Regional on-site training on "Technical, Regulatory and Cultural Aspects of Treated Wastewater Reuse" (REG-8)

Sustainable Water Integrated Management and Horizon 2020 Support Mechanism

SWIM – DEMO Palestine

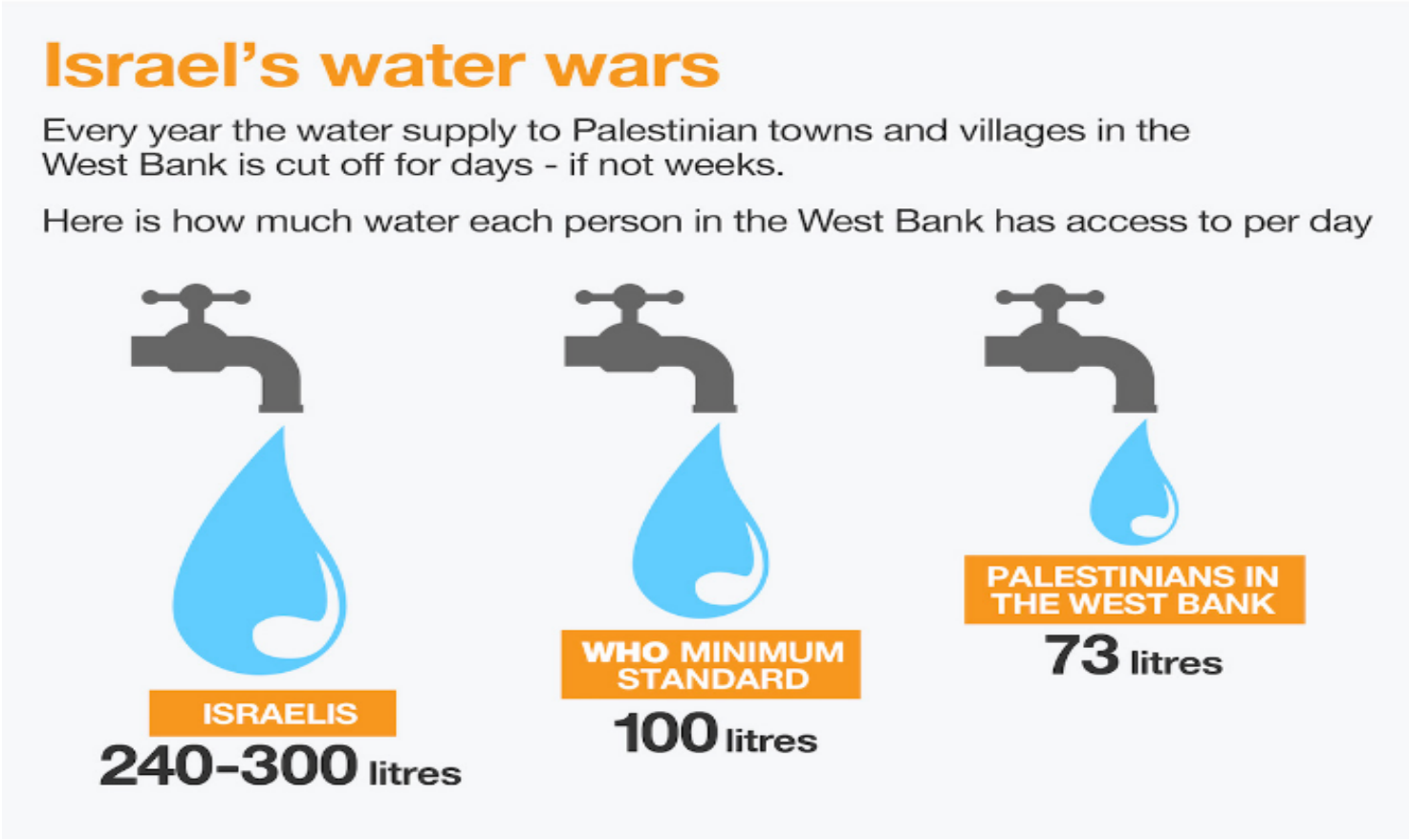
Agricultural Development Association (PARC)

23-24 JULY 2018
ATHENS, GREECE

Treated Wastewater Reuse

- Water scarcity is becoming an alarming issue, specifically in (semi)arid areas and many developing countries.
- Palestinians suffer severe water shortages and acute water quality problems which have negatively affected the lives and livelihoods of millions of Palestinians living in West Bank and Gaza Strip.
- The Palestinians' right to equitable and reasonable utilization of shared water resources has been violated by the Israeli occupation.
- Water resources in Palestine are limited, and nearly 70% of the water is used for agricultural irrigation.

Palestinian Water Consumption VS Israeli Water Consumption



Treated Wastewater Reuse

- Wastewater
  reuse in irrigation provides additional water supply for agriculture and crop yield improvements and saves freshwater resources for human consumption.

- Protect the environment and ground water as most domestic sewage is disposed of into unlined cesspits or septic tanks, or directly discharged to the environment without treatment.

Wastewater Reuse - Agriculture

- Agriculture has always been a main source of income and employment in the West Bank.
- Irrigated agricultural production, in Palestine, accounts for 38% of all agricultural production.

Wastewater Reuse - Agriculture

- The most limiting factor to irrigation is water availability.
- Increasing water supplies for irrigation could significantly improve food production and thus food security and living conditions especially in vulnerable Palestinian communities.

Governing the Reuse of Treated Wastewater

Water governance in Palestine suffers from:

- Poor resources management
- Lack of appropriate institutions
- Bureaucratic impediments
- Lack of inter-sectoral cooperation, as well as fragmented water laws and policies
- Insufficient capacity, and shortage of new investments in the water sector

Actors and Their Roles and Interactions in the Governance of Water and Wastewater

Sector	Actor	Role in water and Wastewater Governanace
Water policy and management	Palestinian Water Authority (PWA)	Managing water resources, preparation of water policies, strategies and plans. Proposing water allocations for the various sectors, protection of water sources, licensing of water resources, and drafting of bylaws and water regulations.
Water Sector Regulatory Council (WSRC)		Monitoring and regulation of water production, transportation, distribution, consumption, and wastewater management aiming at water and wastewater services quality and efficiency at affordable prices.
Agriculture policy and agricultural water management	Ministry of Agriculture	Drafting of agricultural related laws and legislations; management; provision of agricultural services provision; regulation of irrigation water use; supervise of treated wastewater reuse.
Local governance	Municipalities	Water service provider; management of local water and wastewater resources; implement water tariff setting; management of wastewater treatment plants' operations
Water users Associations (WUA)	Palestinian Farmers Union	Manage the service of supplying irrigation water at the local level
Regional Water Utilities (RWU)		Provision of water and wastewater services to customers for domestic use
Social authorities	Religious scholars	Religious interpretation of the use and social acceptance of treated wastewater, awareness and education

Governing the Reuse of Treated Wastewater

<u>The governance of reusing treated wastewater in Palestine is understudied</u>

Identified governance related factors:

- Week unity among actors/stakeholders reflected in overlapping and unclear responsibilities.
- Low extent of legal instruments indicated by the absence of laws and by overlapping and conflicting provisions.
- Inadequate infrastructure and social acceptance towards using treated wastewater for irrigation.

Treated Wastewater by Farmers is Affected by the Following Socio-Economic Factors:

- <u>Low acceptance by farmers to use treated wastewater to irrigate their agricultural lands:</u>

  This is due to their belief that the use of treated wastewater is not religiously appropriate, and their perception that treated wastewater is harmful for their plants.

Treated Wastewater by Farmers is Affected by the Following Socio-Economic Factors:

The pricing policy for treated wastewater is not flexible for encouraging its reuse:

- The cost of purchasing treated wastewater (in some areas in Palestine) compared to freshwater for irrigation is almost similar, which leads farmers to purchase freshwater for irrigation rather than treated wastewater.

- Water providers and policy makers should take into account that pricing could hinder the reuse of treated wastewater by farmers for irrigation.

Treated Wastewater by Farmers is Affected by the Following Socio-Economic Factors:

Lack of legal and information-based policy instruments in the agricultural sector to change the status of using freshwater for irrigation :

- The agricultural share of freshwater could be directed to human consumption, if treated wastewater would be reused for irrigation.
- There is no policy or public awareness to incorporate the use of treated wastewater into laws, other policy instruments and water use practices.
- Therefore laws and legislations should enforce using treated wastewater for agricultural purposes.

Other Obstacles:

- The Palestinian water and treated wastewater policies and strategies do not specify water allocation for the various purposes: domestic, industrial, touristic and agricultural.
- Establishing a wastewater treatment plant undergoes complex procedures and processes that result from Palestine's lack of control over water and land resources due to Israeli occupation.
- Israeli approval and licensing is required (Israeli Civil Administration – ICA), through the Joint Water Committee (JWC) between Israel and Palestine that issues all permits and approvals for building water structures in the West Bank .
- The lack of appropriate infrastructure. A wastewater collection system is usually needed.

Given the water status in Palestine suffering from;

- resource scarcity
- geopolitical constraints
- weakness of the water sector
- lack of inter-sectoral cooperation
- fragmented water laws and policies

more efforts on improving the governance of water and wastewater are needed.

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BIRZEIT UNIVERSITY

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Sustainable Water Integrated Management (SWIM)

Innovative Demonstration on Sustainable Integrated Management of Wastewater and Reclaimed Water Use in

North West Bank – Palestine

Sustainable Water Integrated Management (SWIM)
DEMO Projects

Innovative Demonstration on Sustainable Integrated Management of Wastewater and Reclaimed Water Use in North West Bank – Palestine – (SWIM) – Phase II - 2017	**Beit Dajan and Anza villages – North West Bank Produce More Food Through Sustainable and Safe Use of Reclaimed Wastewater in Agriculture - 2011**
Location: Anin Village/ Jenin Governorate	Location: Beit Dajan Village / Nablus Anza Village / Jenin Governorate
Status : Under Construction	Status: Completed
Project Activities: • Constructing Wastewater Collection System – 9 km • Constructing Wastewater Treatment Plant – SBR System • Installing Irrigation Schemes • Public Awareness and Capacity Building Targeting School Students and Farmers	Project Activities: • Constructing Wastewater Collection System in Beit Dajan – 12 km • Constructing Wastewater Collection System in Anza – 9 Km • Constructing Wastewater Treatment Plant – One in Beit Dajan and One in Anza. • Installing Irrigation Schemes – Beit Dajan and Anza • Public Awareness and Capacity Building Targeting School Students and Farmers- Beit Dajan and Anza

Objectives

- To contribute to improving sustainable water and environment management through the promotion of sustainable and innovative wastewater management systems and reuse schemes in Palestine.

- To create and disseminate innovative solutions in managing wastewater treatment and reuse in a sustainable, socio-economic manner, hence contributing in:

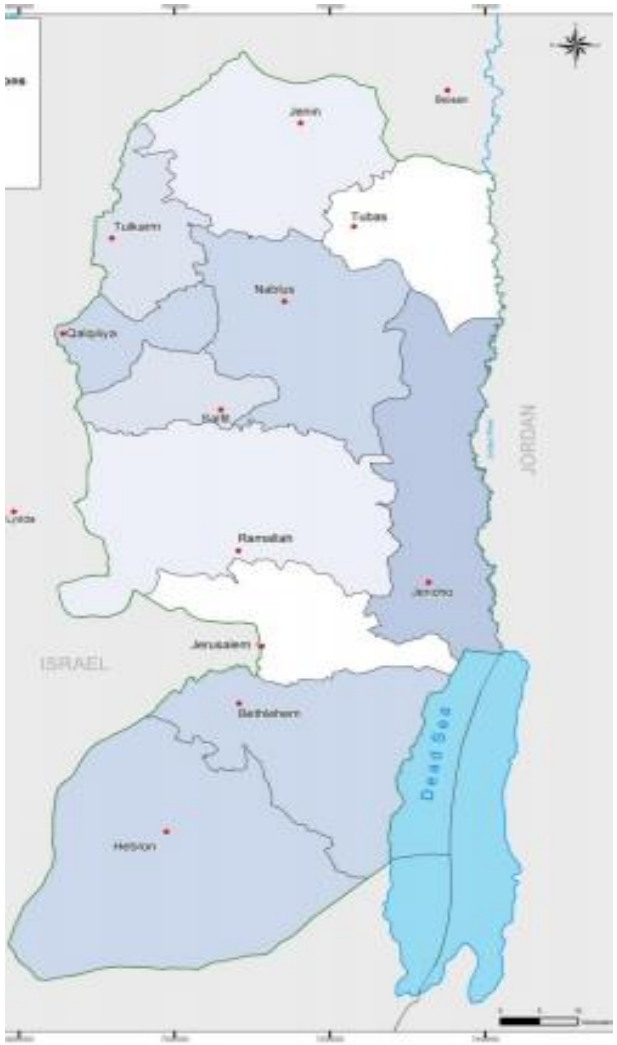
➢ The reduction of wastewater pollution on ground water.

➢ Improving food security conditions and access to non-conventional additional water resources for agricultural purposes in the targeted rural area.

SWIM – DEMO Projects

- Beit Dajan Village – Nablus Governorate
- Anza Village – Jenin Governorate

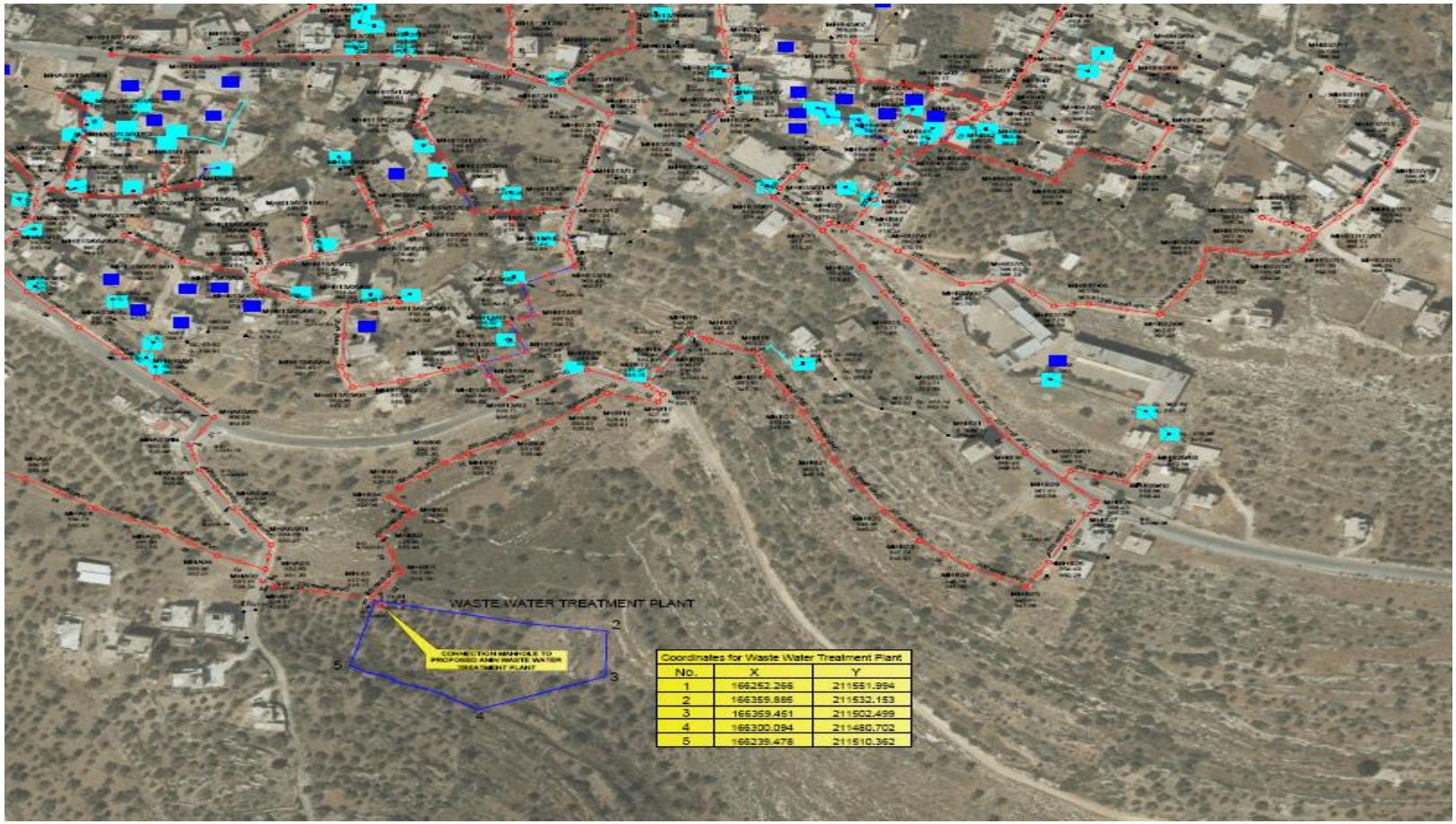
- Anin Village – Jenin Governorate



Demo Project- Anza and Beit Dajan- Wastewater Treatment Plant

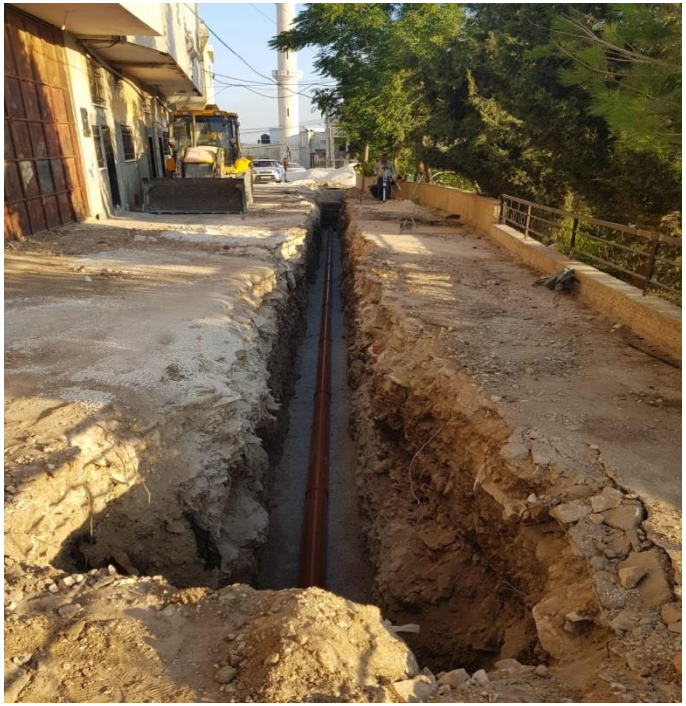
Wastewater Reuse - Anza
Olives, Almonds, Figs, Grapes Trees

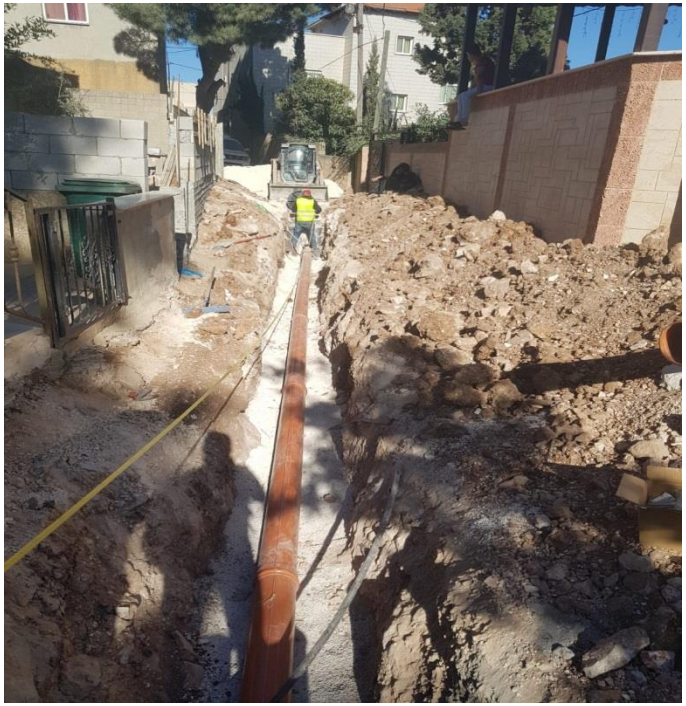
Site Location – Anin Village Location



Coordinates for Waste Water Treatment Plant		
No.	X	Y
1	166252.266	211551.994
2	166359.886	211532.153
3	166359.451	211502.499
4	166300.094	211480.702
5	166239.478	211510.362

Demo Project- Anin
Wastewater Collection System – Under Construction





Expected Impact of the Project

- **<u>Economic Level</u>:**
  - About 50 farmers in Anin Village will have access to extra water for irrigation.
  - The farmers will have additional income source since they have the opportunity to apply irrigated agriculture.
  - About 65% of Anin Village will be connected to sewer lines and WWTP and will save from the unsafe disposal of wastewater and extra financial burden on villagers caused by regular emptying of cesspits (saving of average 300 Euros per year per household).
  - Providing job opportunities.
  - The operational power cost for the WWTP will be 50% covered by clean energy (solar panels) which have economic and environmental positive impacts.

Expected Impact of the Project

- <u>Technical Level:</u>

- Enhancing the capacity of the local authorities (Village Council and the Joint Service Council (JSC) to manage and maintain the sewage system facilities.
- Maintenance units will be established.
- Staff will be trained. At least 8 engineers will be trained (wastewater management and reuse).
- Raising the awareness of school students in 4 schools in Anin Village – 600 students- (2 female schools and 2 male schools) regarding water and wastewater related issues.

Expected Impact of the Project

- <u>Social Level:</u>

➢ Rural families in the targeted village (Anin) suffer from environmental hazards due to uncontrolled discharge of raw sewage and from high cost of sewage evacuation.

➢ Residents of Anin Village will be served by wastewater collection system and WWTP. This will have positive impacts on the social wellbeing of residents.

Expected Impact of the Project

- Policy Level:

Establishment of the Water Users Association (WUA) in line with national polices for both Ministry of Agriculture (MoA) and the Palestinian Water Authority (PWA).

- The MoA has approved a bylaw on WUA.

- The tasks of the WUA include:
    - Responsible for the management of the distribution system of the reclaimed water and its use for irrigation purposes.
    - Responsible for enlisting additional farmers and for resolving conflict between members and securing letter of commitment.
    - Responsible for the maintenance and operation of the distribution system and irrigation facilities.
    - Recommending of cropping patterns.
    - Post harvesting practices including packaging, marketing,…etc
    - Collecting fees from participating farmers.
    - Representing the farmers against all relevant institutions.

Financial Sustainability of the Project

- Sewage collection is by gravity without any pumping station or pumping cost.
- Extensive systems of treatment that need low maintenance and operation cost were used.
- Using solar panels will help ensure a sustainable operation and reduction in the annual operational costs (energy) at the installed wastewater treatment facility in Anin.

Financial Sustainability of the Project

- Enhancing the ownership feeling through extensive consultation with local community represented by their village council.

- Community showed high interest and readiness to contribute in cash and in kind. They have purchased the land for treatment plant in Anin.

- The solid waste / sludge generated from the WWTP will be safely disposed to a very close national dumping site (Zahret Al Fenjan), thus, eliminating the challenge of very high transportation cost .

Sludge Handling

- The plan is to transport Anin WWTP sludge to Zahret Al Finjan landfill.
- The Palestinian experience of handling sludge produced by municipal treatment plants is still very limited.
- The restricted standard of sludge reuse in Palestine makes it not possible to be applied as fertilizer.
- The sludge quality produced is up to standards (class A as a fertilizer) except for the moisture content.
- Most of the treatment plants in Palestine transport and deliver the sludge into Zahret Al Finjan Landfill where they need to pay for transporting and for fees.

Replication of the Project

Replicating the Experience in Other Villages and Areas Can be Achieved by:

- Enhancing and maximizing the role of public authorities in regular monitoring of reclaimed water quality.
- Enhancing the public acceptance to purchase reclaimed water irrigated products.
- Endorsing public trust in, and ownership of the technology installed.
- Solar energy exploitation for different applications including the sanitation sector is crucial in the context of Palestine.
- This will ensure a sustainable operation and reduction in the annual operational costs (energy) at the installed wastewater treatment facility.

Thank You