

Palestinian Strategy for Stormwater Harvesting

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Palestinian Water Sector Strategy 2017-2022

Palestinian Water
Authority

Water Sector Regulatory
Council

Ministry of Agriculture

(Monitoring Water and Wastewater Service Providers)

National Water Company
(NWC)

Service Providers
(Regional Water Undertakings) + (Water Users Associations)

Water and Wastewater Service Provision (Operational Level)

Water Resources

- Since Palestine is a scarce water country, other new water resources are sought. Climate change has its impact on rainfall fallen, water resources and declination of agricultural productivity.
- Rainwater harvesting is one of the major resource to be included in the integrated water resources management in both urban and rural areas instead of being pumped to the sea or Wadis
- Stormwater pilot projects were implemented on roof and street rainwater harvesting

Construction of central rainwater lagoons

Used mainly for storm water collection from urban drainage for the purpose of flood mitigation

- Needed for urban drainage system during large storms
- Need large land areas
- Serve for flood mitigation
- Used for large catchment areas
- Have large storage capacity



Conditions and Risks of central rainwater lagoons

- Large investment cost
- Much efforts for operation and maintenance
- Risk of mixing with wastewater
- In many cases are not able to absorb large rain storms
- Part of an expensive storm water infrastructure (collection, detention, pumping, pretreatment)
- mosquitoes and possible health problems.
- Need to be evacuated and maintained for next storm
- Usually poor infiltration capacity

Master Plan of Rainwater Harvesting

Strategy for Rainwater harvesting achieved through three levels

1st Level : Roof tops

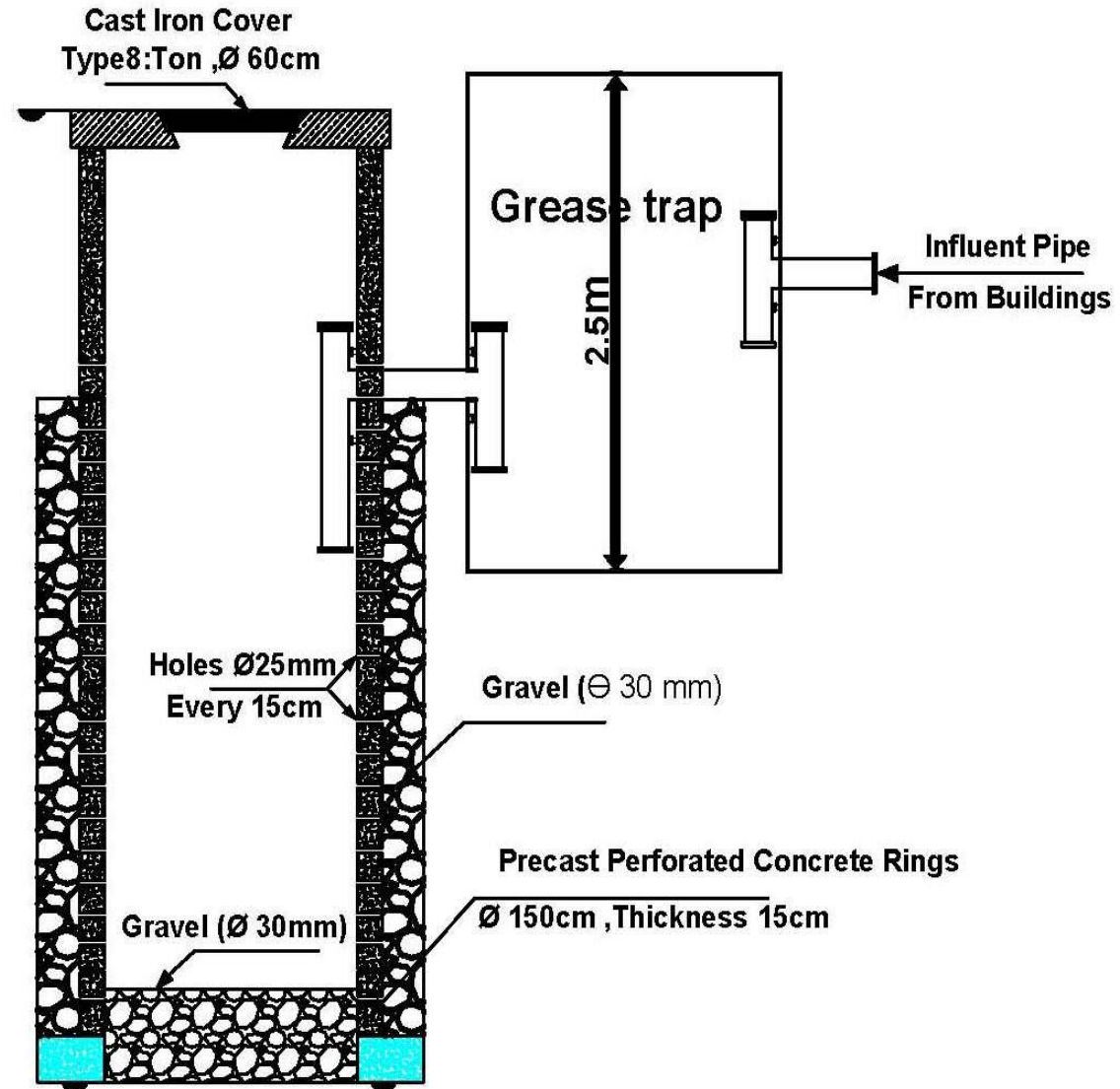
2nd Level : Streets (soakaways)

3rd Level : Central infiltration lagoons

In-Situ Rainwater Infiltration

- Since rain falls in 40 days, it has high intensity exceeding 50 mm per day leading to flooding in depressions and central lagoons
- To damp these quantities, rooftop and streets rainwater harvesting have advantage to mitigate flooding in both depressions and lagoons.

Example of rooftop harvesting unit



Rooftop RWH- Deir Al Balah (pilot)



Street soak away (pilot-Gaza)



Infiltration pit



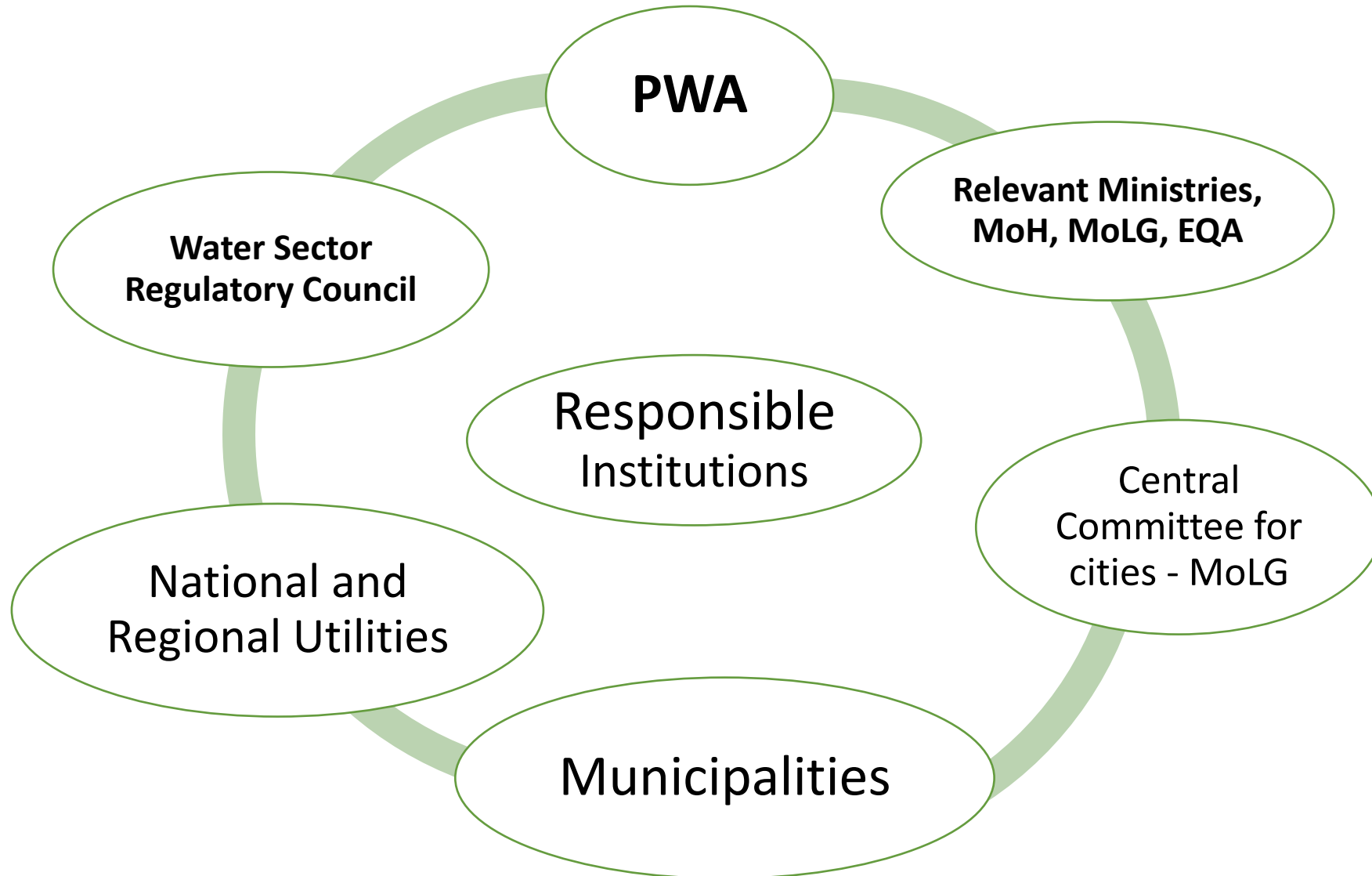
Parameter	Pure	Rooftop	Urban Rd	Tap	PS Drink
PH	6.6	7.5	7.5	7.3	6.5-8.5
EC ($\mu\text{S}/\text{cm}$)	108	463	5944	5920	
TDS (mg/l)	72	309	3963	3947	1500
Cl ⁻ (mg/l)	35	100	2192	1378	600
SO ₄ ⁻² (mg/l)	5	51	323	678	400
NO ₃ ⁻ (mg/l)	3	15	12	155	70
Ca ⁺² (mg/l)	5	19	72	193	100-200
Mg ⁺² (mg/l)	8	17	169	89	150
K ⁺ (mg/l)	2	3	59	14	12
Na ⁺ (mg/l)	24	57	1167	1052	200

Parameter	Pure	Rooftop	Urban Rd	Tap	PS Drink
Zn ($\mu\text{g/l}$)	70.9	148.8	74.6	111.5	5000
Fe ($\mu\text{g/l}$)	65.2	235.9	595.5	258.6	500
Cu ($\mu\text{g/l}$)	11.4	8.7	44.8	5.8	1000
Pb ($\mu\text{g/l}$)	< 3 μg	3.8	29.9	< 3 μg	10
Cd ($\mu\text{g/l}$)	< 2 μg	< 2 μg	< 2 μg	< 2 μg	3
Cr ($\mu\text{g/l}$)	< 2 μg	21.0	5.1	23.8	50

Locations of Street RWH units

- Units could be located in the meridians of the road, or the sidewalks
- Each unit has a sand trap located between the gullies and the unit
- Location and number defined based on engineering calculations

Institutional Aspect



Conclusions

- Rainwater harvesting is one of the most promising alternatives for supplying water to face the increasing water scarcity and escalating demand
- Several combination of rainwater harvesting options can be easily implemented that could improve the aquifer recharge and groundwater quality significantly
- **Next Steps**
 - Endorsement of legislation for RWH
 - Setting RWH as a condition for new projects
 - Setting RWH as a condition for licensing of buildings
 - Setting monitoring program for RWH to avoid pollution

Thank You