



Rain, rain come when you want

A guided trip across Israel's major water facilities yields interesting insights into water management, disaster-preparedness and innovative technologies.

By Sahana Singh

By 2015, we will not depend any more on rainfall," said Booky Oren, Chairman of WATEC, Israel's premier event on water technologies, renewable energy and environment.

While this sounds like a presumptuous statement, the truth is that Israel is largely arid or semi-arid and its water scarcity is only expected to worsen in the future according to climate models. Over the years, the country has been recycling more and more of its wastewater and today about 75% of its domestic sewage is recycled (exclusively for agriculture), a figure which is planned to be increased to 100% by 2020. Purple lines carrying reclaimed wastewater are a familiar sight in Israel's countryside.

The widespread use of drip irrigation in agriculture has helped to conserve precious water resources. Only about 50% of the country's freshwater is used for agriculture compared to a worldwide average of about 70%. Recycled effluents meet about 45% of the total agricultural demand.

Mekorot, Israel's national water agency is the bulk supplier of most of the country's water.

Recharging aquifers with treated wastewater

At the Shafdan Wastewater Reclamation Plant which is Israel's largest water reuse project, about 40% of the coun-

try's reclaimed wastewater is generated. Wastewater from the biggest metropolitan region of Israel (Dan Region) undergoes mechanical-biological treatment. "We use a modified, completely mixed, activated sludge system, with a single sludge nitrification-denitrification process, without primary settling," informed Gal Shoham, a professional instructor at the plant. "The process modification includes anaerobic, anoxic and aerobic sequences," he said.

The treated wastewater coming from the two phases of the treatment and reclamation project are conveyed to Soreq and Yavne recharge areas where the effluents permeate

into the ground and recharge the aquifer. "A special recharge-recovery system is used, which consists of intermittent flooding of the spreading basins, controlled passage of the effluent through the unsaturated zone and a portion of the aquifer, and its subsequent pumping by means of recovery wells surrounding the recharge area," explained Mr Shoham.

The recharged effluent is monitored through observation wells located at various distances from the recharge basins in all directions. The recharged groundwater is then pumped up from the recovery wells and used to irrigate crops by means of a separate main conveyance system.



Biological treatment for wastewater at Shafdan plant.



A recharge area where treated wastewater is allowed to penetrate and recharge the aquifer.



Multi-media filters carry out tertiary treatment of wastewater before use in irrigation.

Stringent tertiary treatment readies effluents for irrigation

Not far from Tel Aviv is the city of Ra'anana with 78,000 residents which has been named the city with the highest quality of life in Israel. Ra'anana's municipality and water corporation play an active role in ensuring this quality.

In 2006, Amiad was selected as the prime contractor for the treatment of sewage for the municipality of Ra'anana. The project, which includes the tertiary treatment of sewage is one of the largest systems of its kind in Israel. Sequencing batch reactors are used for the biological treatment of municipal wastewater. Nitrogen and phosphorus are removed from the effluent. This is followed by tertiary treatment using Amiad's multi-media

filters which purifies the effluents further. Chlorination is carried out for disinfecting the effluents which are then used for irrigation.

Smart water management ensures speed, security and efficiency

The Ra'anana Municipality gives high importance to smart water management and has invested in several leading edge technologies. An advanced Geographical Information System (GIS) is used to document all water and sewage infrastructure.

In 2001, Ra'anana was already the country's first city to adopt a water meter system supplied by a company called Miltel that enabled remote readings and centralised billing of water usage. "Our main aim is to give a better service – to inform our cus-

tomers of a suspected private leak in a matter of days, and help them save their money and water," says Nir Barlev, Managing Director of Ra'anana Water Corporation.

"We deploy a layered approach to help monitor and manage a city's water supply," explained Benjamin Levy of Miltel Communications. "Our network of radio transceivers and backhaul infrastructure is designed to provide continuous information from all layers, and whether it is water pressure, sewage levels or residential consumption, the data is captured by the same technology and transported back for analysis".

The latest technology in which the city's water corporation is planning to invest is a sophisticated online water event detection and situation management system. Mr Barlev believes that rapid detection and response to everyday water events as well as a crisis such as a sudden pollution incident can be critical to protect people's health. According to him, traditional manual sampling which takes 24 to 48 hours to produce results would not allow rapid detection and response to critical events.

Whitewater Security is the company chosen by Ra'anana to provide state-of-the-art tools to secure the city's waters from accidental contamination, terror attacks, natural disasters and for managing daily events. The company has already sold its products to the international market. "Water-Wall is our end-to-end water security management system designed to give operators an unprecedented level of decision-making confidence in the event of a water crisis," said Rani Weinberg from Whitewater Security.

The Ra'anana project includes an online monitoring layer around the city. "Currently, we are on location at a key point in this monitoring layer which utilises online multi-parameter monitoring stations in order to detect water contamination in real time," said Mr Weinberg.

Another technology branded CheckLight will be integrated into the project during later stages of government approval. CheckLight uses luminescent bacteria to detect contamination through changes in light intensity. Here the bacteria act