

# Integrated Water Resources Management in the Lower Jordan Valley

## Sustainable Management of Available Water Resources with Innovate Technologies

### Management Of Highly Variable Water Resources in semi-arid Regions



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## SMART – MOVE

**Workpackage 5: IWRM Implementation**

**Deliverable 5.4: Implementation concept and guidelines for  
institutional development**

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## WP 5 IWRM Implementation

Unlike Work package 1 and 2 (WP 1 and 2) WP 5 does not involve separated sub-workpackages. However, for consistency, the structure of outline levels is adopted from WP 1.

### 5.0.1 Implementation concept and guidelines for institutional development

#### 5.0.1.1 Introduction

The current general guidelines are produced as part of the main deliverables committed under the SMART-MOVE project. They summarize the main problems and challenges related to water in Palestine (WORLD BANK, 2009) and potential measures and solutions to some of these problems as defined.

In total more than 24 people have participated in the organized water tables ( see annex 1) including representatives from national organizations working in the water sector management, local authorities, environmental groups, civil society organization, water user associations, etc. The first water table participants have discussed innovative tools to review public policies and technical solutions for sustainable water management and to develop strategies. In the second water table stakeholders discussed the Palestinian water strategy with special focus on the expected challenges facing integrated management of water and wastewater in Palestine and what options to adopt to face these challenges. Finally, in the third water table stakeholders discussed the main issues related to water governance, regulations and the proposed new water law and recommended some policy objectives and strategies that can be implemented to improve water and wastewater management in Palestine.

Based on the outcomes of the water tables, this policy paper is organized under four main themes.

- The first part covers the water and wastewater resources and their management;
- the second part covers the main challenges and problems facing the resources and access to services;
- the third part covers the existing water governance as well as the proposed reform to improve water governance;
- and finally the fourth part addresses the proposed policy objectives and the main potential strategies to overcome part of the problems identified.

#### Water Resources

Currently groundwater is the main source of water for Palestinians. The magnitude of renewable groundwater resources in the Occupied Palestinian Territories (OPT) is ca. 729 Mm<sup>3</sup> (MCM)/year – (679 MCM/year in the West Bank and 50 MCM/year in Gaza). However, the official estimates, especially those of the West Bank, are those stated in the Oslo interim agreement, which is 679 MCM/year, mainly as renewable groundwater resources, distributed in three major aquifer basins in the West Bank: Western, North-eastern and Eastern, with replenishment capacities of 362 MCM,

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145 MCM and 172 MCM/year, respectively and the coastal aquifer in Gaza. In addition, surface water, represented mainly by the Jordan River, is not yet accessible to the Palestinians due to Israeli control and restrictions.

### Water Access, Use and Demand

The total domestic water quantities supplied to the various communities in the OPT (both West Bank and Gaza) is estimated at nearly 184 MCM/year. Moreover, total water use in agriculture is nearly 150 MCM/ year as shown in Table 5-1. It is good to mention that most of the water supplied to Gaza is secured from groundwater wells where 95% of it is brackish

**Table 5-1: Current Water Supply in the West Bank and Gaza**

Main Category	Supplied Quantity (MCM/year)
Domestic and Industry	184
Agriculture	150
Total	334

The average Palestinian per capita domestic water use varies from 80 L/capita/d to 15 L/capita/d in the urban areas connected to water supply and rural and marginal communities which are not connected to water supply respectively. Currently there are 38 Palestinian communities with 20.000 people are still not connected to water network (PWA report, 2011). Some of them use local springs and some collect rain water at household level while some others purchase water by trucks.

The water demand is much higher than current supply where domestic water demand will reach nearly 445 MCM/year toward the year 2040 as shown in Table 5-2.

**Table 5-2: Projected water demand in the West Bank and Gaza until the year 2040.**

Year	Population (Million)	Projected Water Demand		
		Domestic and Industry [MCM/year]	Agriculture [MCM/year]	Total [MCM/year]
2010	4.05 <sup>2</sup>	192 <sup>1</sup>	301.5 <sup>3</sup>	493.5
2020	5.23 <sup>2</sup>	248 <sup>1</sup>	340.7 <sup>3</sup>	594.7
2040	9.4 <sup>2</sup>	446 <sup>1</sup>	587.3 <sup>3</sup>	1032.3

Source:

<sup>1</sup>Calculated based on 100 l/c/d + 30% losses based on population growth rates of 2.6% in West Bank and 3.2% in Gaza.

<sup>2</sup>Population projections are taken from the PCBS census of 2007 and the water demand projections are adjusted from the GTZ (1998).

<sup>3</sup>Calculated based on 75000 dunum/1 million people (adopted from GTZ 1998).

It can be concluded that current water supply is much below the demand level and therefore, serious efforts is needed to bridge this gap through exploring all options including to gain Palestinian Water rights in their water resources and exploring further sustainable water management options.

Water price and tariff vary substantially across Palestinian communities, it varies from 0.2 €/m<sup>3</sup> in some connected urban areas to 6 €/m<sup>3</sup> in the areas not connected to water supply in the marginal and rural areas.

### Wastewater Generation and Treatment

The percentage of population connected to sewer networks in Palestine counts for approximately 50% distributed as nearly 65 % in Gaza Strip and about 35 % in the West Bank, PWA (2010). These percentages represent mainly the collected wastewater in the major cities through the West Bank and Gaza Strip.

People who are not served by sewage network system in both West Bank and Gaza disposes raw wastewater into cesspits, open drains and vaults. Most of the rural communities and some major towns in the West Bank and Gaza are not served. Among those towns that are not served in Gaza is Kan Younis town in the southern part of Gaza and Jericho as well as Qalqilia towns in the West Bank.

It is estimated that the collected wastewater quantity in the West Bank and Gaza through main sewage collection systems is nearly 71 MCM/Year, out of which 30 MCM in the West Bank and the rest in Gaza, PWA (2010). The collected wastewater in Gaza is diverted into four main treatment plants with the capacity of nearly 31 MCM / year. The treatment plants provide partial treatment before it is either being recharged into the ground or being discharged into Wadi Gaza or to the Sea. The situation, however, is different in the West Bank where there are 7 treatment plants but the only proper treatment plant is that of Albireh wich treats nearly 2 MCM/year currently, PWA (2010).

### Treated Wastewater Disposal and Reuse

Most of the collected wastewater through central sewerage systems is not reused and is being discharged either into the sea in Gaza or into valleys in the West Bank. However, there is some indirect reuse of the effluent produced from the Northern Gaza treatment plant at Beit Lahia through artificial recharge to the aquifer in the north and east of Gaza. The estimated quantity that is being recharged is nearly 8.4 MCM/ Year and accounts for nearly 12% of the total collected wastewater through central collection system in the West Bank and Gaza. Moreover, there is limited reuse in agriculture in some parts of Gaza. In total, this would account for 0.5 MCM/Year.

#### 5.0.1.2 Problems and Challenges Facing IWRM

##### Unequal Water accessibility and distribution

Water allocation and distribution can be used both as a turning point or a strong means of oppression. Water and its access for Palestinians are part of a daily existence **“Exist is to resist”**: this statement has become the key word for Palestinians to express their daily struggle to have access to water and land.

## 6 Problems and Challenges Facing IWRM

Although the Oslo II agreement and Art. 40 state the recognition by Israel of the right to water for Palestinians in the West Bank and Gaza, **the current water situation as reported by international and local NGOs and organizations remained unchanged (Amnesty International, 2009). The unequal water allocation and restricted access of Palestinians to Water and Sanitation services is still one of the major problems facing proper management of the sector.**

### None Revenue Water (NRW)

Non-revenue water includes technical losses (leakage), non-billed water, illegal connections, poor water meter performance and inaccurate readings. The NRW has substantial impact on both resources and water supply providers. The extent and delineation by type of NRW in Gaza and West Bank is not accurately measured. However, it is estimated that average NRW is nearly 37% of total supply as shown in Table 5-3.

Table 5-3: Water losses or NRW in west Bank and Gaza

Region / Palestine	Supplied Water Volume	Billed Water Volume	Water losses
	[MCM/year]	[MCM/year]	[%]
West Bank	85.0	60.3	29
Gaza Strip	96.0	53.1	45

### Over pumping - Insufficient regulation of groundwater pumping

In Palestine the most critical situation about the **water quality is in Gaza, where the groundwater resources are seriously compromised by massive over-pumping.** This has led to increased seawater intrusion to the coastal aquifer causing serious water quality deterioration.

The situation is relatively better in the West Bank. However, there is some unregulated groundwater pumping in some areas that causes negative impact on the local aquifers and affects some major springs.

### Weak role of the tariff in the efficient and aware use of water

In Palestine the estimated costs include the differential cost. Neither the distribution cost nor the storage cost are included since they will be needed regardless of what alternative is selected and the difference in the storage and the distribution costs is minimal under the considered alternatives. In this, the associated capital costs of the solution are recommended to be included.

### Poor Sanitation Service and Low Coverage

In Palestine, despite that 85% of urban communities are connected to sewer networks, nearly all rural and marginal communities suffering from poor sanitation. Most communities in the rural area in the West Bank lack adequate sewage systems to dispose of their wastewater. In some villages and refugee camps black wastewater is collected in cesspits, while grey wastewater is discharged via open channels, then discharged into nearby wadis without any kind of treatment.

### Pollution and vulnerability

Several contaminants pose great pollution threat to the main water resources in the West Bank and Gaza. The main pollution sources are the untreated or poorly treated wastewater effluent originating from Israeli Settlements in the West Bank especially the industrial settlements in addition to the wastewater disposal from some Palestinian communities.

**It was realized that the level of Chloride, Sodium and TDS is high in the Eastern aquifer. This might be related to geogenic effect. Moreover, the increase in the level of Nitrate and bacterial (Fecal and Total) coli form at the Western aquifer might be related to anthropogenic impact. However, the coastal aquifer in Gaza suffers from seawater intrusion, pollution through infiltration of sewage and agrichemicals. United Nations estimated that if the present rate of deterioration continues, the portion of coastal aquifer on which Gaza Strip relies for all its water needs will be unusable by 2016, and irreversibly damaged by 2020.**

The major risks encountered with polluting the major aquifers in the West Bank and Gaza can be summarized as follows:

- (i) Deteriorated water **quality of the aquifers will reduce fresh water availability and cause several public health problems for Palestinians;**
- (ii) **The cost of producing and treating potable water from the aquifers will increase and this in turn will increase the economic burden over the people especially the poor ones.**

### Social Acceptability of Reusing Treated Effluent

Reusing of treated effluent is not yet socially acceptable in the Palestinian society. The main reason for this is either religious or public health concern. However, the public shows more acceptability to reuse treated grey water instead.

### Fragmentation of the Governance

Palestinian Water Authority (PWA) was mandated as the regulatory body according to water law number 3 and the new law number 4 of 2014, yet water management setup is still not fully organized where many actors are still involved in the management. The local municipalities and village councils are the primary body for managing local water supplies and wastewater service. These councils are legally part of Ministry of Local Governments and therefore, they don't feel obliged to follow PWA instructions or policies. However, it is done voluntarily and in coordination with the Ministry in some

## 8 **Water** Sector Reform

cases. Tariff is still decided by these councils in coordination with the Ministry of Local Governments. In the mean time PWA is working to develop a unified tariff policy that should be followed by all water supply management bodies. The same applies for wastewater services. The un-clarity in some roles of other ministries when it comes to water resources management including pollution control, makes the issue even more complicated. The roles of various ministries and authorities mainly Ministry of Agriculture, Ministry of Local Governments and Environment Quality Authority should be well defined and coordinated to ensure better water governance.

### **No Proper Mechanism for Stakeholder Participation**

The current institutional structure and regulations in place doesn't include an institutionalized stakeholder participation mechanism in decision making in water management. This leads to create a large gap between various levels of stakeholders including civil society and water user groups. It also leads to low adaptation of decisions.

#### **5.0.1.3 Water Sector Reform**

PWA is currently undertaking a water sector reform process, which aims at improving the current water governance and ensure better sector regulation. The reform includes the modification of water law and the change of the current structure of water management. It defines more clear responsibilities for the various bodies and - more importantly - sets clear role divisions and separates authorities.

The main recommendations that have emerged from the water tables to address the problems facing water and wastewater management in Palestine can be subdivided into four categories, which are described below.

#### **Policy Level**

It is important to properly inform policy makers about the water related problems and challenges and that Politicians should keep the water issue high in the political agenda and they should consider obtaining Palestinian Water Rights in their resources as first priority, this include to assume full sovereignty over these resources.

#### **Governance and Regulatory Level**

Implementing the new water law#4 and develop all related regulations including water resources protection, pollution prevention, water tariff, water resources development and monitoring, etc.

Ensure separation of authorities among various governmental bodies and ministries to ensure a more coordinated and integrated water management approach.

Develop a clear regulation for stakeholder participation in decision making related to water management and institutionalize such regulation.

### Technical and Technology Level

Water saving devices and tools need to be promoted and national campaign needs to be carried out to provide all public buildings with these devices. In addition an incentive program must be launched to encourage people to adopt and install these devices to rationalize water use.

Decentralized wastewater treatment plants for rural and pre urban areas to be promoted with focus on natural and biological treatment technologies with improved wetlands as proposed by sustainable water management in the Mediterranean( SWMED)<sup>1</sup> project solutions for settlement typologies.

Grey water treatment and reuse at household and group of household level needs to be encouraged this can also be coupled with modified percolation pit to ensure localized sanitation solutions.

Guidelines and manuals needs to be produced to assist people in better understanding and better managing the technological solution and to enable them from operating and maintaining them properly.

### Social and Cultural Level

A National Strategy on Public Awareness need to be implemented and a National Campaign needs to be started to improve public knowledge about the advantages of the water saving practice and installation of the respective saving devices.

Information sessions need to be organized, and visits to pilot locations need to be arranged to positively influence public perception on the reuse of treated effluents.

Getting local media on board to disseminate and communicate the main messages to encouraging people to engage in National Campaigns for water savings or to address various issues related to wrong perceptions and practices regarding water and wastewater treatment, reuse and disposal.

#### 5.0.1.4 Governance and Management

It is the National Water Policy of Palestine to:

1. Ensure that the abstraction, transmission and distribution of water, together with wastewater collection and treatment, is financially sustainable and that providers of these services can demonstrate their financial reliability as regards the full cost recovery (FCR) of operation, maintenance, capital investment and capital replacement costs
2. Define and enforce clear regulations for revenue collection by utilities (including customer debts), as collecting these debts is a key to ensuring the financial viability / sustainability of water and wastewater utilities.
3. Define and enforce regulations to deal with illegal connections to water systems and sewers.

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<sup>1</sup> EU funded project by Neighborhood funding mechanisms

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4. Ensure that the services' proposed financing and funding requirements reflect the approved financial objectives and cost profiles of each service provider and that, where these tariffs do not provide full cost recovery up to the medium-term, all sources of funding required to meet this gap are clearly identified and secured.
5. Set wastewater charges, connection fees, sewerage taxes and treatment fees to cover at least the operation and maintenance costs and part of the capital cost. The medium-term aim is for full cost recovery.
6. Apply different charges for different geographical areas, as a function of use and effluent quality.
7. Assess the citizens' ability to pay for water and wastewater services and ensure that this assessment forms part of tariff reviews and includes issues related to the poor and disadvantaged sections of the community.
8. Develop and implement fair and progressive tariff systems with a view to facilitating access to the service by the poor and vulnerable groups and to ensuring cost recovery by utilities.
9. Regulate the water resources, water supply and wastewater collection, treatment and disposal issues, separating the policy, regulatory functions from those of service delivery.
10. Task the regulated public organizations with the provision of domestic and drinking water supply services, and of wastewater collection and disposal services.
11. Encourage the institutional restructuring of the Water Sector and involvement of the private sector in the funding, implementation, operation and maintenance of water supply and wastewater systems to improve efficiency and the performance of water sector and the transfer of technological expertise.
12. Encourage the involvement of formal water users' associations to ensure optimal management of shared water resources (including wells, springs and treated wastewater) used for economic purposes (irrigation).
13. Ensure the adequate involvement of all stakeholders (from a gender perspective) in water and wastewater programs & projects, to support sustainability in water resources management
14. Prioritize the optimal use of water resources, including the allocation of public funds, by encouraging efficient performances.
15. Encourage water service providers to reduce the quantity of non-revenue water in order to increase the availability of scarce resources to customers and improve their operational efficiency to progressively meet national targets.
16. Develop water demand management strategies, including suitable tariff mechanisms and public awareness-raising.

Stipulate that the organizations responsible for the water sector produce financially and technically sound plans to meet national long-term strategic objectives and regional (within Palestine) infrastructure master planning requirements, as well as the short-term investment requirements of the water sector.

#### 5.0.1.5 Integrated water resources Management institutional recommendations

##### Proposed institutional arrangements

The PWA has been given its mandate through Water Law No. 2 (1996) and has been stressed on in its amendments Law no.3 for 2002 to manage the water resources, to execute the water policy, to establish supervise and monitor water projects, and to initiate co-ordination and co-operation between the parties affected by water management. Other line ministries and agencies have leadership on specific issues:

- Ministry of Agriculture (MoA): Policy and regulation of irrigation and promotion and organization of farmers' associations;
- Environmental Quality Authority (EQA): defining environmental regulations, including standards for the discharge of treated wastewater into natural water courses, carbon footprint and water footprint regulations;
- Palestinian Standards Institute (PSI): standardization of rules for water facilities, sewerage, on-site sanitation;
- Ministry of Planning and Administrative Development: national development plans (taking availability of water resources into account, to be assessed by the MoPW) in coordination with relevant Stakeholders;
- Ministry of Local Government (MoLG): implementing and supporting Joint Service Councils (JSCs);

The PWA is in charge of the overall regulation of water producers and service providers and manages water resources, including:

- Allocation of water abstraction rights;
- Regulation of the right of use of the resources;
- Develop service providers;
- Develop Water Tariff Policy;
- Providing support to PSI for the definition of standards;

##### Interministerial IWRM Implementation Committee

The development of IWRM concepts and sustainable implementation on a national scale is a complex process including

- the institutional and regulatory implementation itself,
- the development and implementation of proper health, scientific, technological, environmental and regulatory standards,

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- clear regulation for stakeholder participation,
- short to longterm cross-sectoral planning and implementation based on agreed standards and a proper assessment of sustainability and resilience, multiscale economics and socio-economics as well as political conditions,
- continuous improvement as a sub-process,
- targeted budgeting of knowledge transfer and capacity development,

Due to the institutional distribution and separation of competences like for policy and decision making, implementation of infrastructure measures, health, financing and so forth cross-sectoral national efforts need a specific institutional structure to address all involved dependencies and stakeholder interests effectively and efficiently.

As a response to these complex requirements and dependencies, we recommend the establishment of an Interministerial and Cross-sectoral IWRM Committee for the Palestinian Territories (Figure 5-1) as a framework for deeper discussion and effective coordination and to support institutional reflection. As a supporting and coordinating structure it may not hold any decision competence. However, it is recommended for a national IWRM policy to include a principle of cooperation which is binding for all public authorities. The effectiveness of such a committee has been demonstrated by the practical experiences and the success that are connected to the National Implementation Committee for Effective Integrated Wastewater Management in Jordan (NICE). The NICE-Office acts as the coordinating unit of the committee and is housed within the building of the Jordanian Ministry of Water and Irrigation.

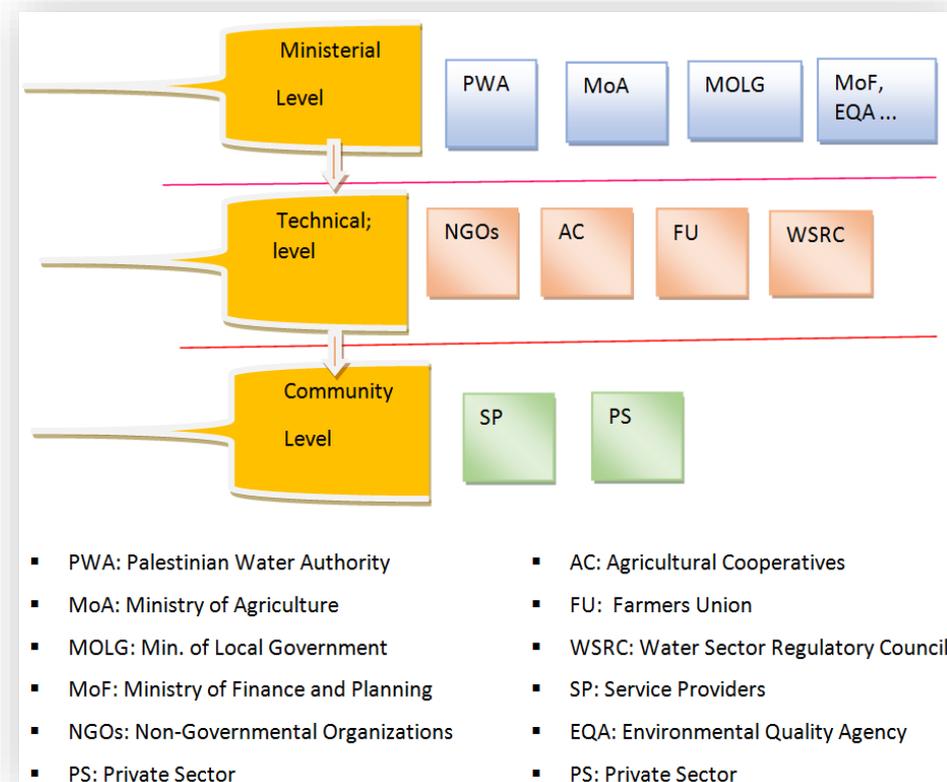


Figure 5-1: Suggested Structure for the IWRM Implementation Committee in the Palestinian Territories.

The suggested framework will be networking hub and a platform to support the national efforts and definition of priority strategies for IWRM implementation and to cope with water scarcity and drought events. Furthermore, it will enhance the regional cooperation to jointly maximize the benefits of sustainable and integrated water resources management, enabling transboundary cooperation and the implementation of measures for climate change adaptation.

### **The Regulatory Water Council**

The water sector in Palestine faces many challenges, among them insufficient water availability, consumer orientation, lack of transparency and accountability, underinvestment in maintenance and infrastructure, and lack of cooperation between key stakeholders. These challenges have long been fully acknowledged by water-sector specialists, donors, and key stakeholders in the sector. Thus in 2009, the Action Plan for Reform was endorsed as a first step, while The Institutional Water Sector Review of 2011 and the New Water Law of 2014 constitute the subsequent milestones in the reform process that led to the establishment of the Water Sector Regulatory Council (WSRC) in 2014. The following chart outlines the various stakeholders and their respective duties.

### **The national Water Company**

The State of Palestine will work to set up a National Water Company in charge of producing and purchasing bulk water, or transporting bulk water between different regions, in the most efficient ways to service providers.

### **Local water and wastewater utilities**

In order to provide effective customer service, the bulk water supplier does not serve the customers itself, but sell water to local service providers.

The Policy promotes the development of JSCs that provide water and wastewater services to more than one municipality. Ultimately, the Policy aims to support the development of regional utilities, whose concession area will include one or more governorates.

These utilities will have an autonomous status both administratively and financially, and will have to operate on the basis of cost recovery principles. On the long term, involvement of the private sector in the implementation of certain projects may be encouraged and possibly the management of services that could be contracted out by National Bulk Utility and regional utilities.

### **Water users' associations**

Water users' associations (WUAs) are very important institutional partners in irrigation water management.

## 14 Recommendations

### 5.0.1.6 Recommendations

The summarized recommendations in were concluded together with the local stakeholders at the round tables that were organized in cooperation with PWA.

Table 5-4: Summarized recommendations for Institutional Development related to IRWM Implementation.

Recommendation	Possible actions	Stakeholders	Legal and institutional reference
<b>Intersector relationships</b>	<ul style="list-style-type: none"> <li>Establish an Agreement/Protocol between the parties</li> <li>Develop methods of internal communication</li> <li>Establish Rules of Procedures for WSRC</li> </ul>	PWA, WSRC, MOLG, MOA	Water law, sector strategy
<b>Align roles &amp; responsibilities of stakeholders from outside the sector</b>	National Interministerial IWRM Committee	Ministries , NGOs, Universities	Endorsment by cabinet
<b>Public Private Partnership concept promotion</b>	Survey potential of existing private sector	Private sector and PWA	Government clear procedures formulated
<b>Tariff regulations and tariff policy</b>	<p>Develop mechanisms to identify true cost of water in bulk and set up the process for the utilities to follow a uniform accounting system</p> <p>Conduct an affordability and willingness to pay study, mainstreaming gender and the poor</p> <p>Develop a dynamic customer data base</p>	PWA , NGOS , water users associations	Tariff endorsment
<b>Improve the capacity of service providers</b>	<p>Put in place a strategy and plan for consolidation</p> <p>Service provision to the customer comes in a “recognizable” form, unify the processes</p> <p>Build the capacity of the staff of the RUs, and properly choose their boards and managers</p> <p>Link new JSC entities to the broader planning and investment needs</p>	Service providers, PWA	Water sector Capacity building national plan

Recommendation	Possible actions	Stakeholders	Legal and institutional reference
<p><b>Suggested checklist for actions related to stakeholder engagement regarding IWRM</b></p>	<p>Strengthen information base on critical issues:</p> <ul style="list-style-type: none"> <li>• national waterresources</li> <li>• real cost of water</li> <li>• wastewater services</li> </ul> <p>Engage stakeholders to discuss and gain support on several issues:</p> <ul style="list-style-type: none"> <li>• investments</li> <li>• tariff levels</li> <li>• service quality</li> </ul> <p>Prepare communication &amp; capacity development strategy, to raise awareness and help identify consumers' needs, mainstreaming youth and gender</p>	<p>All stakeholders</p>	<p>Water sector Capacity building national plan</p>

### 5.0.1.7 **References and Further Reading**

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### Annex 1. List of participants

- Palestinian water authority
- Palestinian Ministry of agriculture
- Palestinian environmental quality authority
- Palestinian NGOs network
- Palestinian Environmental NGOS network
- Palestinian Hydrology Group
- Applied Research Center
- Land research center
- AlQuds University
- Arab American University
- Agriculture Relief committees
- Union of farmers
- Alnakheel company

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