

ECOPEACE

MIDDLE EAST

Sustainable Solutions for Wastewater Treatment



Why is wastewater treatment important?

Water is one of our most important resources and its being squandered. In Jordan, water scarcity is one of the biggest challenges that the country faces.

While sewage is a pollutant, its treatment and reuse can provide an alternative source of irrigation water in semi-arid areas with water shortages or increased levels of consumption.

Water Energy Nexus:

With environmental challenges such as climate change and limited water resources, effective water management and clean energy production are both extremely important. The relationship between water and energy is closely linked. Conventional power plants consume massive amounts of water for operation, while the process of water supply and treatment of wastewater demands vast amounts of energy. Both water and energy must be taken into consideration together, hence the concept of the Water Energy Nexus.



Sewage water Treatment in Jordan:

In Jordan, the agricultural sector consumes 52% of total water available. As Jordan is a water scarce country, water reclamation from treatment plants plays an important role in improving the national water balance.



In 2017, 14% of total water used in Jordan was treated wastewater, amounting to 146.7 MCM. By increasing the number of plants and upgrading existing plants, this quantity is expected to rise to 240 MCM by 2025.

There are 32 operating sewage treatment plants in Jordan, with varying capacities and treatment methods. Each plant treats wastewater effectively, with high removal rates of important parameters such as biological oxygen demand (BOD5), chemical oxygen demand (COD) and total suspended and dissolved solids (TS).

However, operation of these plants consumes large amounts of electricity and requires constant costly maintenance. In addition, when no sewage network connects to the treatment plant, the waste is transferred manually by septic trucks, as is the case for rural communities in the Jordan valley.



The Sewage Scenario in the Jordan Valley:

The Jordan Valley is home to over 500,000 people and is considered to be Jordan's food basket. Unfortunately, sewage management practices in the Valley are not sustainable. Similar to all rural areas in Jordan, each building's sewage is collected in a cesspit until a septic truck pumps the waste. The truck transports it to one of the two plants in the Valley: the North Shuna Treatment Plant, with a daily capacity of 1,200 m³, or the Tal Al Mantah Treatment Plant, with a daily capacity of 400 m³. The practice of using cesspits, which are often inadequately constructed, is harmful to the environment, because it allows for the infiltration of wastewater into the ground and overflow during heavy rainfall in winter.

As a result, groundwater and surface water resources are contaminated, posing a significant threat to both the environment and the health of the inhabitants in the communities who depend entirely on those sources for drinking.



The Tal Al Mantah treatment plant:

The Tal Al Mantah treatment plant serves the district of Deir Alla in Southern Shuneh and two small villages in the vicinity of Al Salt City with total population larger than 130,000. The plant was initially connected to the electric grid, and operation consumes 15,000 kWh, costing \$2,000 per month. The cost places large burden on the plant's finances. The lack of available funds for minor repairs and maintenance results in the temporary suspension of operations, which leaves wastewater partially treated or untreated. In addition, these interruptions force the plant to reject incoming wastewater tanker trucks, which leads to the illegal discharge of wastewater into the environment.

Furthermore, the treatment plant lacks a diagnostic laboratory to determine the type of contamination and the degree of pollution of the delivered wastewater. Currently, the plant operators attempt to determine the type of wastewater by an optical and olfactory inspection.



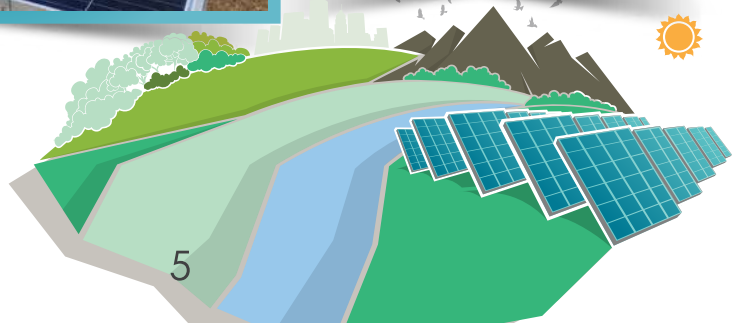
The project to upgrade Tal Al Mantah Treatment Plant – EcoPeace Middle East’s Intervention:

In light of the above situation, EcoPeace Middle East has initiated a project to upgrade Tal al Mantah treatment plant in partnership with the relevant authorities in partnership with MWI and with the support of German partners and donors. The project consists of the following outputs:

- 1- Installation of a photovoltaic system: Solar panels and grids are installed, cutting operational costs, treatment efficiency and overall sustainability.
- 2- Use of energy savings to purchase diagnostic equipment to check if the biological and chemical parameters of arriving sewage are within the allowed limits. This increases operational quality, safety and efficiency of the plant.
- 3- Adequate treatment of sewage. Treated wastewater could be used as a local resource for irrigation or discharged safely to nature.

The project has major positive environmental and social impacts which are:

- Reduced fossil fuel consumption.
- Reduced freshwater contamination.
- Improving public health.
- Effective environmental resources management.
- Reduced reliance on freshwater resources.
- Encourage micro and macro investments in renewable energy projects.



The Green Filter - A Constructed Wetland for Wastewater Treatment:

As an alternative to conventional wastewater treatment plants, constructed wetlands do not require large amounts of energy and human resources for operation and maintenance. Constructed wetlands are a much more sustainable and cost-effective approach to treatment that is applicable in rural areas.



A wetland is an ecosystem that is permanently or seasonally flooded by water. A constructed wetland is a man-made structure that is designed to mimic the natural functions of wetlands. The constructed wetland consists of constructed channels with planted filter beds that provide space for waste water treatment by biological processes. These planted filter beds are commonly made of gravel or sand.



When the channel of the constructed wetland receives the pretreated wastewater, aquatic plants release oxygen from their rhizomes, which stimulates both the decomposition of organic matter and the growth of nitrifying bacteria. Nitrifying bacteria then convert ammonia to nitrate. The nitrate formed diffuses or percolates through to the oxygen poor zones where it will be removed from the system by denitrification.

The green filter constructed at the Jordan EcoPark is an integrated system that consists of a constructed wetland with a sedimentation tank that acts as a pretreatment unit. Wastewater first enters the sedimentation tank where solids break down and settle at the bottom to form a sludge layer. The wastewater then flows to the constructed wetland to pass through the media of gravel and aquatic plants that break down organic matter into primary material which they absorb. The treated effluent can be used for different purposes including agriculture and surface and groundwater recharge.



What does EcoPeace aim to achieve with this project?

EcoPeace aims to showcase how simple investments in sustainability and green energy can solve worsening national problems while also preventing further disruption of the ecological balance as a result of human activity. This project also aims to raise local residents and farmers' awareness of sustainable water solutions by using the treated water for agriculture in nearby communities.

EcoPeace Middle East would like to recognize and thank the Federal Ministry for Economic Cooperation and Development (BMZ), the WILO Foundation, Alfred Kärcher and Global Nature Fund for their support.

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