in 2017 and cover projects undertaken by the State or public institutions, and any moral person of public law with the exception of municipalities or federations of municipalities unless they duly request it. Under the Premiership office, the High Council for Privatization that was renamed as the High Council for Privatization and Public-Private Partnership (HCP&PPP) will

be responsible for PPPs. Prior to the PPP Law enactment, the existing legal framework in Lebanon did not offer the customary guarantees that foreign investors and international financial institutions often seek in order to have visibility on the rules of the game and reduce the projects' risks. The absence of these parameters has impeded the success rate of PPP projects to date.

An MC of € 4.6 million over 4 years was provided to Greater Tripoli (Mina, Tripoli and Beddaoui) by Ondeo, a French water company subsidiary of Suez from 2003 to 2007. Ondeo worked in partnership with the government on improving the technical, commercial and financial performance, on establishing information and management systems and on improving communication on client services. The MC included the organization of the billing system and fee collection with the aim of preparing the city for a possible concession contract. However, the concession contract did not materialize as Ondeo notably faced executive problems due to overlapping mandates among government institutions including MOEW, Ministry of Public Health, Ministry of Environment, Ministry of Interior and Municipalities and Ministry of Transport and Public Works. Moreover, the technical performance of the water system went from 35% to 55% against a target of 75%. But mainly the financial targets were not achieved: the billing rate went from 34% to 55% against a target of 75% and the debt recovery rate went from 29.7% to 33.8%, against a target of 90%.[70]

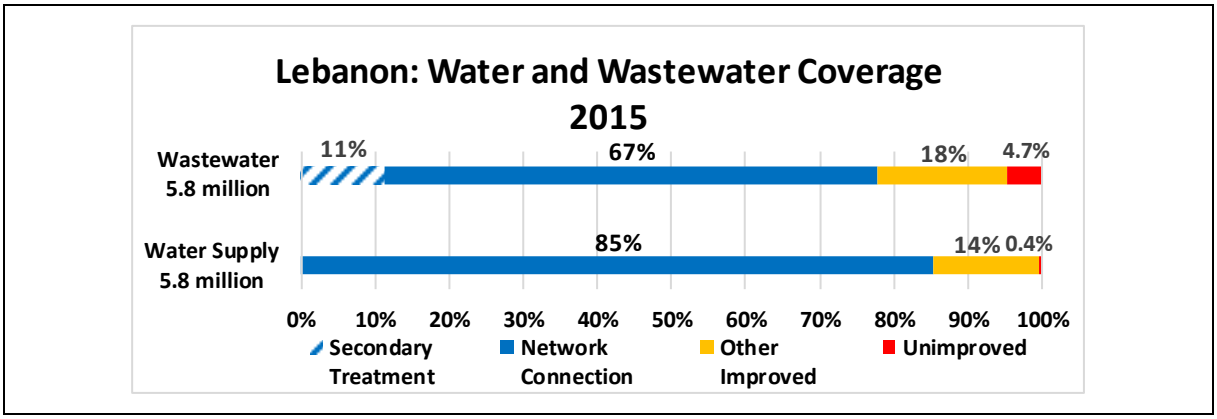
8.1.3 Service Levels

Water and waste water service coverage typologies are illustrated in Figure 8.1. Population having limited access to clean water and sanitation reached 0.4% and 4.7% of the total population respectively in 2015.

Water coverage seems almost contained whereas sanitation remains an issue, especially in the rural areas based on the data provided by WHO-UNICEF Joint Monitoring Program (JMP).[71] Despite huge investments in WWTP installed capacity over the decades, only 11% of waste water is being treated to secondary levels by WWTPs in operation in Lebanon. However, the government reports waste water treatment to secondary levels at 8%.[72]

[70] Social Watch Website: <www.socialwatch.org/node/17792>.
[71] WHO-UNICEF Joint Monitoring Program. WASH database: <https://washdata.org/data>.
[72] BML WE website: <www.ebmal,gov.lb>.

Figure 8-1: Lebanon Water and Waste Water Coverage



Source: Author based on JMP 2017.

8.2 WATER AND WASTE WATER SECTOR ORGANISATION AND OWNERSHIP

The Water Code No. 77, was promulgated on April 13, 2018, 15 years after being prepared. The Water Code calls for: (i) the establishment of a National Water Council (NWC), chaired by the Prime Minister and comprising all institutional actors in the sector; (ii) mandating the preparation of a six-year development plan for the water sector by the line ministry; (iii) re-stating the need to apply the "user pays" and "polluter pays" principles consistently in the water sector; and (iv) restricting the use of government subsidies; and (v) financing of capital investments with high social or environmental benefits. Prior to enacting the Water Code, Law No. 221 of 2000 had already centralized decision-making and clarified the role of each of the water actors. Following this law, the 21 existing water offices merged into 4 WEs (Beirut-Mount Lebanon, North, Bekaa, South), plus LRA, which retained its original status.

There are several government institutions involved to varying degrees in water resources management in Lebanon with overlapping functions. The main agencies are:

- MOEW assumes the following functions: (i) Protect and develop, and assume jurisdiction of water resources; (ii) Develop policies and strategies in water resources; (iii) Determine water supply and demand as well as conservation of water resources; (iv) Design, implement and operate large hydraulic facilities; (v) monitor water resources and the measurement of flows, estimation of water needs, allocation of water resources in all the regions, inspection and monitoring of surface and ground water quality, and estimation of ground water storage capacities; and (vi) Administratively supervise the WEs and LRA (see previous section). The General Directorate for Operations is responsible for overseeing the public establishments, for administration and financial aspects as well as administratively supervising the WEs and the local autonomous water boards and local committees. Incidentally, the MOEW is in charge of managing Shabrouh Dam in Mount Lebanon but, with a number of dams being built, these functions should eventually be devolved to the WEs.

- The Ministry of the Environment (MOE) is the environmental regulatory arm of the country with the following major roles and functions to: formulate laws, regulations, standards and guidelines; prepare environment policies and strategies, monitor, control and enforce water, air, and soil quality; provide the necessary environmental conditions for issuing permits and licenses for construction of industrial establishment and zones, quarries and various kinds of animal farms, and implement environmental projects related to biodiversity and natural resources, climate change, ozone depleting substances and hazardous chemicals. Solicited by the Council of Ministers, the MOE prepared the Combating pollution of the Qaraoun Lake program worth US$ 800 million which is partially funded through budgetary appropriations by the Government and possibly other donors such as the World Bank.
- The Council for Development and Reconstruction (CDR) is the planning and implementing arm of the central Government that mainly deals with donor-funded investments while sectorial budgetary investments are usually assumed by sector ministries including MOEW except when they mandate CDR to manage them. Its major functions are: (i) the preparation of the investment plans for the country; (ii) the design, planning and implementation of programs and projects for reconstruction and development; and (iii) the mobilization of external financing from development partners. CDR has the responsibility for selecting, in cooperation with line ministries, the institutions for the implementation of programs and projects. In the Litani River Basin, the CDR was the implementing agency for the Baalbeck WWTP.
- The Ministry of Public Health's prerogatives with regards to water is to randomly test end of tap drinking water, whereas MOEW prerogatives is to randomly test water at the meter's level. These tests are not carried out as much as they should and could produce contradictory results especially when household water is supplied through wells and trucks.

The WEs manage urban, rural and irrigation water whereas WWTPs are being managed by private firms through renewable contracts. LRA manages the Qaraoun's hydroelectricity, water resources and irrigation schemes (see above).

8.3 BASIS FOR WATER AND WASTE WATER PRICING AND TARIFF SETTING

Potable, irrigation and industrial water as well as waste water charges are set by each WE that need to be approved by MOEW. The water and waste water tariffs vary by WE and by type of connection gauge: Gauge water meter will provide up to 1 m^3 per day which is never effectively supplied due to the irregularity of the service; and the new volumetric water meters is billed based on an assumed consumption of 1 m^3 per day until the volumetric billing will gradually start being applied across the country. Actually, the water tariff system is utterly inequitable as everybody pays the same tariff irrespective of the consumption, the provision (seasonal where water is not supplied for days during summertime in certain regions) and the service quality.

The water and waste water tariff has the same basic structure nationwide and includes one block tariff for water and 1 fixed tariff for waste water as volumetric water meters are gradually being installed.

Other charges vary per WE and include the meter maintenance, automation fee, a rounding and a stamp. An 11% value-added tax is also added to the total tariff and an old contentious 10% tax that was supposed to be paid to municipalities before the introduction of VAT in 2002 is still on paper but not transferred to municipalities unless the WE records a 95% cost recovery in the said municipalities. However, de facto, this tax is no longer paid by WEs. Moreover, industries have special tariff rates and their basic structure has been volumetric for several decades. However, it is very difficult to obtain the charged tariffs as charges are eventually being negotiated on a case by case basis.

The gauge and volumetric water and waste water tariffs for the WEs are set for 1 m^3 per day for 1 year for the time being and are higher for wastewater treatment. Tariffs are illustrated in Table 8.1.[73]

Table 8-1: Water Establishments' Water and Waste Water Yearly Tariffs

(based on a consumption of 1 m^3/day)

BMLWE							
Gauge				Volumetric			
No WW treatment		WW treatment		No WW treatment		WW treatment	
Water Fees	275,000	Water Fees	275,000	Water Fees	321,000	Water Fees	321,000
Gauge Maint.	10,000	Gauge Maint.	10,000	Meter Maint.	50,000	Meter Maint.	50,000
WW Fees	25,000	WW Fees	40,000	WW Fees	25,000	WW Fees	40,000
Automation Fees	3,000	Automation Fees	3,000	Automation Fees	3,000	Automation Fees	3,000
VAT (11%)	34,430	VAT (11%)	36,080	VAT (11%)	43,890	VAT (11%)	45,540
Rounding	570	Rounding	920	Rounding	110	Rounding	460
Stamp	1,000	Stamp	1,000	Stamp	1,000	Stamp	1,000
Total	**349,000**	**Total**	**366,000**	**Total**	**444,000**	**Total**	**461,000**
NLWE							
Gauge				Volumetric			
No WW treatment		WW treatment		No WW treatment		WW treatment	
Water Fees	228,000	Water Fees	228,000	Water Fees	228,000	Water Fees	228,000
Gauge Maint.	12,000	Gauge Maint.	12,000	Meter Maint.	24,000	Meter Maint.	24,000
WW Fees	10,000	WW Fees	20,000	WW Fees	10,000	WW Fees	20,000
Automation Fees	0	Automation Fees	0	Automation Fees	0	Automation Fees	0
VAT (11%)	27,500	VAT (11%)	28,600	VAT (11%)	28,820	VAT (11%)	29,920
Rounding	500	Rounding	400	Rounding	180	Rounding	80
Stamp	1,000	Stamp	1,000	Stamp	1,000	Stamp	1,000
Total	**279,000**	**Total**	**290,000**	**Total**	**292,000**	**Total**	**303,000**

SLWE			
Gauge		Volumetric	
Water Fees	216,000	Water Fees	216,000
Gauge Maint.	25,000	Meter Maint.	55,000

[73] BML WE website: <www.ebml.gov.lb/Library/Assets/Ta3rifa_Jadida.pdf>.

WW Fees	30,000	WW Fees	30,000
Automation Fees	5,000	Automation Fees	5,000
VAT (11%)	30,360	VAT (11%)	33,660
Rounding	640	Rounding	340
Stamp	1,000	Stamp	1,000
Total	**308,000**	**Total**	**341,000**

BWE							
Gauge				Volumetric			
No WW treatment		WW treatment		No WW treatment		WW treatment	
Water Fees	180,000	Water Fees	180,000	Water Fees	180,000	Water Fees	180,000
Gauge Maint.	20,000	Gauge Maint.	20,000	Meter Maint.	20,000	Meter Maint.	20,000
WW Fees	20,000	WW Fees	60,000	WW Fees	20,000	WW Fees	60,000
Automation Fees	5,000	Automation Fees	5,000	Automation Fees	5,000	Automation Fees	5,000
VAT (11%)	24,750	VAT (11%)	29,150	VAT (11%)	24,750	VAT (11%)	29,150
Rounding	250	Rounding	850	Rounding	250	Rounding	850
Stamp	1,000	Stamp	1,000	Stamp	1,000	Stamp	1,000
Total	**251,000**	**Total**	**296,000**	**Total**	**251,000**	**Total**	**296,000**

Source: Communication with WEs.

As an example, the lowest and highest actual tariffs are as follows; respectively: (i) in **Bekaa** with a gauge water meter paying an annual water and waste water tariff of LP **251,000** (lowest in Lebanon) that theoretically provides 365 m^3 per year, the actual **monthly** bill amounts to US$ 13.9 for the provision of 30.4 m^3, resulting in an equivalent tariff per m^3 of US$ 0.46; and similarly (ii) in **Beirut and Mount Lebanon** with a volumetric water meter paying an LP **461,000** (highest in Lebanon) annual water and waste water tariff that theoretically provides 365 m^3 per year, the actual monthly bill amounts to US$ 25.5 for the provision of 30.4 m^3 with an equivalent tariff per m^3 of US$ 0.84.

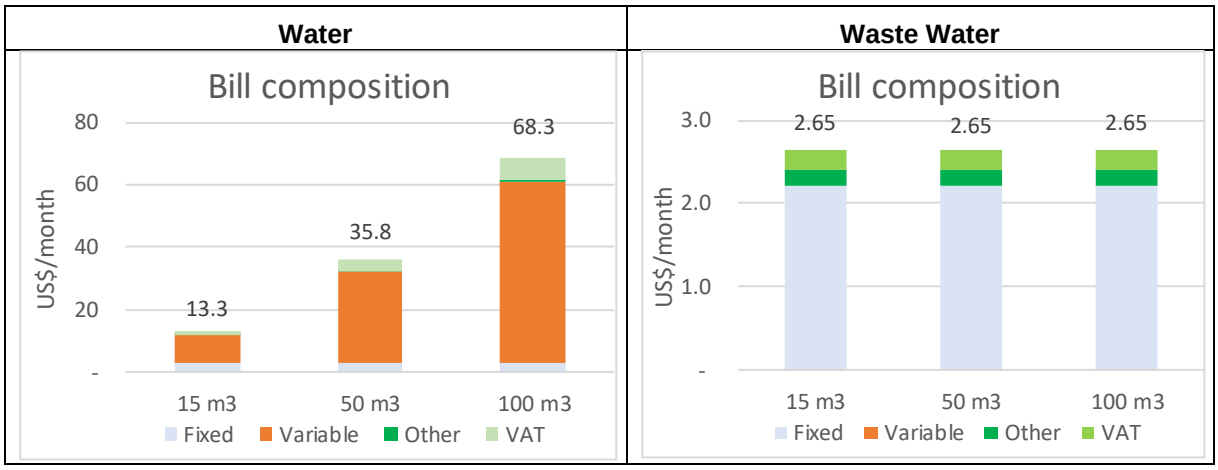
The fixed volumetric tariff has started to being applied in this transition period in Mount Lebanon and North Lebanon. In certain areas in Mount Lebanon, the volumetric tariff is applied and could be lower than LP 444,000 to 461,000 if the consumption is lower than 365 m^3 per year. Conversely, in North Lebanon, the WE tariff ranging between LP 292,000 and LP 303,000 is applied across the board unless the yearly consumption exceeds 365 m^3. However, when the volumetric tariff will be introduced across the board, several block tariffs will be introduced that will result in differentiated brackets by volume consumed.

In the meantime, the one block tariff is considered for the areas where their volumetric tariff is based on the meter reading. This temporary assumption was made to derive the figures when compared to other countries. Hence, the volumetric tariff of LP 321,000 (corresponding to BMLWE water fees without wastewater treatment) for the consumption of 1 m^3 per day for 1 year was used as a base to derive the monthly bill for a consumption of 15 m^3 (LP 13,192), 50 m^3 (LP 43,973) and 100 m^3 (LP 87,945) per month (all being equivalent to 0.59 US$ per m^3 irrespective of the water consumption as there is only one tariff block). When adding the remaining elements which constitute the fixed segments of the bill (which remains constant, regardless of the consumption), the total water and waste water tariff in Beirut

and Mount Lebanon with a volumetric water meter for households assumed to consume 15 m^3, 50 m^3 or 100 m^3 per month in 2018 would amount to US$ 15.9, 38.5 and 71.0, respectively (Figure 8.2). Accordingly, the equivalent total tariff per m^3 after adding those fixed elements would amount to: 1.06, 0.77 and 0.71 per m^3, thus resulting in decreasing water and wastewater tariff per m^3 of water consumed (as waste water tariff is fixed irrespective of the volume discharged).

The consumption of 15 m^3 per month in Beirut and Mount Lebanon is difficultly affordable by lower income households as they will pay US$ 15.90 per month when the volumetric billing will become operational. In fact, the household bill is around 2 to 3 times less than what households spend on average (bottled water and wells or trucks) per month on water. Tariff are poorly structured and inequitable and their levels do not cover water and waste water operational costs which makes it difficult to ensure financial and environmental sustainability. These economic factors have some bearing on economic competitiveness and the environment in terms of externalities (all rivers but mainly the Litani River is highly polluted notably by untreated waste water) that should eventually be paid by the society. Finally, the availability of water quality per capita, and poor waste water services have a negative effect on the well-being of the population, refugees and the displaced persons in poor areas: the Bekaa and the North.

Figure 8-2: Assumed Water and Waste Water Bill per Month in Beirut and Mount Lebanon in 2018



Source: Author based on above cited Tariffs.

8.4 WATER AND WASTE WATER SECTOR UTILITIES REMUNERATION MODELS

8.4.1 Utilities' Status

The four WEs, which are public utilities with an administrative and financial personality and autonomy, were created as efficient and integrated service providers. They own their water and waste water assets but the law is unclear on the property of infrastructures existing before the creation of WEs and some municipal drainage/sewer networks are still managed by the municipalities. The government policy is

for the WEs to become financially independent in the future. However, the WEs were not able yet to drastically improve service levels and move towards financial autonomy and accountability within the local political economy context as they still have to improve their human, technical and financial resources.

8.4.2 Utilities' OMEX Financing

The WEs do not publish financial statements which makes it very difficult to assess their financial states. The WEs prepared 5-year business plans in the early 2010s in the context of the 2012 National Water Sector Strategy (NWSS) formulation but it is not sure if they are being implemented. Still, BMLWE is the only utility that can recover OMEX. The North and South WEs could be able to re-cover OMEX excluding the costs of power, which account for 43% and 50% of their total OMEX costs respectively. Hence, Electricité du Liban is cross-subsidizing these 2 WEs. Yet, the Bekaa WE is the weakest institutionally and is in the red.[74] A number of donors provided technical assistance to the WEs over the years, notably, AfD, AICS, EU, GiZ and USAID. The usual three factors that could improve the financial stance of the 4 WEs still need to be tackled head-on:

- Tariffs are inequitable and poorly segmented while the meter installation targets by all the 4 WEs are behind schedule, therefore, the majority of the 4 WEs' billing is based on the Gauge metering that relies on the antiquated 1 block tariff. Yet, the WEs' water supply is intermittent, especially during summertime, which will deprive the WEs from precious revenues should volumetric meters be installed.
- Water technical losses are among the highest in the region with an average 40% with variations across WEs in 2011 and should be reduced to 10%.
- Bill collection reached 70% on average in 2011 with variations across the WEs (11% in the Bekaa, 52% in the North, 61% in the South and 80% in the BML) and could dramatically be improved.[75]

It is important to remember that the WEs are not providing reliable services and the Lebanese households are paying up to 3 times the water bill to supply additional drinking and domestic water. Hence, any tariff increase and better cost recovery will face social resistance unless they are linked to clear service improvements. Obviously, as mentioned above, a change of the structure of the tariff, shifting from flat to volumetric after installing meters, should be properly studied and should take into consideration a revision of the cost per consumption bracket in order to guarantee financial sustainability of the WEs. Also, the transition to water meters should be in synchronisation with the water supply integration and augmentation that the NWSS calls for.

8.4.3 Utilities' CAPEX Financing

Investment in water supply has been high over the years with about US$ 100 million annually, but results have been disappointing. The irregularity of the water service and the poor treatment of waste water are putting a toll on the economy.

[74] World Bank. 2012. Lebanon Country Water Sector Assistance Strategy 2012-2016. Washington, D.C.
[75] Ibid.

Only BML WE can afford to invest in water systems as it is funding the Janneh Dam that will supply Beirut through the north-south conveyor and will leverage the forthcoming World Bank loan of US$ 200 million with US$ 170 million coming from its own funds to build the Bisri Dam and the south-north conveyor to supply Greater Beirut with 750,000 m^3 annually.[76] Still, capital investments are usually financed by the government through yearly budgetary or program appropriation over several years. Also, grants and IFI loans that are, except for the USAID, usually managed by the CDR (Lebanon's executing agency), were provided over the years by mainly, AfD, AICS, Arab funds, EU, EIB, GiZ, KfW, USAID and the World Bank. Only DBO contracts were attempted by CDR and by BMLWE, as the government policy is to boost PPP contracts in all sectors. Unfortunately, CDR's DBO contracts to build WWTP ended up paying for operations although WWTPs were not yet connected to the existing or planned sewer's system, e.g., Chekka and Tripoli.

8.4.4 Future Investment Needs

In 2010, the MOEW attempted to instil a new momentum by developing a strategic plan that was adopted in March 2012 (NWSS) in order to address the country's lack of infrastructure. The overall goal of the strategy is "to ensure water supply, irrigation and sanitation services throughout Lebanon on a continuous basis and at optimal service levels, with a commitment to environmental, economic and social sustainability." The NWSS called for a total of US$ 2.45 billion of investments from 2011-2015, through the government and International Financing Institutions of which US$ 1.6 billion was to be spent on new projects.[77] A waste water strategy was formulated in 2012 to complement the NWSS.[78] Yet, the strategy implementation is behind schedule and the April 2018 event (Conférence Economique pour le Développement par les Réformes avec les Entreprises (CEDRE) to boost the Lebanese economy following the Syrian crisis proposed a higher allocation than the water and waste water strategies that reached US$ 4.8 billion to be financed for the entire water sector.[79] CEDRE funds are conditional upon Lebanon forming a new government (it took 9 months to form the Cabinet after the election), which was appointed in February 2019, and enacts a series of reforms that notably entail the opening up of all sectors to private funding.

The ultimate goal of the government is to attract donors and private funding through various forms including PPP contracts, although, if not well managed, this could lead to deeper debt as Lebanon has the highest debt per capita in the world.

8.5 WATER DISTRIBUTION: HOW IS IT REGULATED?

There are no water rights recognized internationally regarding the Jordan River riparian countries. However, under the 1954 Main Plan proposed by US Ambassador Eric Johnston, the Jordan River and

[76] World Bank. 2012. Lebanon Country Water Sector Assistance Strategy 2012-2016. Washington, D.C.
[77] Basil, G. 2010. Ministry of Energy and Water: National Water Sector Strategy, Sector Enabling Environment and 2011-2015 Investment Plan. Beirut.
[78] World Bank. 2012. Lebanon Country Water Sector Strategy (2012-2016). Washington, D.C.
[79] CDR website: <www.cdr.gov.lb/study/cedre/cedrelist.pdf>.

its tributaries water sharing is based on the authoritative but never ratified Johnston Plan between Lebanon, Syria, Israel, and Jordan including the West Bank.[80] Under this unofficial arrangement, the West Bank, which was part of Jordan at the time, was entitled to 100 million m^3 annually. Currently, neither Jordan nor the West Bank extract any water from the Jordan River but they receive water from Israel: 53 and 58 million m^3 respectively per year. Lebanon extraction does not exceed 10 million m^3 annually while Israel is the larger user with extractions ranging from 580 and 640 million m^3 depending on the yearly availability of water.

Also, Lebanon and Syria share 2 rivers, the Orontes and Nahr el Kabir, and although there are no basin-wide agreements, there are several bilateral agreements in place on issues such as water allocation. Conversely, The 2018 Water Code recognizes the fundamental right of everyone to dispose of water corresponding to their needs and the basic requirements of their life and dignity.

However, water allocations per region and use across the sectors in terms of water rights are not explicitly cited in the water strategy but the government policy to allocate water across regions and sectors is based on water supply (Box 8.1). Still, the level of bulk water distribution could be derived from water institutions prerogatives and attributions.

Increased competition between different water uses (agricultural, domestic and industrial waters) and the interactions between water-energy-food nexus have prompted the government to move from a sectoral policy to an integrated water policy as there was a need to arbitrate the distribution between users (agricultural, domestic and industrial) which also raised the issue of water governance in the context of scarcity and competition. Yet, the government is not keen on transforming LRA in a water basin agency that will have more teeth to better manage water resources, reduce pollution and engage stakeholders in decision-making and water rights' distribution among various sectors.

Box 8-1: Water Strategy and Water Code No. 77 of 2018

The water sector in Lebanon has long been identified as a high-priority sector where immediate action is required to deal with several key challenges some of which will be exacerbated with climate change. The 2012 NWSS focuses on: (1) balancing supply augmentation with demand management; (2) completing the reform agenda; (3) increasing levels of cost recovery; (4) ensuring equity of distribution; (5) increasing levels of waste water collection and treatment; (6) increasing the efficiency of irrigation water use; and (7) improving the management of groundwater resources.

Based on the 2018 Water Code, Article 5 recognizes the basic right of every person to obtain the water necessary for his needs, and this justifies obligating the beneficiaries to pay the subscription allowances for their use of water, and includes the sanitation between the elements of the right of water. Also, the public water institutions determine the rules for equitable distribution of water among different categories of users. However, in areas with water deficit, MOEW must put in place procedures to ensure the rationalization of water use, ensuring the balance of the ecosystem, while in these areas meeting household water needs and irrigation needs of the population is a priority.

Source: MOEW website: < www.energy.gov.lb>.

Based on the above review of the sector regulation, the water distribution system is managed regionally:

- at the central level, MOEW sets policies and coordinates regional and local bodies;
- at the regional level, the 4 WEs are responsible for the water rights as set in the water code (Box 7.1) and will supply the water needs from surface and ground water. In Mount Lebanon, it

[80] Wilby, Robert. 2010. *Climate Change Projections and Downscaling for Jordan, Lebanon and Syria.* Synthesis Report prepared for the World Bank.

is the MOEW that is still managing the Shabrouh Dam, which is mainly used for drinking water, while dams under construction will have their management eventually devolved to the WEs. However, in areas of water deficit, MOEW will arbitrate the distribution of domestic and irrigation water according to the 2018 Water Code (Box 8.1). However, criteria are not spelled out.

- at the local level, WEs distribute water to the municipalities.

Similar to other countries in the region, and given the more acute demand for domestic and industrial use, WEs are allocating strategic water for these 2 sectors to the detriment of agriculture and the environment. Case in point, the new transfer infrastructure of the Litani, Bisri and Nahr Ibrahim waters to Greater Beirut was planned without any kind of participation and obviously without any water right compensation to the population benefiting from the water of these watersheds. Moreover, the displaced Syrians have dramatically altered the regional demand for water where WEs are no longer in full control of water resources and therefore distribution.

9 MOROCCO

Morocco could face a water deficit starting 2020 based on the water demands projected by the Direction Générale de l'Hydraulique (DGH or General Directorate of Hydraulics) that would require about 14,500 million m^3 in 2020 and would put Morocco in the water scarce bracket with 411 m^3 per capita per year.

The most recent statistics from FAO AQUASTAT estimate the average total renewable water resources at 29 billion of m^3 for the 2013-17 period that is inequitably distributed across the country with a total withdrawal of more than 10 billion of m^3 with the following breakdown: 88% for agricultural use; 10% for domestic use; and 2% for industrial use.

9.1 WATER AND WASTE WATER SECTOR UTILITIES, PPP AND SERVICE LEVELS

9.1.1 Utilities' Services

Morocco's utilities follow a mixed-service model whereby they all provide water and waste water services, and in most cases, electricity too. The rationale for this model is that the relatively profitable electricity business helps subsidize the loss-making waste water activity and finance waste water infrastructure.

The water and waste water utilities in Morocco include: the Office National de l'Electricité et de l'Eau Potable (ONEE or National electricity and potable water Body); 12 Régies autonomes intercommunales (RAI or autonomous intercommunal authorities); the Régies directes (RD or authorities managed by municipalities); and 4 concessionaires or private operators. The 4 typologies are as follows:

- The ONEE is a financially independent public body. In 2017, it is the first producer of drinking water (1.17 billion of m^3) and the first water distributor (2.04 million customers) in Morocco. It reached 100% coverage of 28% of the urban population it serves. 600 small and medium-sized cities (30% of the population) delegate to ONEE their operations of their water and waste water systems while ONEE also provides water through piped-water and stand posts to rural populations. ONEE also manages waste water in 113 communes (4.5 million people) and operates 93 WWTPs (353,000 m^3/day) in 2017, although rural sanitation sector has no clear institutional set up and warrants immediate attention.[81]
- The 12 RAIs are autonomous intermunicipal water and/or electricity authorities. They are public institutions of an industrial and commercial nature, endowed with the legal personality and financial autonomy, under the supervision of the Ministry of Interior. They are responsible for water, sanitation and often electricity services in thirteen major cities in Morocco and their coverage was planned to reach 98% of the 31% of the urban population served. Some RAIs are owned by several municipalities. RAIs serve 30% of the population and most information on

[81] ONEE water activity website: <www.onep.ma>.

waste water treatment is in terms of treated volumes which makes it difficult to determine the population having at least a secondary treatment:

1. Régie Autonome Intercommunale de Distribution d'Eau et d'Electricité de Fès (RADEEF)[82] was created in 1969 with more than 1.3 million population being served with water and 90% of the population having waste water connections.
2. Régie Autonome de Distribution d'Eau et d'Electricité de Marrakech (RADEEMA)[83] was created in 1970 with more than 300,000 being served with water and having waste water connections.
3. Régie Autonome Multi-Services d'Agadir (RAMSA)[84] was created in 1980 with more than 278,410 population being served with water and 91.5% of the population having waste water connections.
4. Régie Autonome de Distribution d'Eau et d'Electricité de Meknès (RADEM)[85] with more than 0.7 million being served with water and having waste water connections.
5. Régie Autonome de Distribution d'Eau, d'Electricité et d'Assainissement liquide de la province de Kénitra (RAK)[86] was created in 1970 with more than 450,000 being served with water and 98% having waste water connections.
6. Régie Autonome Intercommunale de Distribution d'Eau, d'Electricité et d'Assainissement liquide des Provinces d'El Jadida et de Sidi Bennour (RADEEJ)[87] was created in 1971 with more than 100,000 population in 2010 (latest available figures) being served with water and having waste water connections.
7. Régie Autonome Intercommunale de Distribution d'Eau et d'Electricité d'Oujda (RADEEO)[88] was created in 1979 and more than 138,000 clients being served with water and having waste water connections.
8. Régie Autonome de Distribution d'Eau et d'Electricité de Tadla (RADEET)[89] was created in 1964 although the number of population served is not mentioned.
9. Régie Autonome Intercommunale de Distribution d'Eau et d'Electricité de Safi (RADEES)[90] was created in 1971 with more than 80,000 having water and 92% having waste water connections.
10. Régie Autonome Intercommunale de Distribution d'Eau et d'Electricité de Taza (RAEETA)[91] was created in 1978 although the number of population served is not mentioned.
11. Régie Autonome Intercommunale de Distribution d'Eau et d'Electricité de Chaouia (RADEEC)[92] was created in 1976 and more than 81,000 clients being served with water and having waste water connections while 84% of the waste water was treated in 2015.

[82] RADEEF website : <www.radeef.ma>.
[83] RADEEMA website: <www.radeema.ma>.
[84] RAMSA website: <www.ramsa.ma>.
[85] RADEM website: <www.radem.ma>.
[86] RAK website: <www.rak.ma>.
[87] RADEJ website: <www.radej.ma>.
[88] RADEEO website: <www.radeeo.ma>.
[89] RADEET website: <www.radeet.ma>.
[90] RADEES website: <www.radees.ma>.
[91] RAEETA website: <www.raee-ta.ma>.
[92] RADEEC website: <www.radeec.ma>.

12. Régie Autonome Intercommunale de Distribution d'Eau et d'Electricité de Larache (RADEEL)[93] was created in 1996 with more than 66,000 being served with water and having waste water connections.

- The RDs are entrusted by the government to a community with a legal personality. They cover about 1% of the urban population and provide poor water and sewerage services to small towns due to budget constraints.
- Private operators were awarded 30-year concession contracts and are supplying water, waste water and electricity services in 4 major cities with a coverage of about 95% of the 37% of the urban population it serves (see below).

9.1.2 Public-Private Partnership

Morocco was the first country in the region to introduce a Concession Law No. 54-05 of 2006 concerning MCs. Moreover, Morocco has a dedicated Law No. 86-12 on PPP contracts that was introduced in December 2014[94] where it outlines the conditions for resorting to, and procuring, PPP contracts.

The Ministère de l'Economie et des Finance (MEF or Ministry of Economy and Finance) through the Département des Entreprises Publiques et de la Privatisation (DPEP or Department of Public Enterprises and Privatization) is in charge of:

- Preparing, in consultation with the concerned ministries, program-agreements to conclude with the public institutions and companies defining the relationship between the State and these organisms and monitoring their implementation;
- Examining the creation of projects by the public establishments as well as the companies whose capital is fully or jointly subscribed, directly or indirectly by the state, public institutions or public authorities;
- Examining projects of expansion or reduction of the participation of the State, the public institutions and enterprises;
- Participating in the portfolio management of the state, taking and implementing any decision affecting its structure and profitability.

Morocco has awarded 4 concessions:

1. LYDEC, a leading concessionaire with 51% of the consortium (includes an insurance company, RMA Watanya, and an investment company, Fipar Holding and private shareholders) shares is a subsidiary of Suez, provides since 1997 (30 year contract) water (150 million of m^3 sold in 2015), sanitation (143 million of m^3 of treated waste water) and electricity services to Greater Casablanca with 1.1 million of water and waste water subscribers serving a population of more than 2.5 million in 2015. Moreover, LYDEC sells excess water to RAI such as RADEEC.
2. Redal, a leading concessionaire with at least 51% of the consortium shares is a subsidiary of Veolia,[95] provides since 2002 (30-year contract) water (99.3% of the population), sanitation (93.7%) and electricity services to 2.2 million inhabitants, spread over 23 communes and

[93] RADEEL website: <www.radeel.ma>.
[94] Morocco Official Gazette of January 22, 2015: <www.finances.gov.ma/Docs/2015/DEPP/Loi-PPP-ar.pdf>.
[95] Redal website : <www.redal.ma>.

arrondissements of Wilaya of Rabat-Salé-Kenitra. Water and waste water customers amount to 509,562.

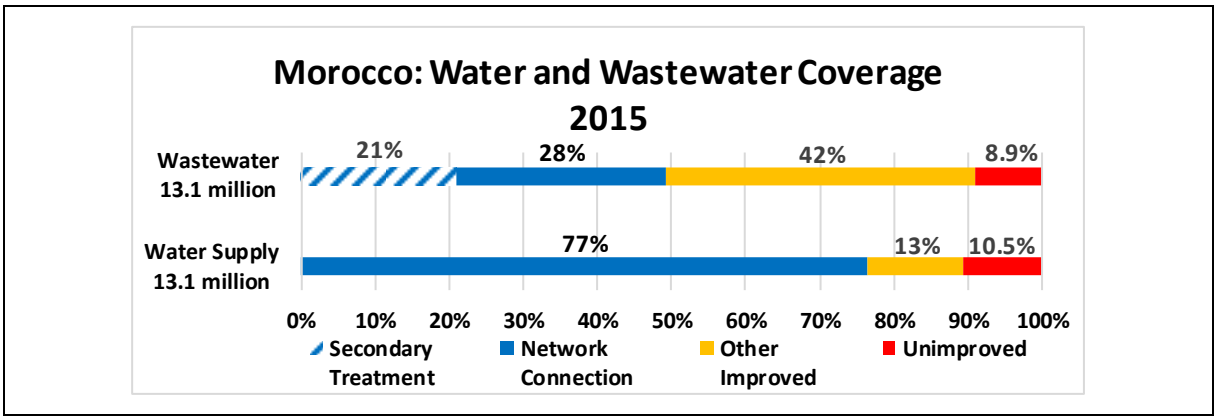
3. Amendis, a leading concessionaire with at least 51% of the consortium shares is a subsidiary of Veolia, provides since 2002 (30-year contract) water, sanitation (461,000 inhabitants) and electricity services to Tanger and Tétouan.

In 2017, ONEE awarded a BOT contract for a desalination station for US$ 358 million with a capacity of 275,000 m^3 per day (with possibility of expansion to 450,000 m^3 per day) for Agadir. A Spanish-led consortium (led by Abengoa), won the contract.

9.1.3 Service Levels

Water and waste water service coverage typologies are illustrated in Figure 9.1. In Morocco, 10.5% of the population suffers from limited access to clean water and 8.9% lacks access to sanitation as poor coverage remains an important issue mainly in rural areas in 2015 based on the data provided by WHO-UNICEF Joint Monitoring Program (JMP).[96] The sewer coverage is among the lowest in the region with 49%, including secondary treatment which reaches 21%.

Figure 9-1: Morocco Water and Waste Water Coverage



Source: Author based on JMP 2017.

[96] WHO-UNICEF Joint Monitoring Program. WASH database: <https://washdata.org/data>.

9.2 WATER AND WASTE WATER SECTOR ORGANISATION AND OWNERSHIP

Morocco's new Water Law No. 36/15 of 2015[97] strengthens the legal framework, enhances rainwater harvesting and waste water treatment, and sets up a legal framework for the desalination of sea water. It also sets up mechanisms for the protection and preservation of water resources, and includes provisions to improve the conditions of protection against extreme phenomena related to climate change.

At the National Level, The Conseil Supérieur de l'Eau et du Climat (CSEC or High Council on Water and Climate) was established in 1981 before issuing the Laws No. 10 of 1995 and No. 36 of 2015 on water. CSEC is a High-level institution under the patronage of the King that brings together water and waste water stakeholders. It is responsible for outlining the broad lines of the country's priorities in water and waste water. This council, which was supposed to meet every year had its last meeting in 1994. Yet, the following stakeholders contribute to the water sector:

- The Ministère de l'Energie, des Mines, de l'Eau et de l'Environnement (MEMEE or Ministry of Energy, Mines, Water and the Environment) is the main government body overseeing water which is responsible for policy, planning and resource management. Within this very large ministry, most of the responsibilities related to the water sector have been delegated to the Secretariat in charge of water.
- The Ministère de l'Intérieur (MdI or Ministry of Interior) is actively involved in water planning and management through 2 directorates:
    1. Direction de l'Eau et de l'Assainissement (DEA or Directorate for Water and Sanitation) that helps municipalities plan water and waste water infrastructure.
    2. Direction des Régies et Services Concédés (DRSC or Directorate for Régies and Concessions) that monitors and supervise municipal utilities as well as the renegotiation of the private concessions.
- Ministère des Affaires Générales et de la Gouvernance (MGAG or Ministry for General Affairs and Governance) that leads an inter-ministerial commission that sets water and waste water tariffs.
- MEF's DPEP (See section 8.1.2) is in charge of preparing program agreements with concerned ministries, examining the expansion or reduction of the participation of the State in projects and participating in the portfolio management of the State.

At the national, regional and local level:

- ONEE supplies bulk water and produces around 85% of the country's drinking water. ONEE is one of the largest water and waste water utilities in the country, and it also produces and distributes electricity.

At the regional level:

[97] Texte de Loi website: <www.droit-afrique.com/>.

- Société des Eaux de l'Oum ErRbia (SEOR or Water Basin Agency of Oum ErRbia) is strategically managed by Suez since 2008, produces 20% of surface water and 8% of underground water (second largest renewable water share of the country), and supplies bulk water from Oum ErRbia River to the Greater Casablanca area where LYDEC manages the system.
- Agence de Bassin Hydraulique (ABH or Water Basin Agencies) where 8 agencies, excluding Oum ErRbia, are the executing bodies that oversee the integrated management and allocation of water resources in their catchment.[98] The ABH boards of directors have decision-making powers such as issuing authorizations and concessions to use the hydraulic public domain; the ABH programming and funding committees ensure implementation of the Integrated Water Resource Master Plan; Six ABH allowed public delegations to maintain a close relation with users; and the Prefectural and Provincial water Commissions constitute the consultation and awareness Framework. The ABHs are:
    1. Moulouya: 8% surface and 19% underground in the basin.
    2. North-West: 15% and 6%.
    3. Sebou: 33% and 11%.
    4. Bouregreg: 5% and 3%.
    5. Souss Massa: 4% and 6%.
    6. Upper and Middle Atlas: NA and 4%.
    7. South Atlas: 9% and 16%.
    8. Tensift: 6% and 11%.

At the local level:

- Municipalities decide how their water and waste water services should be run: by the national utility ONEE ; RAI, RD; or a concession.

9.3 BASIS FOR WATER AND WASTE WATER PRICING AND TARIFF SETTING

Water, waste water and electricity are included in the list of services whose prices are regulated in Morocco according to Ordinance No. 2685/14, setting notably drinking water and waste water tariffs (2014). This list is determined by order of the MGAG[99] that reports to the head of government. The Comité Interministeriel des Prix (CIP or Interministerial Price Committee) housed under the MGAG plays an important role in tariff setting for ONEE and the régies. Four ministries are represented in CIP: MAGAG; MEMEE; MOI; and MOF. Hence, at the national level, the tariffs for the sale of water and electricity to distributors (authorities, municipalities, private operators, régies) are set by ministerial orders. With regards to the private operators or the régies, the sales rates to the final customers and their terms of review and adjustment are fixed according to the provisions and conditions laid down in the MCs, which are concluded between the delegating authority (commune or municipality), the Ministry

[98] OECD website: <www.oecd.org/mena/governance/43316384.pdf>.
[99] MGAG website: <www.mag.gov.ma>.

of the Interior and the private operator or the régie. Therefore, the latter cannot change tariffs without the local government endorsement and final MGAG authorization.

The water price sold in bulk to the distributors is exclusively sold by ONEE and varies by region. The latest ONEE water prices available are from 2014, range between DM 1.65 and DM 4.88 and are fixed by ministerial order. A 5% tax is levied to cover small towns and rural water supply. Moreover, the price of water is differentiated by public and private operator where, for instance, LYDEC in Casablanca pays twice the price of a neighbouring régie. Yet, any water increase by ONEE should be passed on by distributors to final customers on the basis of "no gain or loss".

The water and waste water tariffs vary geographically and by distributor: authorities, RAI, RD and private operator. For instance, in the greater Casablanca region, the distribution tariffs are set by the Monitoring Committee of the private operator, composed of the delegating authority (commune, municipality), the MdI and the private operator, LYDEC. The 2014 tariffs are still valid in 2018 in accordance with the more recent Ministerial Order issued by MGAG.

The water and waste water tariff has the same structure nationwide and includes a fixed element and 2 types of variable elements: one progressive for lower consumption up to 12 m^3 per month; and one selective for higher consumption above 12 m^3 per month. This two-prong variable rate was adopted by ONEE-government *Contrat-Plan* for all national distributors starting August 2014. However, the fixed and variable elements vary by region, are different for water and waste water and vary by customer's affiliation. A 7% value-added tax is also added to the total tariff.

For Illustration purposes, Casablanca water tariffs will be also calculated as they are probably the highest in Morocco and the region. Other tariffs are available online for certain RAIs.[100]

The Water and Waste Water tariffs per month are structured as follows:

- The Water tariff includes a Fixed Rate of 8 DM and a Volumetric Rate with 2 different rates depending on consumption and customer's affiliation. The Water variable rate is as follows:
    1. Category I: Households with progressive Volumetric Water tariff up to 12 m^3
        - 1st tranche: ≤ 6 m^3: 2.99 DM/m^3
        - 2nd tranche: 6 < m^3 ≤ 12 m^3: 6.00 DM/m^3
    2. Category II: Households with the selective Volumetric Water tariff more than 12 m^3 per month
        - 1st tranche: 1 < m^3 ≤ 20 m^3 with 6.00 DM/m^3
        - 2nd tranche: 1 < m^3 ≤ 35 m^3 with 11.24 DM/m^3
        - 3th tranche : 1 to > 35 m^3 with 16.46
    3. Category III: Commercial and Professional Activities
        - 1st tranche: ≤ 35 m^3 with 11.24 DM/m^3
        - 2nd tranche: > 35 m^3 with 16.48 DM/m^3

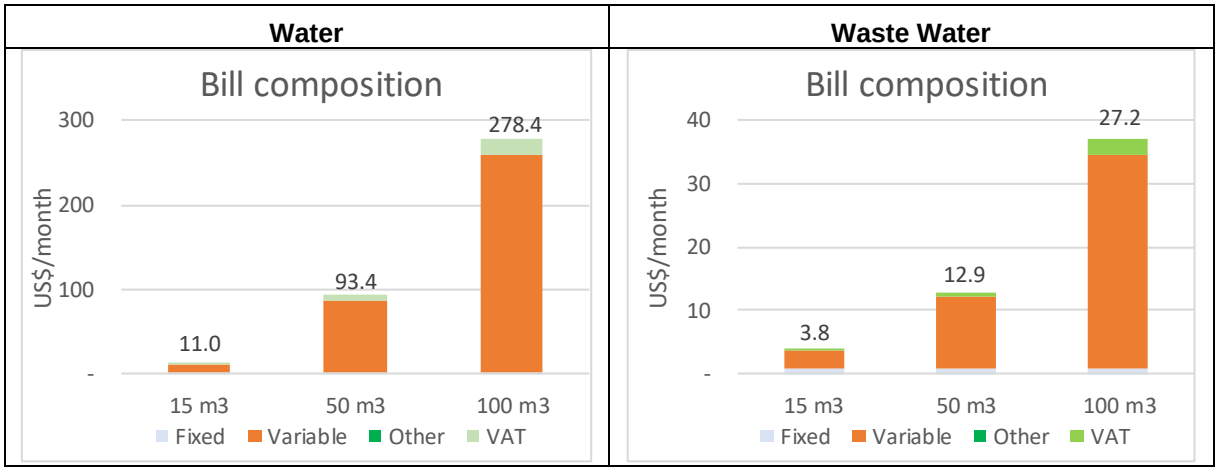
[100] Selected RAIs' tariffs: <www.radeef.ma/Accueil/EspaceClients/AccueilClientèle/Tarifsenvigueur.aspx>; <www.ramsa.ma/Accueil/EspaceClient/Tarifseauetassainissement.aspx>; <www.radem.ma/Espace-particulier/Tarifs-de-ventes>; <www.rak.ma/rak/Accueil/EspaceClient/Guidesclients/Redevancesettarifs.aspx>; <http://radeej.ma/Espace-Client/Les-tarifs-de-vente/Le-tarif-deau-potable>; <http://radeej.ma/Espace-Client/Les-tarifs-de-vente/Le-tarif-dassainissement-liquide>; <www.radeeo.ma/Accueil/EspaceClient/Tarification/tabid/309/language/en-US/Default.aspx>; <www.radees.ma/page/tranches-de-facturation-et-tarifs>; and <www.radeel.ma/images/radeel-docs/3-Nos-Clients/Tarifs-Eau-et-Assainissement-liquide.pdf>.

- The Waste Water tariff includes a Fixed Rate of 7 DM and a Volumetric Rate with 2 different rates depending on consumption and irrespective of the customer's affiliation:
    4. Category I: Households and Professional Activities with progressive Volumetric Water tariff up to 12 m^3 per month
        - 1st tranche: ≤ 6 m^3 with 0.35 DM/m^3
        - 2nd tranche: 6 < m^3 ≤ 12 m^3 with 0.91 DM/m^3

    5. Category II Households and Professional Activities with selective Volumetric Water tariff more than 12 m^3 per month
        - 1st tranche: 1 < m^3 ≤ 20 m^3 with 1.77 DM/m^3 per month
        - 2nd tranche: 1 < m^3 ≤ 35 m^3 with 2.16 DM/m^3 per month
        - 3th tranche : > 35 m^3 with 2.54 DM/m^3 per month

As an example, an water and waste water tariff in Casablanca for hypothetical households consuming 15 m^3, 50 m^3 or 100 m^3 per month in 2018 amounts to US$ 14.8, 106.3 and 315.5 respectively per month (Figure 9.2). The equivalent tariff per m^3 is as follows (US$/$m^3$): 0.75, 1.88 and 2.81 respectively.

Figure 9-2: Water and Waste Water Bill per Month in Casablanca in 2018



Source: Author based on LYDEC Tariffs.

The 1st tranche tariff seems difficultly affordable by lower income households. The rates introduced in 2016 and still in effect in 2018 are high enough to cover operational costs for water only which makes it difficult to ensure financial and environmental sustainability although ONEE, the concessionaires and 11 RAIs are both water and electricity providers. If waste water treatment is below acceptable standards, it could induce environmental degradation whose economic cost would eventually be paid by society in terms of well-being, natural capital, productivity, tourism, etc. Finally, the availability of water per capita and waste water services has a positive effect on the well-being of the population.

9.4 WATER AND WASTE WATER SECTOR UTILITIES REMUNERATION MODELS

9.4.1 Utilities' Status

Municipalities of small and medium cities contracted out ONEE, a public enterprise with financial autonomy, to manage their water, waste water and possibly electricity services. For the water and waste water network, municipal network assets are owned by the municipalities whereas ONEE is responsible for managing the networks and for supplying drinking water and collecting and treating waste water effluents.

For the municipalities of areas contracted out to RAIs to run their water, waste water and electricity (1 only does not include electricity) services, network assets are owned by the municipalities whereas the RAI is responsible for managing the networks and for supplying drinking water and collecting, treating waste water effluents and providing electricity. Contracts are being revised periodically to match demand and the updated government water and waste water master plans so that the RAIs prioritise their investments accordingly.

Few municipalities provide water and waste water services through RDs. Network assets are owned by the municipalities whereas the RD is responsible for managing the networks and for supplying drinking water and collecting and treating waste water effluents.

Four municipalities contracted out concessionaires to manage water, waste water and electricity services. Concessionaires are responsible for water, waste water electricity services and improvements. Assets will be returned to the municipalities at the end of the concession unless the latter is renewed. Still, the MdI is working on the third generation of delegated MCs, which will experience profound changes. Commitments will be clearer on both sides, and governance and control mechanisms will be more effective as some problems occurred over the years that needed to be settled in the court. Other important developments will take place: the delegating authority will be endowed with legal personality, which will allow it to raise the necessary funds for the investment, to recover VAT and to manage, through a local development company, the Work fund account, now managed by the concessionaire (see below).

9.4.2 Utilities' OMEX Financing

Except for the 4 concessions and some RAIs, OMEX is always higher than revenues. The former (i.e. the concessions) are financially viable because of the cross-subsidisation of electricity services. All other operations should be subsidized by either the government, the commune or the municipality.

Yet, water tariffs are regularly being adjusted for all 4 typology of services although waste water tariffs remain low to balance the books. For all four typologies, CIP calculates an average tariff as the revenue requirement divided by the total volume sold to derive blocks based on economic and social considerations. The relative flexibility of tariffs was introduced by the concessionaires and was later

internalized by CIP. This allows the concessionaires to fund not only maintenance but also replacement of existing infrastructure by counting on additional revenues from higher block tariffs.

Across all 12 RAIs, NRW (bill collection and technical losses) was 29.7% in 2014 (with significant differences between the best and worst performers). Their objective is to reach NRW of 24.4% in 2018. The 4 concessionaires (NRW less than 20%) are having better results than the 12 RAIs, e.g., REDAL with 18.4%, whereas all others systems under ONEE or RD management exceed the 30% mark. The National Water Strategy's objective is to bring NRW down to less than 20% by 2030. Although the 4 concessionaires are planning to consolidate and improve their performance further but they are far from the acceptable benchmark of 10% for unaccounted for water.

9.4.3 Utilities' CAPEX Financing

The 4 concessionaires go to the financial market to seek private loans for the replacement of equipment, new investments or for third parties investments. For instance, LYDEC[101] gross operating surplus increased in 2015 to reach almost DM 1 billion (for all activities) that helped absorb amortizations linked to the financed investments: this however increased the "net debt" over the "gross operating surplus" ratio to 1.32. Yet, not all investments are assumed by the concessionaire. For instance, REDAL invested DM 21.9 billion in 2016 (although 41% were reimbursable by the government), 30% were payable to the client municipality, 15% to replenish the Works Fund and 14% for renewing infrastructure. Cumulative investments by REDAL between 2002-2016 amounts to DM 5.4 billion (See Box 9.1 for examples of investments in 2016). Conversely, Amendis has poor reporting on its activities. Actually, Veolia has been trying to leave the Moroccan markets for a number of years now by suggesting alternative concessionaires, such as Actis, a short term investment fund, but the government has so far refused the offer.

Box 9-1: Examples of Investments Realised by REDAL in 2016

Implementation of the reservoir of 50,000 m^3 in Ouled Hasan in Salé: DM 29.6 million
Implementation of the reservoir of 10,000 m^3 at Skhirat centre: DM 17.8 million
Implementation of the reservoir of 5,000 m^3 at Skhirat (upper floor): DM 10.6 million
Implementation of the reservoir of 7,500 m^3 at Témara Centre : DM 9.9 million
Implementation of the reservoir of Adolph 6,000 m^3 in Bouknadel to Salé: DM 2.3 million
Rehabilitation of the reservoir of AAA Benson 50,000 m^3 in Rabat: DM 7.8 million
Rehabilitation of the reservoir of Annahda 40,000 m^3 in Rabat: DM 7.0 million
Rehabilitation of the reservoir of 12,000 m^3 Souk Lakhmi to Salé: DM 2.8 million
Centralized Technical Management: DM 4.6 million
Implementation of the variable speed pumping station (upper floor) at Sala Al Jadida: DM 4.3 million
Implementation of the booster to the reservoir Lalla Zina to Sebbah : DM 2.9 million
Network Extensions and social connections (56,732 units): DM 122.0 million
Distribution network renewal: DM 193.9 million

Source: REDAL website: <www.redal.ma>.

[101] LYDEC website: <https://client.lydec.ma/site/>.

The contract-programme concluded between ONEE and the government for the period 2014-2017 paid off and allowed ONEE to improve its performance and reduce its deficits. The cash deficit, which has risen to DM 7.29 billion in 2013, plummeted to DM 1.74 billion in 2016. Yet, technically, ONEE is still incurring deficits despite the amalgamation of the water and electricity sectors in 2012. But its financial stance allows it to borrow more from IFIs. Still, ONEE's CAPEX has been funded by the government and IFIs where, for instance ONEE, contracted several loans, including in local currency from IFIs, to improve infrastructure all over the country but mainly in rural areas. Although Morocco still has much to do in terms of waste water treatment, the emphasis is likely to focus not only on WWTPs and treated waste water reuse but also on desalination stations, and service provision in rural areas.

For the régies, the contract-programmes are concluded between MdI and the régies. Investment funds are allocated by MdI to the régies to implement water and waste water master plans. If administrative (land expropriation, etc.) delays occur, investments are carried over to the next year whereas if the régie is at fault from not executing planned investments, the régie is penalised by the MdI. For instance, RAIs notably built 14 WWTPs over the years, worth DM 2.71 billion: Zar, El Jadida, Oualidia, Meknes, Fez, Marrakech, Oujda, Settat, Sealem, Deroua, Sidi Race, Ras el Aïn, Ouled Saïd, and Sidi El Aidi. Eleven of them have a tertiary treatment system that is safe for reuse. Moreover, Marakesh's REDEEMA brokered a deal with golf courses where the golf company paid the additional investment cost (DM 486 million) of bringing the WWTP to tertiary level (total cost of DM 1.23 billion) and the dedicated network against the supply of a convened volume of reused water per year.

The major IFI financing for infrastructure include the African Development Bank, Belgium, Arab Funds, the European Union, France, Germany, Japan, Luxemburg, Spain, the United States and the World Bank. The latter provided budget support linked to the fulfilment of certain policy conditions. Also, some IFIs such as the AfD have lent money to some RAIs with a good financial stance.

9.4.4 Future Investment Needs

According to the G20's Global Infrastructure Outlook, Morocco does not face an infrastructure financing gap over the next 20 years, assuming current trends. During this period, Morocco could provide up to US$ 18 billion in financing and requires US$ 18 billion to meet its water sector investment needs. For 2019 alone, the investments that could be provided amount to US$ 596 million.[102]

The water sector has just awarded the first BOT contract (see above) in local currency (DM) for a desalination station where there was only one offer that was accepted as other investors perceived high exchange rate risks. Still, EPC contracts are still favoured and long term MCs for large utilities are to be promoted, especially since IFI funding is readily available.

[102] G20 website: <https://outlook.gihub.org>.

9.5 WATER DISTRIBUTION: HOW IS IT REGULATED?

The basic Principles on which the 2015 Water Law is based are the general ownership of water, the right of all citizens to have access to water, the right to a healthy environment, the management of water in accordance with the practices of good governance.

However, water allocations per region and use across sectors in terms of water rights are not explicitly cited in the water strategy (Box 9.2) but the government policy to allocate water across regions and sectors is based on water supply. Still, the level of bulk water distribution could be derived from the water institutions' prerogatives and attributions.

Box 9-2: Water Strategy

The 2015 National Water Plan ensures more efficient water management, through the development of an action plan based on three key pillars, including:

- Pillar 1 calls for increasing to 80% of the national average of the profitability of drinking water systems in the horizon 2025, the maintenance of the same level up to the year 2030 through the rehabilitation and maintenance of the sewerage networks, in addition to the repair of leakage, which will reduce the demand for drinking water by about 120 million m^3 per year by 2025. Moreover, the plan calls for water economy in irrigation by transforming traditional irrigation systems into local irrigation at a rate of 50,000 ha per year and saving 4.1 billion m^3 by 2020. This plan was Extended under the National water plan and the green Morocco plan in order to save an additional 3.2 billion m^3 by 2030.
- Pilar 2 focuses on the management and development of supply, through the mobilization of surface water and the setting up of dams, non-traditional water resources, such as sea water desalination to reach 510 million m^3 and the reuse of 325 million m^3 of waste water after purification by 2030.
- Pilar 3 includes preservation of surface and groundwater water resources and natural spaces, as well as the protection of sensitive areas against pollution, through the implementation of an action plan on artificial recharge of groundwater, protection of lakes and the preservation of oases and wetlands, the acceleration of the National Liquid Sanitation Programme and the implementation of a national flood protection programme and the establishment of programmes for the management of water resources in times of need.

Source: GiZ website: <www2.gtz.de>.

On the supply side, the country draws on seven major river basins: the Loukkos, Moulouya, Sebou, Bou Regreg, Oum, Tensift, and the Souss-Massa. Morocco has 150 dams (14 under construction) which mobilize a total of 17.6 billion m^3 of water.

On the demand side, dams' reservoirs supply municipal water. Water from these reservoirs is treated before being diverted into the water mains for distribution through 13 main water lines, spanning 1,100 km. Service lines branch off water mains to service individual houses.[103]

Yet, increased competition between different water uses (agricultural, domestic and industrial waters) and the interactions between water-energy-food nexus have prompted the government to move from a sectorial policy to an integrated water policy as there was a need to arbitrate the distribution between users (agricultural, domestic and industrial) which also raised the issue of water governance in the context of scarcity and competition.

Based on the above review of the sector regulation, the water distribution system is managed regionally:

[103] Worcester Polytechnic Institute website: <www.wpi.edu/>.

- at the central level, MEMEE sets policies and coordinates regional and local bodies;
- at the regional level, the ABHs are responsible for water mobilisation and allocations are decided in coordination with all stakeholders.
- At the local level, ONEE supplies the municipalities that are run by ONEE, the 3 concessions and the other régies, while the Casablanca concession is supplied from the Oum erRbia concession.

Similar to other countries in the region, and given the more acute demand for domestic/services and industrial use, the two sectors will be favoured to the detriment of agriculture and the environment.

10 PALESTINE

The water resources available to the Palestinians include springs, major groundwater, and harvested rainwater. About sixteen streams are shared between Israel and Palestine,[104] of which approximately two thirds originate on the Palestinian territory, flowing through Israel and partly discharging into the Mediterranean Sea to the west. The Jordan River is mainly used by Israel, while the Palestinians in the West Bank are banned from using it.

The most recent statistics from FAO AQUASTAT estimate the average total renewable water resources at 0.873 billion of m^3 for the 2013-17 period that is inequitably distributed across the country with a total withdrawal of more than 0.418 billion of m^3 with the following breakdown: 48% for agricultural use; 48% for domestic use; and 7% for industrial use. Yet, the real needs are 3 times the total renewable water resources. In the Palestinian Central Bureau of Statistics household survey of 2015, the water consumption is 50 litres per capita per day in the West Bank and 73 litres per capita per day in Gaza[105] both of which are below WHO's recommended daily consumption of 100 litres per capita per day.

The Palestinian water sector faces countless challenges, among them the groundwater extraction rate cap that is set by Israelis at under 100 million m^3 per year, insufficient water availability due to parsimonious water transfers from Mekorot, the Israeli Water Company, multiplicity of the small water utilities which are financially not viable, lack of transparency and accountability, underinvestment in maintenance and infrastructure, and a cumbersome institutional set up that prevents cooperation between key stakeholders.[106]

10.1 WATER AND WASTE WATER SECTOR UTILITIES, PPP AND SERVICE LEVELS

10.1.1 Utilities' Services

Currently, 4 public regional water and waste water utilities operate in West Bank and Gaza: the Coastal Municipalities Water Utility (CMWU), which serves about 200,000 inhabitants in Gaza; the Water Supply and Sanitation Authority (WSSA), which serves about 12,399 customers in Bethlehem and neighbouring towns; the Jerusalem Water Undertaking (JWU), which serves 59,195 customers; and the North Region Water Utility (NRWU) which is usually hardly mentioned or dismissed. In addition, 226 small water service providers operate at the local level within the West Bank and Gaza.

Further to the adoption of the water Law of 2014 that governs the sector, the water reform process is under way and some of the entities under the new institutional framework set up are still in the making. At any rate, all utilities will be under the tutelage of the Palestinian Water Authority (PWA):[107]

[104] GWP-Med, 2014.
[105] Palestinian Central Bureau of Statistics 2015 household survey.
[106] Mumssen, Yogita U., and Thelma Triche, eds., with support from Norhan Sadik and Ali Dirioz. 2017. Status of Water Sector Regulation in the Middle East and North Africa. World Bank, Washington, DC.
[107] Ibid.

- The National Water Company (NWC) will be established to assume responsibility for extraction of water and transmission of bulk water supply to providers. This function is currently assumed by Mekerot which supplies about 65 million m^3 of water per year to the Palestinians through the West Bank Water Department (which is currently functioning as the main bulk water supplier in the West Bank for the Palestinian communities).
- The Regional Water Utilities (RWUs) will be established in the larger municipalities to improve efficiency through economies of scale. The aggregation policy will start by expanding the 4 existing RWUs to include small service providers in their perimeter. New utilities will be established in large municipalities that will expand to include their natural clusters. The aggregation policy will target the large and small utilities:
    - In the Centre: JWU is the largest and oldest service provider serving 310,000 people in the two cities of Ramallah and Al-Bireh, 10 smaller towns, and more than 45 villages and 5 refugee camps. JWU was enacted in 1966 to develop new water resources, control all water projects in the area and bear the responsibility of providing the population with potable water. It is a corporatized entity, non-profit, and independent civil organization run by a Board of Directors with representatives from the two main municipalities in the area.
    - In the North: NRWU undertaking will be significant since the water sector in this region is more fragmented than in any other region requiring extensive planning and investment to have a number of joint service councils develop and consolidate water resources and infrastructure. The NRWU is not a recognized entity, as the cities, small towns, and municipalities provide the water and sewer services. In the North-Eastern Jenin area, a Joint Service Council (JSC) formed by eleven villages provides the water, according to the Joint Council for Services, Planning and Development (JCSPD) Bylaw, enacted in 2006. The development of this water utility has received the least attention though has had investment in developing water infrastructure in those governorates.
    - In the South: WSSA a much smaller utility than JWU, serves Bethlehem and the neighbouring towns of Beit Jala and Beit Sahour. The Southern Area Services Improvement (SAWSIP) Program, funded by the WB, aimed at improving sufficiency and efficiency of the water and waste water services in the southern area of the West Bank, preparing and implementing an appropriate institutional framework for water and waste water services provision, and building regulatory and institutional capacity. The desired impact was to restore infrastructure, strengthen institutions, and facilitate PSP presence in the economy. The program started in 1999 and was completed in early 2006 without the creation of a Southern Utility.
    - In the Gaza Strip: CWMU in addition to water divisions in a number of municipalities was established by Decree of the Minister of Local Government in 2010. Municipalities are represented in the general assembly of the Utility in proportion to the total assets owned by municipalities and transferred to the CMWU.
- The 226 small utilities are run according to 3 types of services: (i) Joint Water Service Council; (ii) a Municipal Water Department; and (iii) a Village Council. Selected small utilities out of the 226 existing ones include: Nablus, Tubas, Bethlehem, Hebron, Tulkarem, Anabta Ramallah,

Silat Ad Dahr, Ya'Bad, Al Zababdeh, Kufur Ra'Ie, Birqin, Jaba', Qabatiya, Arraba, Marj Ibn Amer, Jenin (two distinct utilities serving different areas), Maythaloun, Zeita, Beit Leed, Al Kafriyyat, Kafr Allabad, Deir Al Ghosoon, Qaffin, Bala'a, Illar, Attil, Baqa Al Sharqiya, Sabastia, Kufur Thulth, Deir Istya, Qarawa Bani Hassan, Kifel Haris, Biddya, Al-Zawya, Salfit, Bruqin, Kafr Al-Deek, Deir Ballout, Ni'Lin, Beituniya, Asira Ash Shamaliy, Beit Furik, Howwara, Beita, Jammain, Qabalan, Jayyous, Qalqilia, Azzoun, Hableh, Beit Liqia, Bani Zaid Al-Gharby, Al-Ittihad, Kobar Al-Auja, Jericho, Janata, Tuqu', Al-Ubeidiya, Za'Tara, Beit Fajjar, Dura, Ash Shuyukh, Beit Ummar, Al Yassriya, Taffuh, As Samu', Halhul, Ad-Dahiriya, Idhna, Tarqumiya, Beit Ula, Nuba, Kharas, Yatta, Sa'Ir, Bani Naim, Surif, Reef Dura.

- Joint Water Service Councils (JWSC), which are an aggregation of small village councils in rural areas where political or geographical constraints exist. JWSCs are an interim step before their eventual absorption into RWUs.
- Municipal Water Departments (MWD) where in the long term, these will be integrated under RWUs as the reform process is underway.
- Village Councils (VC) are elected by their communities to manage the local units. The VCs are responsible for providing clean drinkable water, defining water requirements, fixing fees and connection tariffs, preventing pollution and water contamination, as well constructing, managing, and controlling the sewerage network.

The time table to operationalize NWC is 2019 whereas the RWUs will take more time to materialize as the process of amalgamation will need more efforts.

10.1.2 Public-Private Partnership

There is currently no dedicated PPP law. Moreover, PPP programs currently fall under the remit of the Deputy Prime Minister's Office for Economic Affairs.

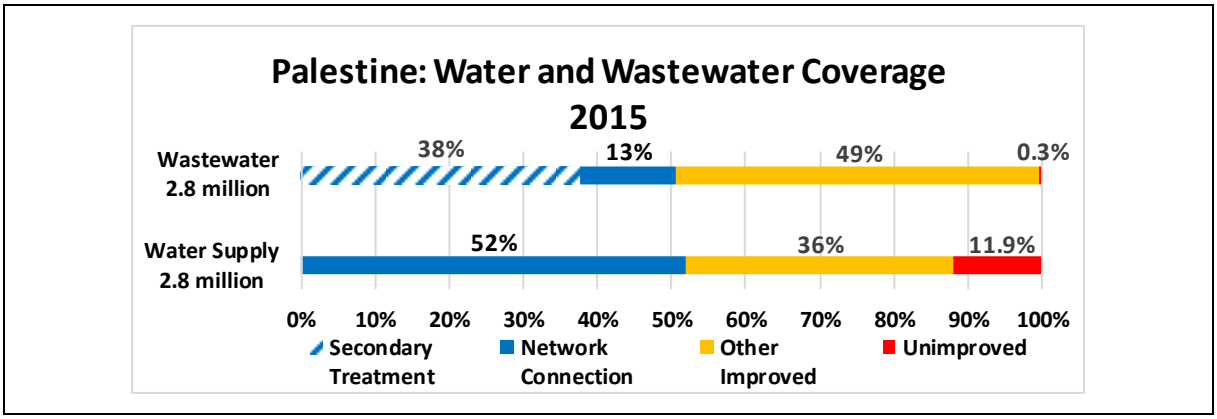
Two MCs were fairly successful but were terminated with the Intifada: Gaza from 1996-2002 with Suez and local partners; and Hebron from 1999-2002 with Veolia. Still, PPP contracts are being sought regarding the desalination station in Gaza, NRW reduction using PBCs, and WWTPs.

10.1.3 Service Levels

Water and waste water service coverage typologies are illustrated in Figure 10.1. Water service coverage is moderate as limited access to clean water concerns 11.9% of the population. Conversely, poor sanitation coverage is very low (concerns only 0.3% of the population) in 2015 based on the data provided by WHO-UNICEF Joint Monitoring Program (JMP).[108] With 38%, waste water treatment coverage is relatively high given the difficulty of operating WWTPs.

[108] WHO-UNICEF Joint Monitoring Program. WASH database: <https://washdata.org/data>.

Figure 10-1: Palestine Water and Waste Water Coverage



Source: Author based on JMP 2017.

10.2 WATER AND WASTE WATER SECTOR ORGANISATION AND OWNERSHIP

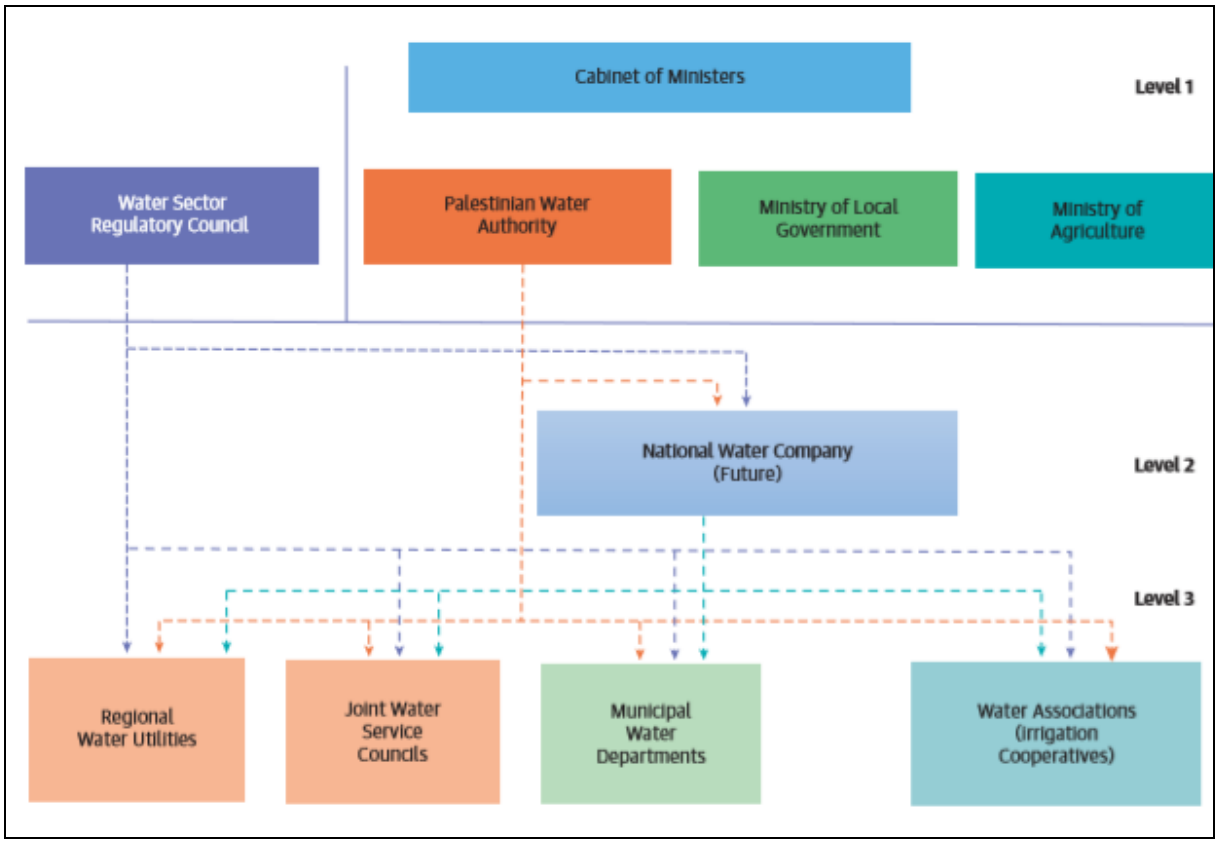
The Water Law[109] of 2014 has proposed a series of reforms in the water sector. The new Law: defines the general structure and function of the institutions governing and managing the sector; clarifies the responsibilities of the different ministries involved in the water sector; separates the ministerial functions from the regulatory functions; defines legal issues related to water, and establishes the West Bank Water Department into a government owned company and allows the PWA[110] to become the central body for water resource management, to establish regional water utilities and users' associations; . Some bodies were cancelled such as: (i) the National Water Council[111] which was established in 1996 as the policy making body for the water and waste water sector; and (ii) the West Bank Water Department. However, prior to passing the Water Law, the National Water and Waste Water Strategy[112] was revised in 2013 and has some discrepancies when compared to the 2014 Water Law: the Strategy calls for establishing a Water Sector Advisory Board, whereas the Law does not; and the Strategy calls for pricing bulk water in relation to its production cost while the Law stipulates unified national price for bulk water.

At the supranational level, Palestinian and Israeli water resources are managed by a Joint Water Committee (JWC) that consists of equal representatives of Israelis and Palestinians where decisions are supposed to be unanimous. However, Israel has a *de facto* veto power and the JWC did not work effectively since 2013. JWC's responsibilities are to: jointly manage water and waste water resources; protect water resources; cooperate and exchange information and resolve outstanding water issues; and regulate water supply. The JWC has formed 4 sub-committees: the hydrological committee to discuss and provide authorization for drilling; the committee on water projects for laying pipes and

[109] AICS. WASH report, June 2014.
[110] PWA website: <http://pwa.ps/english.aspx>.
[111] Development of an Institutional Framework and Organizational Structures for Water and Sanitation Service Providers in the West Bank – Palestine", Dalia Zakarya Daifi.
[112] PWA website: <http://pwa.ps/english.aspx>.

construction of reservoirs and pumping stations; the committee on sewage for the establishment of waste water treatment plants; and the committee on water pricing for setting selling prices of water by the Israelis to the Palestinians. However, the JWC does not operate as a joint-management committee, and there is an unevenness[113] between Israelis and Palestinians in terms of information, decision power and capacity, with the Palestinian side being the weakest. In addition there is no mechanism for solving disputes. On the Israeli side, the Israeli Civil Administration, Mekerot, and the Israel Water Commissioner are the counterparts in the JWC.

Figure 10-2: Water Law of 2014 - Institutional Framework



Source: PWA website: <http://pwa.ps/english.aspx>.

At the national level, water stakeholders under the new Water Law, which have the responsibility of "ensuring water and waste water service quality and efficiency to consumers at affordable prices, include (Figure 10.2):

- PWA manages resources, allocates, protects water quality, and develops projects.
- National Water Company (NWC) will assume responsibility for extraction and transmission of water and for selling bulk water supply to the JWSCs, RWUs, and other local authorities and associations.
- Water Sector Regulatory Council (WSRC)[114] was created by the Cabinet according to the Water Law of 2014.[115] The WSRC responsibilities are to set water prices, monitor the

[113] World Bank, 2009. "Assessment of Restrictions on Palestinian Water Sector Development," Sector Note.
[114] RWC website: <www.wsrc.ps/>.
[115] National Water Policy and Strategy; http://procurement-notices.undp.org/view_file.cfm?doc_id=27192.

performance of the Water and Waste Water service providers from economical, technical and environmental point of view, issue licenses for water, waste water and desalination infrastructure, establish water quality assurance services and manage citizens' complaints. WSRC also monitors the water Service Providers and the National Water Company in the water production, transportation, distribution, and consumption and in waste water management. However, the bylaws still need to be developed such as water tariff regulation, regional water utilities regulation, regulation on licensing of service providers, water and waste water connection regulation, strict controls on using groundwater including elimination of free abstraction, etc.

- Ministry of Agriculture (MOA)[116] is responsible for managing the agricultural resources in Palestine. Its responsibilities include: Establishing policy and regulation of irrigation and promotion and organization of farmers' associations; working closely with the PWA for the rehabilitation of water resources, protecting of water resources from pollution and promotion of their rational and economic use for agricultural production.
- Environmental Quality Authority (EQA) is responsible for defining environmental regulations related to water quality, including standards for the discharge of treated waste water into natural water courses.
- Ministry of Local Government (MOLG)[117] is considered to be the cornerstone of local governance. The Ministry supports the Joint Service Councils, oversees the local council units and provide infrastructure services to all areas, both within and outside the municipal boundaries.
- Ministry of Public Work and Housing (MOPWH)[118] involvement in the water sector includes the improvement of housing standards related to health, safety and housing services such as water and sanitation facilities, and waste water disposal.
- Ministry of Planning and Development (MOPAD),[119] is responsible for the strategic planning process at the national level. It seeks the participation of all ministries in the preparation of the 3-5 year development plan (taking availability of water resources into account) and coordinate the development and the projects in the water sector in a sustainable manner.
- Ministry of Health (MOH)[120] sets the standards related to the public health such as: drinking water quality; discharge of treated sewage in bathing water; disposal of treated sewage in the natural environment and in the sea which could affect fisheries; reuse of treated waste water for irrigation, which may affect the agricultural products, and the disinfection of and drinking from water storage.
- Ministry of Finance (MOF) responsibilities are notably to control financial activities of the country and its expenditure, supervise, study and organize monetary funds and the economic and political analysis of financial aid directed towards the country, supervise and control the private capital funds of the Palestinian National Authority and provide the money needed for facing the government's expenditures.

[116] National Water Policy and Strategy; <http://procurement-notices.undp.org/view_file.cfm?doc_id=27192>; and the Environment Sector Strategy, 2010.
[117] Idem.
[118] Idem.
[119] Environment Sector Strategy.
[120] Environment Sector Strategy, 2010.

At the local level, water stakeholders include:

- VCs (see above)
- MWD (see above)
- JWSC (see above)
- Points of delivery of the bulk water are RWUs (including the 4 utilities) for all water users (other than for irrigation), and Water Users Associations for irrigation water.

10.3 BASIS FOR WATER AND WASTE WATER PRICING AND TARIFF SETTING

The West Bank and Gaza 4 regional utilities and about 226 small water utilities suggest water tariffs, cost of services, collection procedures, and develop financial, administrative and technical regulations that will be reviewed and authorized by JWA. This will change with the reform underway where WSRC will serve as the regulator that will notably set tariffs. The tariff structure includes a variable element with 4 block tariffs for water and 1 block tariff for waste water. However, the tariff rates are differentiated by utilities.

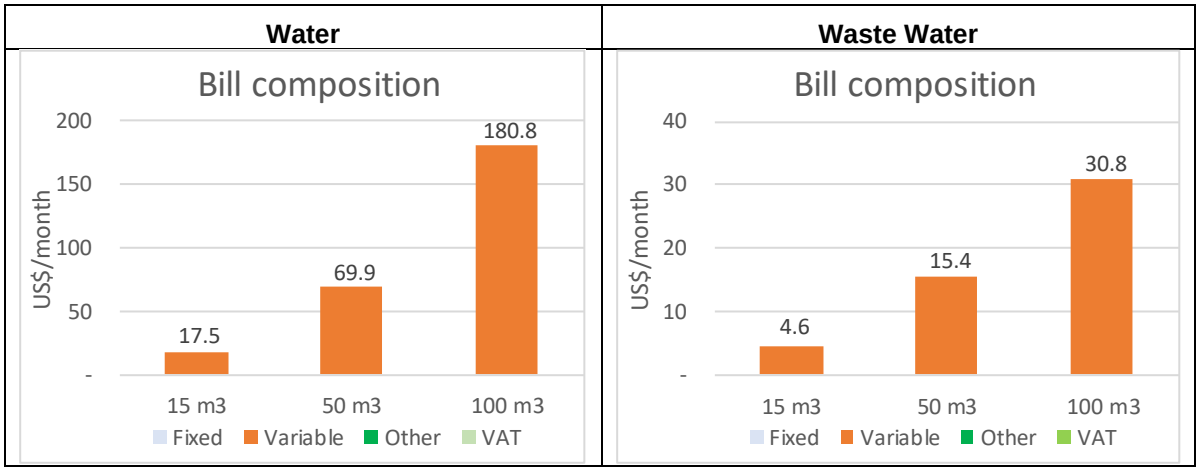
For Ramallah and Al Bireh:

- The water tariff is as follows:
  - 1st block up to 20 m^3: Israeli Shekel (IS)/m^3) 4.5.
  - 2nd block more than 20 up to 40 m^3: (IS/m^3) 5.6.
  - 3rd block more than 40 up to 60 m^3: (IS/m^3) 6.8.
  - 4th block more than 60 m^3: (IS/m^3) 9.
- The waste water tariff is as follows:
  - 1st block more than 0 m^3: (IS/m^3) 1.2.

As an example, a water and waste water tariff in Ramallah and Al Bireh for hypothetical households consuming monthly 15 m^3, 50 m^3 or 100 m^3 in 2018 amounts to US$ 22.1, 85.4 and 211.6 respectively per month (Figure 10.3). The equivalent tariff per m^3 is as follows (US$/$m^3$): 1.47, 1.71 and 2.12 respectively.

The 1st tranche tariff is the highest in the region and seems difficultly affordable by lower income households. In fact, the household bill could significantly exceed the water bill during summertime where households supplement their supply with bottled water and trucks. Tariff levels seem high enough to cover operational costs for water but not waste water which makes it difficult to ensure financial and environmental sustainability. Moreover, high tariffs, especially if the hike is induced by Mekorot, reduce economic competitiveness as they could considered as a surcharge. Finally, the low availability of water per capita could increase water-borne diseases among the poor.

Figure 10-3: Water and Waste Water Bill per Month in Ramallah and Al Bireh in 2018



Source: Author based on above cited Tariffs.

10.4 WATER AND WASTE WATER SECTOR UTILITIES REMUNERATION MODELS

10.4.1 Utilities' Status

There are 4 regional public utilities under the PWA tutelage and 226 small municipalities with various management typologies. In reality, there are four models for the provision of services in domestic water supplies, otherwise called Service Providers, either in the form of: (i) a Regional Utility; (ii) a Joint Water Service Council; (iii) a Municipal Water Department; and (iv) a Village Council. All these water service providers are commercially weak, with poor service quality, and mostly intermittent supply. Yet, it is assumed that in all cases, the water and waste water networks are owned by municipalities whereas services are performed by PWA or service providers. Under the new 2014 Water Law, PWA and service providers are responsible for supplying drinkable water and collecting and treating waste water effluents.

10.4.2 Utilities' OMEX Financing

The plethora of small service operators has prevented the efficient development and management of the water and waste water services. The financing policy adopted within the sector is the water-pays-for-water principle, where OMEX and CAPEX are totally financed by the water tariff (full cost recovery), rather than through taxes or transfers. Ultimately, PWA and small service operators' revenues are insufficient for proper operations, maintenance and capital investments. Moreover, high levels of nonrevenue water range between 28% and 48% for the service operators[121] which does not help the bigger picture. As a result, PWA relies on subsidies from the government and aid from donors to bridge the deficit of water operations.

[121] ACWA website: <www.acwa.org>.

10.4.3 Utilities' CAPEX Financing

CAPEX has been funded by the government and IFIs over the years. However, Palestine face a perpetuation of ad-hoc emergency planning as opposed to strategic planning and uncertainty and delays in infrastructure project authorization and implementation due Israel policies. Yet, the reform of the water sector through consolidation and efficiency is bound to attract private sector participation for the operation of water and waste water system through MCs as successfully experienced before the 2002 Intifada (see above). The major IFI financing for water and waste water infrastructure include the Arab Funds the European Union and EIB, France, Germany, Sweden, the United States through USAID and the World Bank.

10.4.4 Future Investment Needs

The National Water and Waste Water Strategy for Palestine – Toward Building a Palestinian State from Water Perspective. Palestinian Water Authority (July 2013) – was prepared by the PWA.[122] The document provides "the planning and management framework necessary for the protection, conservation, sustainable management and development of water resources and for the improvement and sustainable management and provision of water supply and waste water services and related standards in Palestine." PWA has also prepared a water sector plan for 2016-2018 with the following vision, message and four strategic goals, as well as their level of intervention, responsibilities and indicators.[123] The strategic vision is: to have a sustainable and integrated water resources to meet the needs and the development of the State of Palestine. Its strategic message is to have an authority that manages, improves and protect the water sources and its infrastructure in an equitable, integrated and sustainable manner in order to provide safe water uses as to endure the protection of the environment and the achievement of the development goals of the Palestinian Community. However, the strategy is not costed and future investment needs could not be reviewed.

10.5 WATER DISTRIBUTION: HOW IS IT REGULATED?

There are no water rights recognized internationally regarding the Jordan River riparian countries and the Ashkelon-Gaza-Sinai Aquifer.

Regarding the Jordan River, under the 1954 Main Plan proposed by US Ambassador Eric Johnston, the Jordan River and its tributaries water sharing is based on the authoritative but never ratified Johnston Plan between Lebanon, Syria, Israel, and Jordan including the West Bank.[124] Under this unofficial arrangement, the West Bank, which was part of Jordan at the time, was entitled to 100 million m^3 annually. Currently, neither Jordan nor the West Bank extract any water from the Jordan River but they receive water from Israel: 53 and 58 million m^3 respectively per year. Lebanon extraction does not

[122] National Water Policy and Strategy: <http://procurement-notices.undp.org/view_file.cfm?doc_id=27192>.
[123] PWA, 2015, Strategic Plan for PWA: <www.pwa.pd>.
[124] Wilby, Robert. 2010. *Climate Change Projections and Downscaling for Jordan, Lebanon and Syria.* Synthesis Report prepared for the World Bank.

exceed 10 million m^3 annually while Israel is the larger user with extractions ranging from 580 and 640 million m^3 depending on the yearly availability of water.

Moreover, under the Oslo Peace Accord II, Palestine had the right to extract up to 800 million m^3 from underground water (mostly shared with Israel) and receive transfers from Mekorot. Yet, Palestine lacks sovereign control over these water resources where Jordan River water sharing was not considered in the Oslo Accord II, water extractions are below the cap imposed by Israel and the transfer from Mekorot are below the decided volumes and are over-priced.[125] Also, Palestine was not invited to participate in the Red Sea-Dead Sea Conveyance project.

Regarding the coastal Aquifer, there are no formal or informal agreements for the optimization of use or protection of the aquifer. Political constraints currently make riparian cooperation over water resources in the Coastal Aquifer Basin unlikely, particularly between Israel and Palestine. Most of the abstraction in the basin originates from Israel (around 66% of total abstraction), while the Gaza Strip is responsible for 23% and Egypt has the lowest abstraction at about 11%.

Given the highly restricted access to water resources and in light the indefinite postponed of the Final Status of water rights of the Peace Treaty with Israel, Palestine is not even getting half the needed water volume it is entitled to.

The fragmented water resources is matched by the regional and local fragmentation of water distribution responsibilities between the PWA, the Municipal Water Departments and the 4 RWUs. Those are responsible for water extraction from scattered wells and its distribution in the West Bank and Gaza RWUs and small utilities. The supply is topped off by Mekorot transfers to PWA that distributes water through mains in the West Bank. Gaza fragmentation is also prevalent where small utilities pump some 150,000 m^3 per day from brackish and contaminated underground water. An EU-funded desalination station in 2017 provides 6,000 m^3 per day of drinkable water that will be expanded to reach 20,000 m^3 per day in 2019 although it is facing chronic electricity shortages.

[125] Al-Shabaka website: <https://al-shabaka.org>.

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The most recent statistics from FAO AQUASTAT estimate the average total renewable water resources at 4.62 billion of m^3 for the 2013-17 period that is inequitably distributed across the country with a total withdrawal of more than 3.3 billion of m^3 with the following breakdown: 80% for agricultural use; 15% for domestic use; and 5% for industrial use.

Water and waste water service typologies reveal that access to clean water (1.4% of the population) and sanitation (2.2% of the population) is close to full coverage in 2015 according to WHO-UNICEF Joint Monitoring Program (JMP).[126]

The water sector infrastructure and service have been under a lot of strain since 2011. The water scarcity and expected climate change effects are already putting to the test a system that is overstretched (large transfer of water from north to south and water treatment is not always up to international quality standards) where water augmentation is coming at a high price and where service improvement of public utilities is reaching a plateau due to financial constraints: cost recovery, unaccounted for water and tariffs have not been addressed heads on. To top it all, the highly centralized decision-making process is revealing its limitations in terms of equitable water rights and allocation.

11.1 WATER AND WASTE WATER SECTOR UTILITIES, PPP AND SERVICE LEVELS

11.1.1 Utilities' Services

The water and waste water is based on highly centralized responsibilities and decision-making powers. It is monopolized by 2 utilities respectively and one Directorate focusing on rural water supply. These include:

- The Société Nationale d'Exploitation et de Distribution des Eaux (SONEDE or National Company of Exploitation and Distribution of Waters) is an Etablissement Public à Caractère Industriel et Commercial (EPIC or public industrial and commercial establishment) with its own legal personality and financial autonomy created in in 1968. It is under the supervision of the Ministère de l'Agriculture, des Ressources Hydrauliques et de la Pêche (MARHP or Ministry of Agriculture, Water Resource and Fisheries). SONEDE is responsible for the production and distribution of drinking water as well as the management of industrial waters. SONEDE provides potable water services to more than 10 million people across the country (more than 83% of the national population). Currently, SONEDE serves about 500 cities and towns (100% coverage in urban areas), and 2,659 villages and rural communities (about half of the rural population, with another 40% being served through user association schemes). The Ghdir El Golla (GEG) complex located in the north-west of the capital maintains a raw water reserve

[126] WHO-UNICEF Joint Monitoring Program. WASH database: <https://washdata.org/data>.

allowing the securing of water supply, ensures the treatment of the drinking water necessary for greater Tunis (governorates of Tunis, Ariana, Ben Arous and Manouba) and provides an adjunct for Cape Bon (Nabeul Governorate) and the governorates of Zaghouan and Bizerte as required. These waters come from two dams in Sidi Salem on the wadi of the Medjerda as well as from the northwest dams that pass through the canal Medjerda/Cap-Bon.

- The Office National de l'Assainissement (ONAS)[127] is an EPIC with its own legal personality and financial autonomy created in 1974. It is under the supervision of the Ministère de l'Environnement et du Développement Durable (MEDD or Ministry of Environment and Sustainable Development). Pursuant to the law of 1993, it has responsibilities for the protection of water resources and the environment: combating all sources of water pollution in the areas within its purview; management, operation, renovation and construction of all urban sanitation works such as WWTPs, pumping stations, networks and marine outfalls; promoting the distribution and sale of treated water, sludge from treatment plants, and all other products; planning, preparation and execution of projects on behalf of the State and local authorities. The ONAS has a plan for sanitation in rural areas and more generally in the villages of more than 4,000 inhabitants in 2021 as almost half of the population is not connected to the sewer and 20% of the population still uses septic tanks.
- The Direction Générale du Génie Rural et de l'Exploitation des Eaux (DGGREE or Directorate General for Rural Engineering and Water Operations), which is under MARHP, is responsible for supplying water in rural areas that are not served by SONEDE. In addition to agriculture tasks, it coordinates drinking water programs in urban and rural areas, coordinates water supply programs in rural areas, and monitors and evaluates projects.

11.1.2 Public-Private Partnership

PPP contracts are bound by Law No. 49 of 2015.[128] Additionally, Decree No. 2014-1039 covers both PPPs and concession contracts. Although PPP and Concession contracts are both governed by the same Unit (Instance nationale des PPP), this new law still coexist with the previous concession laws: In fact, PPPs in Tunisia were previously governed by Law No. 2008-23 dated on April 1st 2008 relating to the concessions regime (referred to as the "Concessions Law").

The Présidence du Gouvernement (PdG or Prime Minister's Office) responsibility regarding PPP is to pursue the quality of the regulatory reform. Its principal mission is to centralize all laws proposed by the various ministries, to ensure their conformity with legislation, to compile all legal texts that are to be published in the official Gazette and to approve their publication. Reporting to the chief of staff of the head of government since 2002, the General Directorate of Privatization supervises privatization operations in cooperation with the other public entities concerned.

- The Instance Générale des Partenariats Public Privé (IGPPP or General Public Private Partnership Ruling Body) is a public body specializing in concession and PPP contracts which aims to minimize risks and strengthen the capacity of the public sector in concession contracts and partnership contracts.

[127] ONAS website: <www.onas.nat.tn>.
[128] Tunisia Offical Gazette Site : <www.legislation.tn/sites/default/files/news/tf2015491.pdf>.

- Unité de Suivi des Concessions (USC or Concession Monitoring Unit) created by Decree No. 2 013-4630 of 18 November 2013 within the PdG is an advisory unit to provide support for government agencies in the preparation, tendering and monitoring of concession projects. In particular, it is responsible for national coordination of concessions through: helping to prepare and oversee the execution of concessions, and in general the negotiation of investments requiring the use of new forms of partnership between the public and private; helping to build the capacity of government employees in the areas of concessions; promoting regional concession projects; and helping the government to prepare its strategy on new forms of co-operation between the public and private sectors, and PPP in particular.

The Ministère de l'Economie et des Finances (MEF or Ministry of Economy and Finance) oversees in terms of its PPP attributions the:

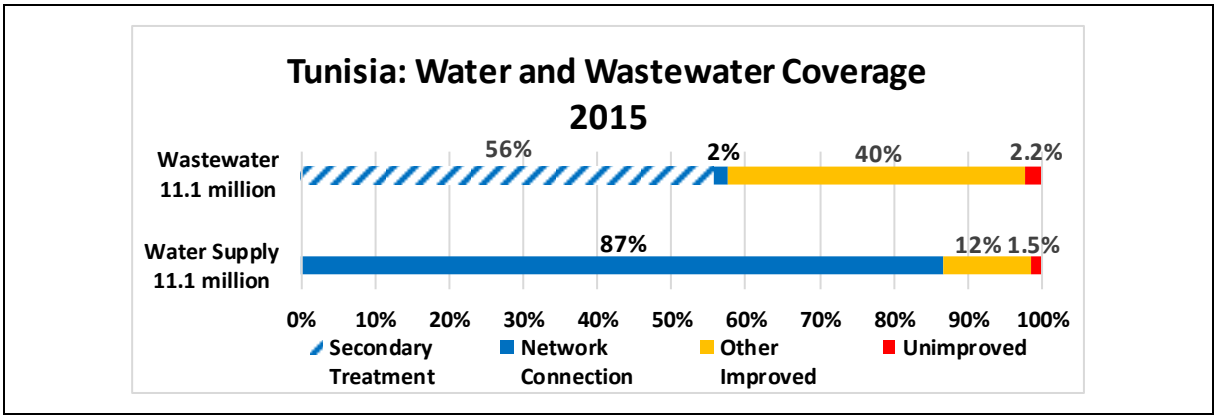
- Siège social or Head office which intervenes in the PPP project preparation.
- Direction General de la PPP (DGPPP or General Directorate of PPP) which has the following responsibilities: development of legislation in the taxation, accounting and financial areas and in the competitive tendering of PPP; strengthening international and regional co-operation in PPP to take advantage of financing mechanisms in the area; monitoring and guiding the preparation and award of projects between the public and private sectors; and creating a database.

Few Desalination Station (Jerba, Meliane and Chotrana) BOT contracts were launched in the late 2000s and were cancelled in early 2011.

11.1.3 Service Levels

Water and waste water service coverage typologies are illustrated in Figure 11.1. Population having limited access to clean water and sanitation reached 1.4% and 2.2% of the total population respectively in 2015 based on the data provided by WHO-UNICEF Joint Monitoring Program (JMP).[129] Waste Water treatment is among the highest in the region with 56%.

Figure 11-1: Tunisia Water and Waste Water Coverage



Source: Author based on JMP 2017.

[129] WHO-UNICEF Joint Monitoring Program. WASH database: <https://washdata.org/data>.

11.2 WATER AND WASTE WATER SECTOR ORGANISATION AND OWNERSHIP

The Water Code, which was first adopted in 1975 and amended in 1987, 1997 and 2001, is the principal legislative tool for the water and sanitation sector. The Water Code, which is in need of further revision, is currently being reviewed by the government based on the proposed amendments to the national consultations, by the specialized offices and monitoring committees. These are aimed at ending the over-exploitation of certain groundwaters, preserving the resources from pollution and strengthening the role of civil society in water governance. Conversely, the right to water has been officially recognized in the new Tunisian Constitution: Article 44 provides that “the right to water is guaranteed. It is the duty of the State and of the society to preserve water and to rationalize its use.”

The Conseil National de l’Eau (CNE or National Council of Water) created in 2010, oversees the water sector and assists MARHP in defining the general principles for mobilizing and enhancing the use of water resources. Chaired by the MARHP, it is a strategic advisory body comprising representatives of several ministries, enterprises and national organizations. Under CNE lies three main vertical structures where decision making is very centralized: MARHP is responsible for water resources and the provision for water; MEDD is responsible for water quality, in conjunction with the Ministry of Public Health, and sanitation; and the PdG in conjunction with MEF is in charge of the transition towards PPP. The main water sector stakeholders include:

- MARHP, which in accordance with Article 2 of Decree No. 2001-419, is in charge of water management. MARHP is also responsible for agricultural activities, natural resources, soil conservation, the field of plants and forestry, the management of large dams and fisheries. MARHP establishes policies for the sector, prepares plans for the sector's development, oversees the preparation and follow-up of studies, directs the planning of investment, and exercises oversight authority over institutions involved in carrying out the missions within its purview. MARHP carries out its functions at the central headquarters through central directorates, and outside the headquarters through public companies such as the SONEDE and through semi-autonomous institutions such as DGGREE.
    - SONEDE is in charge of domestic water services.
    - DGGREE supplies water in rural areas that are not served by SONEDE and coordinates drinking water programs in urban and rural areas, coordinates water supply programs in rural areas, and monitors and evaluates projects in addition to its agricultural attributions.
    - Bureau de la Planification et des Equilibres Hydrauliques (BPEH or Office of Planning and Hydraulic Balance) is the agency responsible for coordinating the various players in the water system, planning the mobilization of water resources, allocating water among uses, and monitoring the water system's functioning. The BPEH is in charge of developing the water strategy to 2050 that was initiated in 2009 with the African Development Bank funding.
    - Commissions Régionales pour le Développement Agricole (CRDA or Regional Agricultural Development Commissions) are the regional directorates of MARHP in

each governorate. They are in charge of implementing the government's agricultural policy. They oversee water and soil conservation, manage hydraulic equipment and oversee distribution of agricultural water to farmers. They recover waste water and transport to irrigated agricultural zones.

- Direction Générale des Barrages et des Grands Travaux Hydrauliques (DGBGTH or General Direction of dams and major hydraulic works) is responsible for the management, regularization and monitoring of the water quality of dams and their infrastructures. The DGBGTH implements the dams' policy and prepares a daily report on the state of the dams, their capacity and their level of siltation.
- The Société d'Exploitation du Canal et Adductions des Eaux du Nord (SECADENORD or Company operating the Canal and networks of the North Water) is a public institution of an industrial and commercial nature, endowed with legal personality and financial autonomy. SECADENORD ensures the operation, management, and maintenance of the canal and the water transfer lines of Sidi Salem, Ichkeul Lake, and the dams of the extreme north of Tunisia to their users. This company is responsible for the distribution and sale of the dams' waters to the various bodies such as SONEDE and DGGREE. The SECADENORD sells water to the SONEDE at 0.37 Dinar Tunisien (DT)/m^3.

- MEDD prerogatives are protection of natural resources and the fight against pollution, the protection of the quality of life and the fight against the impacts of climate change and desertification. MEDD is responsible for legislation, policies, preserving the environment and introducing ecological good governance. MEDD is also involved in investments and pollution control as the problem of industrial discharges has not yet been solved and sewage plants continue to receive industrial discharges mixed with domestic waste water without pre-treatment. Several entities fall under its tutelage with most relevant ones for water resources are:
  - The Agence Nationale pour la Protection de l'Environnement (ANPE or National Environmental Protection Agency) is involved in preparing and implementing the general government policies for combating pollution and protecting the environment. It oversees the integrity of the process for preparing, monitoring and improving environmental assessments and practices in Tunisia.
  - ONAS is in charge of waste water services. However, there is an institutional vacuum for the setting up and management of sewage treatment plants in villages with less than 4,000 inhabitants as these villages are neither covered by ONAS not by DGGREE and SONEDE mandates. More recently and in an attempt to fill this gap, the Restricted Ministerial Council of June 2016 clarified the roles of the actors for rural sanitation: the areas of more than 3,000 inhabitants will be supported by ONAS, 1,000 to 3,000 by the municipalities and for the "dispersed" (less than 1,000 inhabitants) by the Agricultural services of the MARHP under the responsibility of the DGGREE.
- PdG (see previous section)
- MEF (see previous section)

11.3 BASIS FOR WATER AND WASTE WATER PRICING AND TARIFF SETTING

Water tariffs are determined by ministerial order after being studied and proposed by the SONEDE. It aims to ensure access to water for all, and guarantee social and regional solidarity, a reasonable use of the resource and the financial balance of the SONEDE.

Pursuant to the order of MEF and the MEDD, ONAS sanitation tariffs were increased on April 28, 2017.

The tariff setting is highly progressive and selective and relatively complex in Tunisia. The purpose of 7 brackets and the increase in rates between each bracket, especially substantially from the 2nd bracket, while still not creating too many rate differences for the modest consumers, is to encourage them, and especially the largest ones, to moderate or reduce their consumption to prevent them from passing into the next higher bracket. This approach successfully reduced consumption but penalized the largest consumers that had to seek alternative resources (wells, trucks, etc.).[130]

The water and waste water tariff structure includes a two-pronged fixed element per bracket and 2 variable elements within each bracket. Different fixed and variable rates are used for water and waste water. A social tariff exists for stand posts and consumption that does not exceed 20 m3 per month. The fixed and variable elements do not vary by region but are different for water and waste water and vary by customers' affiliation:

- The fixed element is intended for the management, maintenance and modernization of existing facilities. It also enables the production of new installations and the extension of the drinking water and sanitation distribution network.
- The variable element of water and waste water is based on the tariff grid and is based on real consumption that is metered.

1. Water for domestic use: the rate is as follows:

1.1 Domestic Water use for customers connected to both the SONEDE network and the ONAS network:

- User not **exceeding a quarterly consumption of 20 m^3 of water**; Fixed amount: 1.875 DT/Quarter; Amount according to consumption: 0.028 DT/ m^3 of water consumed
- User with a **quarterly consumption of water not exceeding 40 m3 and more than 20 m^3**; Fixed amount: 1.875 DT/Quarter; Amount according to consumption: 0.041 DT/ m^3 of water for the first 20 m^3 and 0.245 DT/m3 for the remainder of the consumption
- User with a **quarterly consumption of water not exceeding 70 m^3 and more than 40 m^3;** Fixed amount: 5.865 DT/Quarter; Amount according to consumption: 0.257 DT/ m^3 of water for the first 20 m^3 and 0.408 DT/m3 for the remainder of consumption
- User with a **quarterly consumption of water not exceeding 100 m^3 and more than 70 m^3**; Fixed amount: 11.515 DT/Quarter; Amount according to consumption: 0.408 DT/m^3 of water for the 70 first m^3 and 0.675 DT/ m^3 for the remainder of consumption
- User with a **quarterly consumption of water not exceeding 150 m^3 and more than 100 m^3**; Fixed amount: 12.090 DT/Quarter; Amount according to consumption: 0.429 DT/m^3 of water for the 70 first m^3 and 0.700 DT/m^3 for the remainder of consumption

[130] Plan Bleu website: <www.planbleu.org>.

- User with a **quarterly water consumption of more than 150 m³**; Fixed amount: 12.450 DT/Quarter; Amount according to consumption: 0.429 DT/m³ of water for the 70 first m³ and 0.866 DT/m³ for the remainder of consumption

1.2 User (domestic water) connected to the SONEDE but not connected to the ONAS network as this user pays the same amount as those of point 1.1 but does not pay a fee to ONAS.

1.3 Water user domestic use using water supplied by wells or water tank, etc. In this case the user does not pay the ONAS even if it is connected to the network.

2. Water use for tourism. For the tourism water use, the charge is as follows: Fixed amount: 12.425 DT/Quarter; and Amount according to consumption: 1.540 DT/m³ of drinking water.

3. Water use in industry, trade, professional or other: Water for use in industry or other polluting activity: Fixed amount: 12.425 DT/Quarter; Amount according to consumption: 1.215 DT/m³ of drinking water, this amount is applied to the discharge into the sewer network of ONAS which is complying with the national standards of rejection in the public network.

Waste Water charges per quarter are reported in Table 11.1.

Table 11-1: ONAS Waste Water Charges Structure by Affiliation, 2017

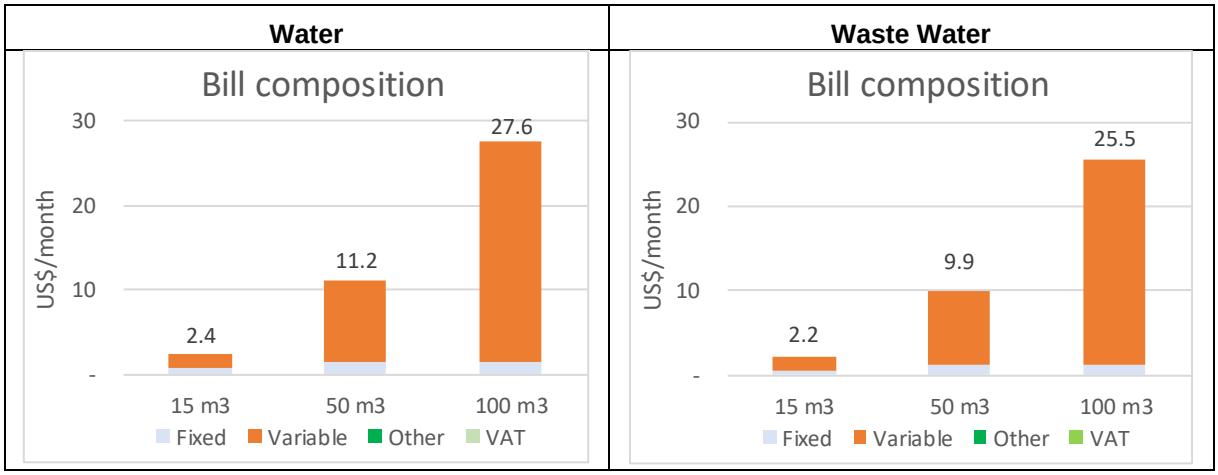
Consumption	Consumption Bracket	Charge	
		Variable	Fixed
m³/quarter		Millimes or 1000th of DT	
Domestic			
0-20	0-20	26	1735
21-40	0-20	38	1735
	21-40	227	
41-70	0-20	238	5430
	24-70	378	
71-100	0-70	378	10660
	71-100	625	
101-150	0-70	397	11195
	71-150	648	
+151	0-70	397	11525
	+71	802	
Tourism		1425	11505
Industrial or Polluting Activity			
Effluents compliant with National Sewerage standards		1125	11505
Effluents compliant with nature regenerating capacity		815	11505
Effluents non-compliant with National Sewerage standards		1125 + (Qx540)	11505
Effluents non-compliant with nature regenerating capacity		815	11505
Commercial, Professional and others			

Consumption	Consumption Bracket	Charge	
		Variable	Fixed
m^3/quarter		Millimes or 1000th of DT	
Effluents compliant	<10	762	11505
Effluents compliant	>10	947	11505
Effluents non-compliant with National Sewerage standards		1125 + (Qx540)	11505
Administration			
Effluents compliant		1125	11505
Effluents non-compliant with Sewerage standards		1125 + (Qx540)	11505

Note: Q is a pollution coefficient that represents the amount of additional pollution to the discharge standards in the public sanitation network. It is determined based on the results of the analyses done on a sample of the user's rejection into the network.

Source: ONAS website: <www.onas.nat.tn/En/fr/image/pdf/Tarification.pdf>.

Figure 11-2: Water and Waste Water Bill per Month in Tunisia in 2018



Source: Author based on Tariffs cited above.

For Illustration purposes, Tunisian water waste water tariffs calculated for hypothetical households consuming 15 m^3, 50 m^3 or 100 m^3 per month in 2018 amount to US$ 24.7, 21.1 and 53.1 respectively per month (Figure 11.2). The equivalent tariff per m^3 is as follows (US$/$m^3$): 0.31, 0.42 and 0.53 respectively.

The 1st tranche tariff seems affordable by lower income households. The rates above the social tariff are high enough to cover operational costs for water and waste water (almost equivalent to the water tariff) which makes it possible to reach financial and environmental sustainability. Having the right market price increases the country's competitiveness especially in terms of forgone environmental degradation cost. Finally, the availability of water per capita and waste water services has a positive effect on the well-being of the population.

11.4 WATER AND WASTE WATER SECTOR UTILITIES' REMUNERATION MODELS

11.4.1 Utilities' Status

Water and waste water services are provided by two centralized public utilities, SONEDE and ONAS respectively. Network assets are owned by municipalities and SONEDE provides drinkable water and ONAS collect and often treat waste water effluents.

11.4.2 Utilities' OMEX Financing

OMEX are financed by the utilities' own funds but are also subsidized by government transfers when need be. Average unaccounted for water has increased recently to reach on average 33% in 2016.[131] Still, it is among the lowest in the region although some efforts are needed to bring this figure down to the 10% benchmark. Similarly, bill collection is also among the highest in the region with 95%. Finally, the tariff structure is very sophisticated but is being eroded as tariff increases are not being set to reflect the market price for water and especially for waste water. Still, the first two social blocks are equivalent of 21% and 36% of average respective cost of service.

11.4.3 Utilities' CAPEX Financing

The SONEDE and ONAS use their own resources to carry out investments that are leveraged by both government budgetary transfers to fund water and waste water plans and programs and IFI grants and loans. Over the years, SONEDE accumulated a debt of DT 338 million in 2017 which might affect its financial viability in the long run. However, this will not increase its borrowing terms in the future as all the contracted IFI loans are sovereign loans guaranteed by the government of Tunisia. Tunisia is however reluctant to reduce the powers of these two monopolies by trying to engage the private sector to provide services through various forms of PPPs. The demand for additional funding is becoming more pressing, especially for desalination stations to bridge the water deficit gap with the growing population and the expected effects of climate change. Indeed, water consumption is growing at 3.5% per year in Greater Tunis alone in 2017.

Yet, Tunisia has an ambitious US$ 1.4 billion investment program, the National Water Security Investment Program (NWSIP), which aims to enable SONEDE to cope with growing water demand and the effect of climate change in the next 10-15 years, so as to continue being able to provide continuous (24 hours/7 days) water services to all its customers. SONEDE succeeded in 2014 in mobilizing US$ 630 million in funding from donors, especially the Gulf countries, to cover the full NWSIP financing gap.

[131] World Bank website: <http://documents.worldbank.org/curated/en/183991537626737059/pdf/Concept-Stage-Program-Information-Document-PID-Tunisia-Water-Sector-Reform-Project-P162165.pdf>.

The major IFI financing for water infrastructure include the African Development Bank, the EBRD, the European Union with the EIB, France with the AfD, Germany with the KfW and the GiZ, the Gulf-countries with Arab funds, Japan with JICA and the World Bank.

11.4.4 Future Investment Needs

According to the G20's Global Infrastructure Outlook, Tunisia faces an important infrastructure financing gap over the next 20 years, assuming current trends. During this period, Tunisia could provide up to US$ 5 billion in financing, but requires US$ 7.3 billion to meet its needs, resulting in a US$ 2.4 billion water sector investment gap until 2040. For 2019 alone, the investments that could be provided amount to US$ 164 million against US$ 234 million that are required leaving a deficit of US$ 70 million or 30%.[132]

EPC contracts are still favoured by SONEDE and ONAS although IFI funding will not match demand and will require from the government of Tunisia to change its borrowing policy vis-à-vis important water infrastructure investments.

11.5 WATER DISTRIBUTION: HOW IS IT REGULATED?

In addition to the Medjerda Basin water sharing between Algeria and Tunisia, water rights are enshrined in the 2015 Constitution. Still, the level of bulk water distribution could be derived from the water institutions prerogatives and attributions. Moreover, the strategy does not spell out the water quotas or rights by sector (Box 11.1).

Box 11-1: Water Strategy

The 2015 Water Strategy is to contribute to the socio-economic development, by securing the availability and access to the water resource for Tunisia for the 2050 horizon, in an efficient, equitable and sustainable manner, following an integrated water resource management approach. Further to formulating the strategy funded by the AfDB, it is expected that : (i) the Government adopts the water sector strategy for the horizon 2050 for Tunisia, and it is considered as a single repository of intervention for all actors; and (ii) the financing of the priority actions of the first action plans will be firmed up. The formulation of the strategy revolved around three components: (i) elaboration of the vision and strategy and implementation action plans; (ii) Technical Assistance; and (iii) project management and stakeholder participation.

Source: MARHP website: <www.marhp.gov.tn>.

On the supply-side, the country draws from 7 major river basins and several other smaller ones: Barbara; Beni M'Tir; Bezirk; Bir Mcherga; Bou Heurtma; Chiba; El Abid; El Aroussia; El Breck; El Haouareb; El Hamma; El Kebir; El Masri; Gamgoum; Ghdir El Goulla; Ghezala; Hajar; Joumine; Kasseb; Kebir; Lakhmess; Lebna; Mellègue; Mornaguia; Nebhana; Rmel; Rmil; Sarrat; Sejnane; Sfissifa; Sidi El Barrak; Sidi Saad; Sidi Salem; Sidi Yaich; Siliana; Tessa; Ziatine; and Souss-Massa. Tunisia has 37 dams which mobilise a total of 2.2 billion m^3 of water.

On the demand side, Tunisia has a very complex system of water transfer from the north to the south that is run by SECADENORD and that ensures water security to the Capital (85% of the resources) that seems to have reached its full capacity. The future demand will absorb the following allocations per year: agriculture with 79% of the total resources; domestic/services water with 15%; industry with 4%.

[132] G20 website: <https://outlook.gihub.org>.

The allocation across the sectors remain the same in the future so the strategy calls to meet the demand for water.

Yet, increased competition between different water uses (agricultural, domestic and industrial waters) and the interactions between water-energy-food nexus have prompted the government to move from a sectoral policy to an integrated water policy as there was a need to arbitrate the distribution between users (agricultural, domestic/services and industrial) which also raised the issue of water governance in the context of scarcity and competition.

Based on the above review of the sector regulation, the water distribution system is managed regionally:

- at the central level, MARHP sets policies and coordinates regional and local bodies;
- at the regional level, SECADENORD is responsible for water mobilisation and sales to SONEDE and DGGREE.
- At the local level, ONEE and the DGGREE supply the municipalities run by SONEDE and the DGGREE.

Similar to other countries in the region, and given the more acute demand for domestic/services and industrial use, the two sectors will be favoured to the detriment of agriculture and the environment.

12 COMPARATIVE ANALYSIS

Agriculture accounts on average for 78% of total fresh water consumption in the 8 countries, while its share in the total Gross Domestic Product (GDP) roughly equals 10% in 2017. Conversely, the average industrial value-added is 31% against 4% of water use and the services and domestic sector accounts for 53% of the value-added while not exceeding on average 19% of the total use in 2017 (Table 12.1 and Figure 12.1).

Table 12-1: Relative GDP and Water Use by Sector in the Beneficiary Countries, 2017

Country	Population	Agriculture		Industry		Services and Domestic	
	million	Value-added	Water Use	Value-added	Water Use	Value-added	Water Use
Algeria	41.3	12%	59%	37%	5%	46%	36%
Egypt	97.6	11%	86%	34%	3%	53%	11%
Israel	8.7	1%	58%	19%	7%	70%	35%
Jordan	9.7	4%	65%	25%	4%	64%	31%
Lebanon	6.1	4%	60%	14%	11%	74%	29%
Morocco	35.7	12%	91%	26%	2%	50%	7%
Palestine	4.7	3%	45%	20%	7%	63%	48%
Tunisia	11.5	10%	80%	23%	5%	59%	15%
Average		7%	68%	25%	5%	60%	27%
Weighted Average by Population		10%	78%	31%	4%	53%	19%

Note: World Development Indicators' value-added figures are not quite equal to 100%. Totals may not add up due to rounding.
Source: World Bank World Development Indicators. 2019. Washington, D.C.; Israel Water Authority website: <www.water.gov.il/>.and FAO AQUASTAT website: <www.fao.org>.

The major factors responsible for the rise in water consumption and depletion of non-renewable freshwater resources in the 8 countries over the last years are:

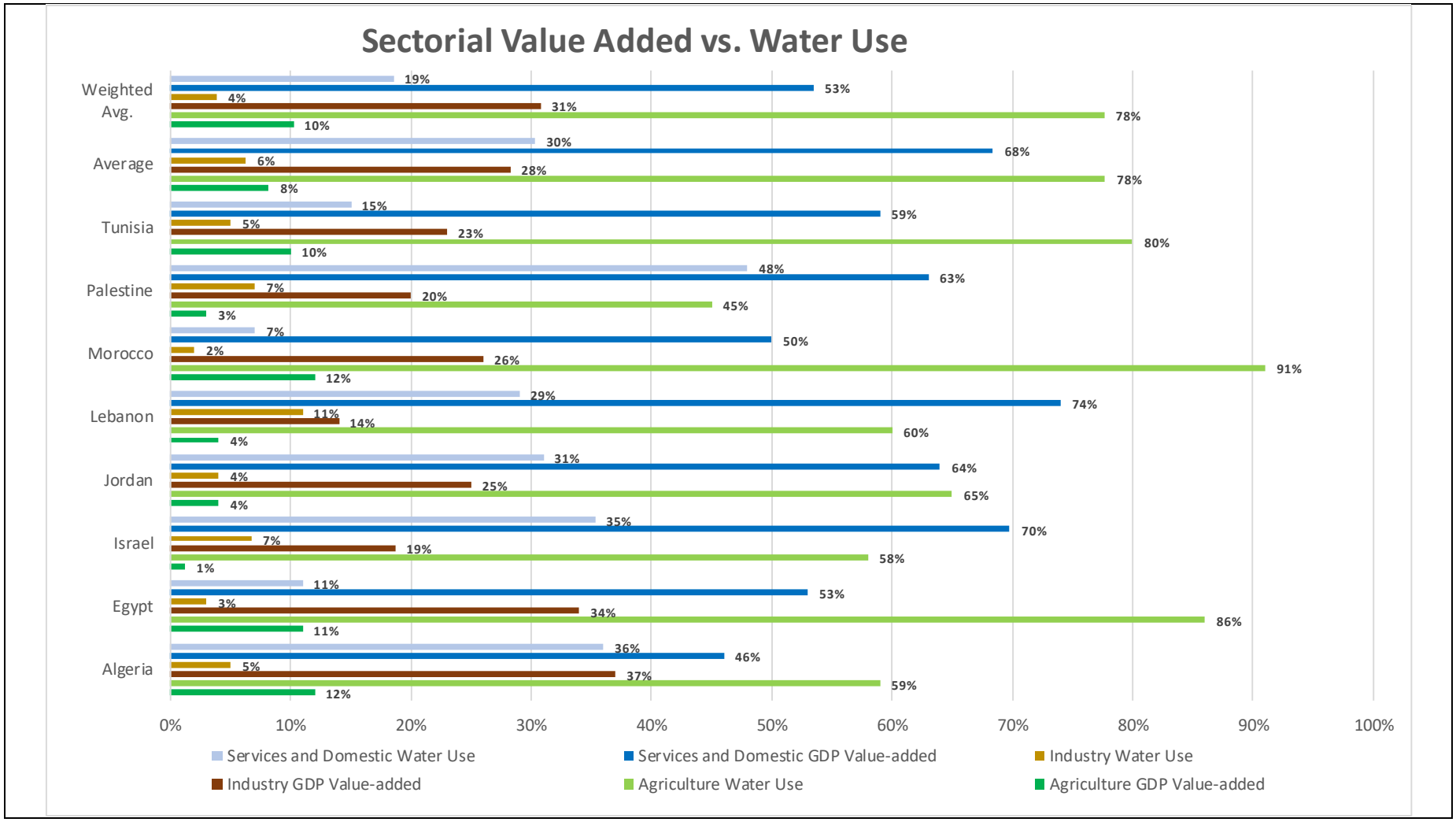
- High population growth rate;
- Higher standards of living;
- Increasing urbanization and industrialisation;
- Failure to adopt basic water conservation principles across the sectors in general;
- Delay in adoption of smart irrigation systems in particular, especially in terms of climate adaptation measures;
- Lack of public awareness; and
- Regional conflicts, especially since the 2010s, resulting in mass flow of internal migrants.

Although the bulk of water demand is still coming from agriculture in the driest and most water stressed region on earth, the policies to address these shortages and adopt smart irrigation systems are lagging

behind. Still, water is such a precious and scarce good that it is being coveted by all the sectors (and their lobbies) of the economy in the 8 countries. Most water strategies aim to match demand with supply in theory but in practice, this is not being achieved and actually, the water gap is meant to increase should the challenges at more than one level are not addressed swiftly and efficiently by the 8 countries.

The comparative analysis of the 8 countries tries to shed some light on the results of the 5 reviewed themes under the study that are synthesised in Tables 12.2 to 12.6 and that could help address the challenges.

Figure 12-2: Relative GDP and Water Use by Sector in the Beneficiary Countries, 2017



Source: Table 12.1.

12.1 UTILITIES' IDENTIFICATION, PPP AND SERVICE LEVELS

Water and waste water utility typologies are diverse:

- In Algeria and Tunisia, two centrally-based monopolies, which are managed on commercial basis, are responsible for water and waste water services respectively at the local level throughout the country. Algeria allows a hybrid model where the 3 largest cities are managed by international operators under MCs that are renewed every 3 years or so. Whereas the Tunisian model is over stretched, the Algerian model lacks efficiency except in the 3 cities under MCs.
- In Egypt, 26 regional public commercial utilities or ACs, which are managed on commercial basis, were created and are under the tutelage of a central public holding, HWWC, where the aim is a divesture and corporatisation of all the utilities.
- In Jordan and Palestine, the MWI and PWA attempted to manage utilities at the central level while attempting to test 2 and 2 MCs respectively that were not renewed or were cancelled. In Jordan, WAJ was introduced as a new institutional layer under MWI to manage 3 public utilities providing services to 6 governorates, which are managed on commercial basis, and is directly managing the 4 other governorates. Conversely, a full reform of the sector is underway in Palestine due to exogenous and endogenous challenges.
- In Lebanon, water and waste water have been amalgamated at the regional level by creating WEs, which are managed on commercial basis, to provide services at the local level but include the provision of irrigation services as well. There is an overlap with LRA regarding water resources management upstream and some confusion with the municipalities regarding network and sometimes WWTP operations downstream.
- Morocco is accommodating several models where a monopoly utility providing electricity as well as water and waste water services, and which is managed on commercial basis, is responsible for water and waste water services at the local level, except where regional or local régies as well as concessions (30-year contract) operate. The latter 3 models have contracts negotiated under the MdI, the Wilayas under which they operate and their respective municipalities. The RAI (autonomous intercommunal authorities) and concession utilities cover both electricity, water and waste water which help them balance their budget. Also, the concessionaire of Casablanca obtained another concession to run the watershed supplying Casablanca with water.
- In Israel, regional and local utilities are gradually taking over water and wastewater services from municipalities.

Regarding PPP, 5 out 8 countries (Egypt, Jordan, Lebanon, Morocco, Palestine and Tunisia) have or about to have dedicated PPP laws but all countries have an institutional PPP focal point and can accommodate PPP through their legal and procurement system. Except for Tunisia, all countries are or are about to diversify their PPP contracts, e.g., DBO, BOT, BOO, MC and concession. They have

introduced or are about to introduce a regulator which, in most cases, lacks the necessary powers and remains under a sectorial ministry tutelage which defeats its purpose.

As for the level of service, all countries are doing pretty well in terms of improved water and waste water coverage except for Morocco, especially in rural areas and Palestine, especially for water according to JMP in 2015. Yet, sewer connections vary significantly across countries with 49% in Morocco to 78% in Lebanon and even 99% in Israel. However, waste water treatment to secondary levels gives a different picture where Lebanon ranks last with 8% treatment according the WEs and Israel ranks first with 93% treatment according to JMP in 2015.

12.2 STAKEHOLDERS

With regards to the stakeholders, all countries have an overarching inter-ministerial council, committee or commission to coordinate water resource management at the strategic, policy and allocative levels. Also, the countries have a system of water management where: (i) the anchor ministry centrally manages the resource, e.g., MWRI in Egypt and MWI in Jordan; (ii) several bodies help the anchor ministry to centrally manage watersheds at the regional level, e.g., ABH in Algeria and Morocco; (iii) several bodies help the anchor ministry to manage dams and water transfers between watersheds (e.g., ANBT in Algeria, Mekorot in Israel and SECADENORD in Tunisia); (iv) the anchor ministry devolved water management at the regional level to 4 WEs and LRA (Lebanon); and (v) the anchor ministry is not allowed to be fully in charge of water resources, e.g., Palestine.

12.3 PRICING

Different entities are responsible for setting tariffs in the 8 countries. However, there is a clear distinction between entities that suggest tariffs and entities that approve tariffs. Moreover, 3 countries have dedicated regulators (Algeria, Israel and Egypt) and 3 other countries (Jordan, Morocco and Palestine) are about to introduce a water regulator. So far, Lebanon and Tunisia do not have a dedicated water regulator. The tariff is based on a volumetric element in all countries and has also a fixed element in 5 countries (Egypt, Jordan, Lebanon, Morocco and Tunisia). Block tariffs vary from 1 tranche to 7 tranches with Tunisia having the most sophisticated tariff setting system (dual 7 tranches). Moreover, Algeria adds other charges to the tariff whereas 5 countries (Algeria, Israel, Jordan, Lebanon and Morocco) top up the tariff with VAT ranging from 7% in Algeria and Morocco to 16% in Jordan and 17% in Israel. Regarding waste water, the block tariff ranges between 1 tranche to 7 tranches or is a percentage of the volumetric tariff (Egypt). In Lebanon, a dual gauge tariff system and volumetric tariff is still in place where the volumetric meter installation is lagging behind as it would reduce the WE revenues due to the irregularity of water provision. Moreover, there is an issue in Lebanon with an old 10% tax of the bill that was supposed to be transferred to municipalities which was not sorted out after the introduction of VAT in 2002. Israel has a combined volumetric tariff for both water and waste water.

All tariffs have the same base for calculation in each country but are differentiated by provider (e.g., ONEE, régies and concessionaires in Morocco; 4 public water utilities (about to be called RWE) and

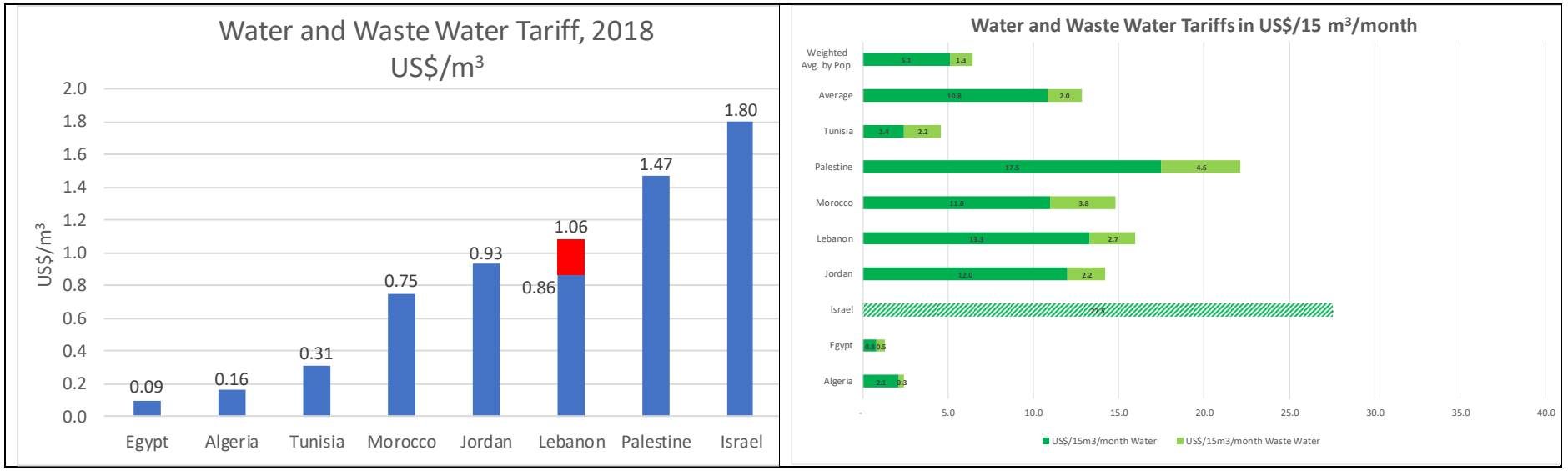
small utilities in Palestine), by region (e.g., Algeria and Lebanon) and by user (Israel and Tunisia have the highest segregation by professional usage with a high pricing sophistication).

Although it is difficult to assess economic sustainability, a qualitative scoring was attempted (Low, Moderate and High) where 4 countries scored Low (Algeria, Egypt, Lebanon and Palestine), 3 scored Moderate (Jordan, Morocco and Tunisia) and 1 scored high (Israel) as all economic externalities (environmental degradation, social and gender bias, etc.) and distortions (real water price, opportunity cost of water, subsidies, cross-subsidies, etc.) would need an in-depth analysis that is outside the purview of this exercise.

Not all utilities publish their financial statements which makes it difficult to assess their profitability or at least their viability. Yet, a qualitative scoring was attempted where 4 countries scored Low Algeria, Egypt, Lebanon and Palestine, 1 country Moderate (Tunisia) and 3 countries High (Israel, Jordan and Morocco). These are also based on reviewing the OMEX under the Remuneration section. As for environmental internalization, the scoring is based on the ratio of waste water tariff over the water tariff for a consumption of the 15 m^3 per household per month: 2 countries scored Low (Egypt and Lebanon), 4 countries Moderate (Algeria, Jordan, Morocco and Palestine) and 1 country scored High (Tunisia). Israel is not ranked because of its combined tariff.

With regards to the social water and waste water tariff for 15 m^3/month, there is huge price variation across countries with the lowest being in Egypt with US$ 1.3 per month and the highest being in Palestine with US$ 22.1 per month due to the outrageous over-pricing charged by Israel's Mekorot water company which is passed on to the consumer in Palestine, and in Israel with US$ 27.5 per month. Also, 5 countries (Algeria, Israel, Jordan, Lebanon and Morocco) that charge a VAT have higher prices and Tunisia has the most balanced social price with US$ 4.6 per month. When considering the water and waste water price per m^3, Egypt has obviously the lowest with US$ 0.09 per m^3 and similarly, Israel has the highest with US$ 1.8 per m^3 when considering a consumption of 15 m^3 per household per month (Figure 12.2).

Figure 12-1: Water and Wastewater Pricing for 15 m³ per month per household, 2018



Source: above Sections

12.4 REMUNERATION

OMEX of most utilities are being subsidised to a certain degree with variations: SONEDE in Tunisia as a water utility is breaking even, so are the 12 RAIs and concessionaires in Morocco that are cross-subsidising their activities as they also sell electricity. In Jordan, WAJ is showing a balanced budget in 2016 although the OMEX budget is financed up to 56% by grants. All other utilities either receive mainly budget transfers and possibly grants to balance their budgets. Most utilities could at least recover their operational costs should they focus on improving bill collection, reducing unaccounted for water and adjusting tariffs. All suffer from at least one of these weaknesses.

CAPEX of most utilities are financed through government programs and plans, special funds (Algeria), IFI grants and IFI loans, and exceptionally through their own funding such as WSCs in Israel, the RAIs and concessionaires in Morocco and BMLWE in Lebanon that will cover the cost of the water supply and/or conveyor from the North and the South to Beirut. Jordan's WAJ issued bonds in the late 2000s that almost bankrupt the utility: few IFIs saved the utility by structuring a rescue package. Actually, the water utility sector in these countries still needs to mature before envisaging the introduction of bonds although Mekorot is a public shareholding company.

However, investment needed over the long run in most countries, except Israel and Morocco due an excellent credit rating, are beyond the governments' allocations and IFIs' leveraging. This will require the rapid setting up of a trusted enabling environment that will attract PPP schemes to bridge the financial gaps.

12.5 WATER DISTRIBUTION

Water rights among riparian countries are recognised internationally by treaties except in the case of the Jordan River shared by Lebanon, Israel, Jordan and Palestine, the West Bank aquifers between Israel and Palestine and a coastal aquifer shared by Israel, Palestine and Egypt. At the local level, all countries have enshrined water rights either in their constitutions and/or in their water laws except for Israel that considers water as a public good. Moreover, all water strategies call for balancing supply with demand which, despite all the conservation targets, blurs the picture as if all sectors will get their fair share of water allocations. However, water scarcity, bad water pricing and poor water management is creating an increasing water demand compared to the supply and will increasingly need an arbitration between water uses where the domestic water usage (as considered as a human right) will be fulfilled first and industrial water usage will be fulfilled second to the detriment of agricultural usage. Quotas and rights in terms of distribution of water across the sectors are not spelled out in all countries. In theory, all water distribution is meant to be allocated economically and equitably among the 3 sectorial uses irrespective of the intensity demanded. In practice, all decisions (command and control) are political and made at the central and even at the State level where domestic/services and industrial water needs must implicitly and strategically be fulfilled first before agricultural water needs as both contribute up to 84% of the economic value added and use 22% of water while there is also a bias favouring urban areas in terms of distribution. At the other extreme, Israel decoupled her municipal water use (fed by natural

resources) from the industrial and agricultural uses (fed by reused and desalinated water) where water is considered a commodity with a price adjusted for quality and availability and the market is the clearing house to arbitrate water distribution for these 2 sectors. Within the command and control, and the market signal for water distribution spectrum, poor governance and lack of criteria (especially based on economic principles, e.g., how much) to allocate water allow for some abuse where sectorial lobbies could interfere to obtain larger water shares..

Table 12-3: Utilities' Identification, PPP and Service Levels in the Beneficiary Countries

	Category	Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	Palestine	Tunisia
Utilities	**Central**	-ADE Water Public Holding -ONA WW Public Holding	-HCWW Water & WW Public Holding	WA	-WAJ public company	-MOEW exercises control over regional WEs and LRA public companies	-ONEE (Electricity/Water/WW) public company	-NWC will provide bulk water to regional utilities	-SONEDE public company (water) -ONAS public company (WW)
	Regional		-25 Water and/or WW public companies for urban/rural services -Suez Canal Authority	-WA -26 WSCs	-AWC, Miyahuna and YWC public companies for urban/rural services	-BMLWE; NWE; SWE; BWE; LRA for water supply to WEs and and irrigation services	Under MdI: -12 RAI s	-4 existing RWUs will be multiplied with the aim to absorb smaller Water and WW utilities	
	Local	-ADE/ONA countrywide provide urban/rural services -20% run by municipalities -3 MCs	25 utility companies governorate-wide provide urban/rural services	-29 WSCs -Municipalities -Small providers in rural areas Desal. PPP	WAJ, AWC, Miyahuna and YWC provide local urban/rural services	WEs provide local urban/rural services with some exception where services are provided by municipalities	-ONEE provides urban/rural Water and partial WW services -Under MdI, 12 RAIs, few RDs and 3 concessions provide local urban/rural services	4 RWUs, about 226 small utilities and Joint Water Service Councils provide local urban/rural services -Two other providers will disappear with the 2014 Law	-SONEDE provide local urban/ most rural services -ONAS provide local urban/rural with pop. > 4,000 services -DGGREE provide local rural water services
PPP	**PPP and Concession Law**	-No PPP Law	-Draft Law of 2016 under review	-No PPP Law	-PPP Law of 2014	-PPP Law of 2017	-PPP Law of 2014 -Concession Law of 2006	-No PPP Law	-PPP Law of 2015 -Concession Law of 2008 being updated
	PPP body	-CNED acts as PPP Unit	-Ministry of Finance PPP Unit	-MOF	-Ministry of Finance PPP Unit	- Prime Minister Office's HCP&PPP	Ministry of Economy and Finance's DPEP	Deputy Prime Minister's Office for Economic Affairs	Prime Minister Office's IGPPP
	PPP operations	-3 active MCs: SEEAL in 2006; SEACO in 2007; SEOR in 2008; SEATA MC cancelled -DBO and EPC	3rd parties: -WWTP BOT in New Cairo -Desal. DBO in Matrouh HCWW:	-Desal. DBO, BOT and BOO	-2 MCs: ended in Amman in 2007; and cancelled in Yarmouk in 2012 -1 PBC in Madaba	-Tripoli Ondeo MC 2003-2007 that did not lead to a concession - Mainly CDR; WE:	-3 active concessions in 4 cities over 30 years: LYDEC in 1997; Redal in 2002; and Amendis in 2002 in 2 cities; Water Basin Agency MC.	-2 non-renewed MCs in Gaza (1996-2002) and Hebron (1999-2002) -PPP contracts for Desal., NRW and	-3 Desal. and WWTP BOT were cancelled in early 2011 -EPC and DB for all contracts

	Category	Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	Palestine	Tunisia
		-Desal. by Oil & Gas with excess sold or given to ADE	- WWTP DBO in Abu Rawash		-WWTP, Desal., dam and conveyor BOT	-EPC and DBOs for water treatment; WWTP; & soon Desal.	-BOT Desal. in Agadir in 2017 but mostly EPC	WWTPs are being sought	
Service Level	**Improved Water; of which piped**	98.6%; 77%	98.8%; 97.6%	100%; 100%	98.6%; 86.1%	99.6%; 85.4%	89.4%; 76.5%	88.1%; 51.9%	98.6%; 86.8%
	Improved WW; of which sewer	95.9%; 76.0%	97.3%; 58.2%	100%; 99%	96.7%; 57.8%	95.3%; 77.8%	91.1%; 49.3%	99.7%; 50.7%	97.8%; 57.7%
	WW ≥2nd Treatment	13.0%-44.0%	43.1%	93%	57.8%	8.0%-11.3%	21.0%	37.6%	55.8%

Source: above Sections.

Table 12-4: Stakeholders in the Beneficiary Countries

	Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	Palestine	Tunisia
Over-arching Advisory/Coord.	-CNCRE	-HCW	-WAC	-RWC -NWAC	-NWC, yet to be established	-CSEC	-JWC	-CNE
Central Water Sector Management	-MREE Anchor -ADE supplies bulk Water -ANBT manage water and 80 dams	-MWRI Anchor and bulk water distribution (management of 9 dams) -MWWU supplies Water through HCWW	-MEWR Anchor -WA executing arm -Mekorot supplies bulk Water and treat part of WW	-MWI Anchor and supplies bulk Water -WAJ	-MOEW Anchor	-MEMEE Anchor -MdI Anchor for Régies ONEE supplies bulk Water	-PWA Anchor and mobilises some of the water supply -Mekorot transfers less than the Water needed -A Plethora of ministries are involved in the provision of Water and WW which makes the sector management very cumbersome -NWC, yet to be responsible for extracting and distributing bulk water	-MARHP Anchor -SONEDE -BPEH is in charge of integrated water systems including 31 dams for the distribution of bulk water and manages -SECADENORD sells bulk water to SONEDE and DGGREE
Central Water Quality	In all cases, the Ministries of Public Health are responsible for tap drinking water quality whereas the Ministries of Environment are responsible for the waste water quality released in nature and both entities perform them at different scales and levels. Similarly, these two tasks are also carried out by the entities under the Water Anchors at different scales and levels.							
Regional	-5 ABHs manage water resources		-WA -Mekorot -WSCs -Desal. PPP		MOEW (1 dam and others just completed or under construction) and LRA (1 dam) allocate bulk domestic and irrigation Water	-9 ABHs issue authorizations for water supply		
Local	-ADE for Water -ONA for WW -20% of Municipalities manage Water; WW mgt. in these	-25 ACs for Water and WW -Suez Canal Authority for Water and WW	-WSCs -Desal. PPP Municipalities -Small providers in rural areas	-PMU oversees Water and WW services -3 Utilities for Water and WW	-WEs for Water and WW -Municipalities for Water and WW networks and	Municipalities decide their provider: ONEE, régies or concessions for Water and WW	-RWU -MWD -VCs	SONEDE supplies Water to 500 cities and towns -ONAS under MEDD provides waste water services for urban areas

	municipalities is unknown -3 MCs for Water and WW -Third Parties for Desal. DBO	-New Urban Communities Authority for WWTP BOT in New Cairo -Third Parties for Desal. BOT		-JVA focuses on water extraction for drinking and irrigation water in the Jordan valley areas	occasionally provide water and operate WWTPs	in urban but not in all rural areas		and villages with >4,000 inhabitants -DGGREE supplies-NWC rural Water not covered by SONEDE

Source: above sections.

Table 12-5: Pricing in the Beneficiary Countries

	Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	Palestine	Tunisia
Price Setting (Regulator or soon to become a Regulator)	ARAPE and ONA propose MREE approves	EWRA proposes MWWU approves	MEWR with MOF for Mekorot bulk Water WA with WAC for tariffs	PMU proposes WAJ/CM/Parliament approve	WEs propose MOEW approves	Utilities/Régies/concessionaires propose MGAG with CIP approve	PWA sets tariff policies and WSRC, yet to review and approve	SONEDE and ONAS propose MdF approves
Last Update	2005	2018	2015	2016	2018	2014	Multiple years	2017
Fixed element	Water: No WW: No	Water: Yes WW: No	Water: Yes WW: No	Water: Yes WW: Yes	Water: Yes WW: Yes	Water: Yes WW: Yes	Water: No WW: No	Water: Yes WW: Yes
Gauge element					Water: Yes			
Volumetric element	Water: 4 Blocks WW: 1 Block	Water: 5 Blocks WW: 75% of Water	Water and WW: 2 Blocks	Water: 7 Blocks WW: 7 Blocks	Water: 1 Block WW: 1 Fixed	Water: 2-3 Blocks WW: 2-3 Blocks	Water: 4 Blocks WW: 1 Block	Water: 2 x 7 Blocks WW: 2 x 7 Blocks
Other charges	3 DA/m^3 for water transfer OMEX	No		No	No	No	No	No
Taxes	7% VAT	No	17% VAT	16% VAT	11% VAT	7% VAT	No	No
Differentiated by provider	No	No	Yes	No	Yes	Yes	Yes	No
Differentiated by Region	Yes	No	No	Yes	Yes	Yes	Yes	No
Differentiated by user	Yes	Yes	Yes	Yes	Industrial tariff rates unclear	Yes	Yes	Yes
Economic sustainability	Low	Low	High	Moderate	Low	Moderate	Low	Moderate
Financial viability	Low	Low	High	High	Low, except BMLWE	High when Water and Energy utilities are combined	Low as some Water is imported and there is no economies of scale	Moderate
Environmental internalization	Moderate	Low	High	Moderate	Low	Moderate	Moderate	High
Social Tariff (2018): 15 m^3/ month/household	Moderate Water: US$ 2.1	Low Water: US$ 0.8	High	High Water: US$ 12.0	High	High for Concessions Water: US$ 11.0	High Water: US$ 17.5	Moderate Water: US$ 2.4

	Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	Palestine	Tunisia
	WW: US$ 0.32 (Applicability: ADE Bills)	WW: US$ 0.5 (Applicability: Affiliated Companies)	Water and WW: US$ 27.5	WW: US$ 2.2 (Applicability: Amman)	Water: Assumption US$ 13.3 for 15 m^3 and Actual US$ 25.5 for 30.4 m^3 WW: Actual US$ 2.65 (Applicability: BML WE)	WW: US$ 3.8 (Applicability: Casablanca)	WW: US$ 4.6 (Applicability: Ramallah and Al Bireh)	WW: US$ 2.2 (Applicability: Tunisia)
Cost per m^3 of Water and WW for 15 m^3/ month/HH	US$ 0.16	US$ 0.09	US$ 1.8	US$ 0.93	Assumption: US$ 1.06 for 15 m^3 and Actual US$ 0.84 for 30.4 m^3	US$ 0.75	US$ 1.47	US$ 0.31
Other issues of interest	Water transfer could be as high as DA 80 per m^3	Reused drainage and water for irrigation	Tariffs are flexible and function of water quality and scarcity for agriculture and industries	-Reused water is priced and sold -Non-residential higher tariff	Untreated WW is used for irrigation	Casablanca and Oum ErRbia concessions linked to secure Water supply	-Transfer of water bulk price determined by Mekorot -Underground water extraction cap determined by Israel	Tariff structure is the most complex in the region

Source: above sections.

Table 12-6: Utilities' Remuneration Model in the Beneficiary Countries

Remuneration	Category	Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	Palestine	Tunisia
Central Utility	**Water**	ADE	HWWC	Mekorot	WAJ: authority overseeing utilities	MOEW: ministry overseeing utilities	ONEE	PWA: authority overseeing utilities	SONEDE
	WW	ONA							ONAS
Regional Utility	**Water**		25 ACs (separate provisions in Cairo and in Alexandria)	-Mekorot -WSCs	3 Water companies	4 WEs	12 RAIs	4 to become RWEs	
	WW								
Municipality and under	**Water**			-WSCs -Municipal. -Small providers for rural areas		Few municipalities under MOIM and water associations	Few RDs	226 to be divided among RWEs	
	WW								
Mgt. Contract	**Water & WW**	3							
Concession	**Water & WW**						4		
Current OMEX	**Tariffs**	Low	Low	High	High	High	High	High	High
	License Fee	Low	Low	High	High	Moderate	High	High	High
	Other charges	Moderate		High		Moderate			
	Gov. Transfers	High	High	Low	High	High	Moderate	Moderate	Moderate
	Donors	Low	High	NA	High	High	Low	High	Low
	PPP	Low	Low	High	Low	Moderate	Low	Low	Low
Untapped OMEX	**Cost Recovery**	Low	Low	High	High	Low, except BMLWE	High	Low	High
	Unaccounted for Water	High	High	Low	Moderate	High	Low: Concessions Moderate: others	High	Moderate
	Tariff	Low	Low	High	High	High	High	High	Moderate
Current CAPEX	**Own resources**	Low	Low	Moderate	Moderate	Moderate/Low	Moderate/Low	Low	High
	Transfers	High	High	Moderate	Moderate	High	Moderate	High	Moderate
	Donors	Low	High	Low (EIB)	High	High	High	High	High
	PPP	Moderate	Low	High	Low	Moderate/Low	Moderate	Low	Low

Remuneration	Category	Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	Palestine	Tunisia
Untapped CAPEX	**Bonds**	Wait and see after the launching of Vision 2035	Not ready before the corporatization of regional utilities	Could be considered	JWA had a bad experience with issuing bonds that required to structure a rescue financial package	The water reforms are taking time and the country credit rating is being downgraded	Government wants to avoid the exchange rate risk and foreign investors seem not willing to invest in local currency, so issuing local Bonds denominated in DM might not be fully subscribed	Need to see the outcome of the reform first	Public utilities maintain their monopoly with little interest for the time being
Future Financing Needs	**Strategies, G20 and other sources**	Large Gap	Large Gap	Manageable Gap	Small Gap	Large Gap	Balanced	Gap but unknown amount	Moderate Gap

Source: above sections.

Table 12-7: Water Distribution Level and Regulation in the Beneficiary Countries

Distribution	Algeria	Egypt	Israel	Jordan	Lebanon	Morocco	Palestine	Tunisia
International Water Rights	Exist with Tunisia for the Medjerda	Exist for Nile River and Nubian Sandstorm Aquifer	Exists only with Jordan on the Jordan River allocations and inequitably with the Palestinian Authority on the West Bank aquifers	Jordan River rights are mentioned in the unratified 1954 Johnston Plan	-Jordan River rights are mentioned in the unratified 1954 Johnston Plan -Bilateral water allocations between Lebanon and Syria exist for the Orontes and Nahr el Kabir.		-Jordan River rights are mentioned in the unratified 1954 Johnston Plan -No water rights exist for the Ashkelon-Gaza-Sinai Aquifer where Gaza relies on this resource that is over-abstracted and polluted	Exist with Algeria for the Medjerda
National Water Rights	Water as a human right enshrined in the 2005 Water Law	Citizen right enshrined in the 2014 Constitution	1959 Water Law entrusted the water as a public good to the public sector	Water rights are not enshrined in the 2011 updated Constitution	Citizen right enshrined in the 2018 Water Code	Citizen right enshrined in the 2015 Water Law	Lack of sovereign control over water resources	Water right enshrined the 2013 Constitution
Water Resource Management	MREE	MRWI	-WA -Mekorot	MWI	MOEW, 4 WEs and LRA	MEMEE	PWA	MARHP
Central	AGIRE	MRWI	Mekorot	MWI	MOEW	MEMEE	PWA	MARHP
Regional	-ANBT		-Mekorot -PPP Desal.		MOEW (Shabrouh Dam and other dams just completed or under construction), 4 WEs and LRA	ABHs		SECADENORD
Local	-ADE -20% municipalities	25 ACs	-Mekorot -PPP Desal.	-WAJ -3 Water companies -JVA	4 WEs	ONEE (including 3 other concessions) and LYDEC	PWA, MWD and RWU	SONEDE and DGGREE

Source: above sections.