Case Study

Sustainable Smart Irrigation System - An Effective Way to Reduce Water Consumption, Operational Cost, and Impact on the Environment

Background

With the rise in population in the UAE, water consumption has increased exponentially. Irrigation accounts for a very large proportion of water consumption and leads to faster depletion of this precious resource. *The 2022 article titled* - '**Irrigation Systems in the United Arab Emirates**' by **EcoMena** reveals that the UAE is one of the top 10 most water-scarce countries in the world and has one of the highest per capita water usages of **550 liters per person per day**. Another study titled -'Ranking the World's Most Water-Stressed Countries in 2040' by **World Resources Institute (WRI)** reveals that the Middle East draws heavily upon groundwater and desalinated seawater, and will face exceptional water-related challenges for the foreseeable future.

Without a surprise, irrigation accounts for a vast amount of water. The research by **EcoMena** finds out that when using spray irrigation (sprinkler systems) in the UAE -

60% **of the water evaporates before it is absorbed by the plants**

40% **only of the water intended for irrigation is used**

which itself is not evenly distributed. This lack of uneven distribution coupled with the decrease in the amount of water used is detrimental to the plant's health. This creates an urge to explore more sustainable irrigation methods to cut down on water usage and provide adequate hydration for crops even with a limited supply of water.

Problem Statement

One of the Kaizen AMS-managed communities located in *Nad Al Sheba* had a traditional irrigation system. Due to its high occupancy rate, large area, landscaping, and green cover, the community had high water consumption

40% - 45% **of the total water consumption was used by the landscaping alone**

In **Q1, 2022**, the community witnessed a steep rise in water usage and exceeded the daily water supplied by the Dubai municipality daily. The community's daily water requirements were **1600 cubic meter water a day compared to 1200 cubic meter** supplied by Dubai municipality.

1600 Cubic Meter — Community's Daily Water Requirements

1200 Cubic Meter — Supplied By Dubai Municipality

Being an environment-friendly firm, Kaizen AMS deploys the following systems to regularly track the water & energy usage at its managed communities and take necessary steps to cut down on the usage

- **Water Meters**
- **Flow Meters**
- **Flow Switches**
- **Electricity Usage Monitors**

Our energy-efficiency team conducted a study to analyze the reasons for this sudden rise in water consumption and found out **the challenges with the manual irrigation system which are as follows -**

1. Poor site visibility and lack of instant connectivity
2. Inefficient manual operation resulting in inconsistent irrigation schedules
3. High maintenance cost and water consumption
4. Lack of water flow management leads to a drop in water pressure
5. Deposit of algae on the landscaping and bad aeration owing to using excess irrigation water

Solution

Kaizen AMS leveraged its tech-enabled approach to reduce water consumption in the community. Our team retrofitted the existing irrigation system with an advanced and sustainable solution **'BASELINE by RADIUS' which has induced** root zone growth technology and full site water management capability to the process.

As per the research paper titled - 'Sustainable Irrigation: Designing Water and Energy Efficient Systems' published by **MIT** in partnership with **Tata Center for Technology and Design**, **drip irrigation is a powerful technology that, compared to furrow (flood) irrigation, can achieve**

20% - 40% **Reduction In Water Consumption**

20% - 50% **Increase In Crop Yield**

The technology facilitates growing plants under strict water constraints, dry seasons, or low-pressure municipal supplies, as in many parts of the Middle East

The comprehensive highlights of the new sustainable irrigation system are as follows -

1. Deploying smart technology to collect the readings of the water consumption
2. Installing advanced moisture sensors systems to analyze the water required for irrigation
3. Timely monitoring of the lower and upper root zones' moisture thresholds
4. Fitting pressure sensors and water flow devices to ensure the proper hydraulic flow of water
5. Introducing Geo-location maps to improve the management's visibility on system hardware and water consumption and enable them in taking timely measures to reduce it
6. Deploying tank water level sensors to timely monitor tank water availability and irrigate based on priority
7. Automating the sustainable irrigation system using Artificial Intelligence (AI)

Outcome

The installation of the advanced Drip irrigation system has worked wonders in substantially reducing water consumption and minimizing the operational cost by half. The implementation of an AI-powered sustainable irrigation system **has reduced** the maintenance cost by half with **minimized** the need for manpower to operate it.

The installation of live-interaction software's has improved the visibility on the management of the irrigation system and enabled them in performing timely analysis of water required for irrigation. Furthermore, the implementation of the moisture sensors and weather data technology ensured sufficient water level is maintained 24x7.

Within the first 90 days of the implementation of the Sustainable irrigation system, our community witnessed -

100%	Reduction in water drop pressure	**60%**	Decline in water consumption
55%	Drop in the maintenance cost	**45%**	Fall in DEWA water bill
35%	Decline in the overall operational cost	**15%**	A surge in the occupancy rate
15%	Improved landscaping with an increase in green cover	**90% - 97%**	Increase in resident satisfaction
900 Cubic Meter	Community's New Daily Water Requirements	**1600** Cubic Meter	Community's Old Daily Water Requirements