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Kenya Industrial Water Alliance

LEADING BY EXAMPLE

REPLICABLE BEST PRACTICE IN INDUSTRIAL WATER MANAGEMENT

RED LANDS ROSES

"In a global context where food security is becoming more and more of a challenge, producing ornamentals on land that can be used for food does not make sense. We therefore started with the premise to keep the environmental footprint of our production as low as possible. Soil as well as water play an essential role and both need to be preserved from overexploitation and pollution."

Isabelle Spindler, Founder and Managing Director

SECTOR	Horticulture
EMPLOYEES	560
REVENUE	KES 760 million (2017)
CONSUMPTION	
○ **Public Service Provider**	○ 0 m³/d
○ **Surface Water Abstraction**	○ 900 m³/d
○ **Borehole**	○ 50 m³/d
INVESTMENT IN WATER USE EFFICIENCY	○ Hydroponics ○ Drip irrigation ○ Misters ○ Ultra-Filtration for recycling
REDUCED WATER CONSUMPTION	15 m³/d
WATER RECYCLING	Post- harvest water recycled through use of Ultra-Filtration
WASTE WATER MANAGEMENT	Domestic water treated in multi-tier wetland system

ABOUT RED LANDS ROSES

Red Lands Roses is a medium-sized flower farm producing roses exclusively for export. Established in 1996 in Ruiru, 35km northeast of Nairobi, it was an early leader in water efficient horticulture, developing one of the first soil-less growing systems that remains among the few, if not the only, of its kind in Kenya today. The farm grows over 130 different varieties of roses in nurseries covering an area of 28ha of otherwise non-arable land (20.5ha in Ruiru and 7.5ha in Kamiti) with a production of approx. 50,000 stems per day (representing a range of between 40,000 to 100,000 per day).

Roses are grown exclusively in greenhouses using hydroponics,[1] enabling the highest possible resource efficiency with regards to the input factors, mainly water and nutrients.

The intensive production achieved depends on the reliable supply of water, both in terms of providing

[1] Hydroponics are raised troughs in which the flowers are grown without soil, whereby the required nutrients are provided with the water.

sufficient water for the hydroponics as well as maintaining the necessary levels of humidity inside the greenhouses. Since its inception, owners Isabelle and Aldric Spindler have pursued a deliberate strategy of environmental protection and sustainability without sacrificing product quality. Red Lands' roses and operations meet international fair trade standards and are certified by a number of standard-setting bodies, including MPS, Kenya Flower Council, Fair Flowers Fair Plants and Global G.A.P.

RED LANDS ROSES AND WATER USE

Water is used for four primary types of processes during production:

1. Irrigation during growth of the flowers: **600m³/d**
2. Climate management in greenhouses: **300m³/d**
3. Post-harvest preservation of cut flowers: **30m³/d**
4. Domestic water use: **20m³/d**

Red Lands Roses abstracts the majority of its water, approx. 900m³/day, from a dam fed by the Mukuyu river. An additional 50m³/day is abstracted from a borehole and used for post-harvest processes and domestic water.

To assure water availability, there are several storage ponds on the farm with a total capacity of approx. 10,500m³. Rainwater harvested from four of the greenhouses is also added to the storage ponds for irrigation.

INNOVATION AND INVESTMENT IN WATER USE

Efficiency, Waste Water Treatment and Reuse

Red Lands Roses has invested in water-efficient technologies and operational approaches to reduce the volume of new water abstracted each day by recycling nearly all the water that is not either consumed or evaporated. Likewise, the minimal waste water produced is bio-organically treated before being released back into the environment.

Irrigation

The use of hydroponics provides a number of advantages over soil-based agriculture.

First, the inflow of water and nutrients delivered via the drip irrigation system can be effectively managed and monitored, allowing precise control over both.

Second, the water and nutrients that are not absorbed by the plants are collected and reused in a recirculating nutrient reservoir, creating a closed circuit system with high water efficiency and minimal water loss (e.g. common minor leakages from the pipes and beds). This process not only saves the farm water but also reduces the volume of fertilizer required for flower growth. Studies have shown that hydroponic systems only need about 10-20% of water compared to field cultivation for the same yield.[2]

About 50% of the water supplied to the flowers - what is left over after evaporation on the beds and evapotranspiration through the flowers - is recollected and treated with Ultra Violet light (UV) to kill any bacteria that could threaten the health of the flowers. Hydrogen peroxides (H_2O_2) are then added to keep the water clean and free from contamination. After the addition of new fertilizers and fresh water, the solution is pumped back through the entire hydroponic system again.

[2] Bradley, P & Marulanda, C. (2001). Simplified hydroponics to reduce global hunger. Acta Horticulturae. 554. 289-295.

Climate Management

Roses require a relative humidity of about 70% for optimal growth, however average relative humidity is around 55%. Even though there are times during the year when the humidity is sufficient, during the dry seasons significant amounts of water are required to increase humidity inside the greenhouses. A typical way of increasing the relative humidity is by wetting the floor, which, through evaporation of the water, leads to an increase in relative humidity. This is a very water intensive process with a rather low water use efficiency. To reduce the water required, Red Lands Roses installed misters and foggers in most of the greenhouses. Using a mister reduces the required amount of water by about 80% compared to wetting the floor.

Post-Harvest Preservation

As soon as the roses are harvested, they must immediately be placed in a water bath to prevent wilting. Since they are very susceptible to fungal and bacterial infections at this stage, the water has to be free of any such contaminants. While initially clean borehole water in conjunction with preservatives has been used for this process, the installation of a KES 4.7 million Ultra Filtration system that removes microorganisms and suspended solids, has enabled Red Lands Roses to recycle nearly 100% of the post-harvest water while at the same time eliminating the need for expensive preservatives.

This process not only saves the company about 15m³ of water per day but also KES 120,000 per month as a result of reduced water costs, preservative use, and energy.

Ultimately, the pay-back period for the UF is just under four years. Red Lands Roses was the first flower farm in Kenya to install an UF to recycle post-harvest water.

Rainwater Harvesting

Due to the topography of the farm, only 4 out of 20 greenhouses are suitable for gravity rainwater collection and storage. The other rainwater and runoff from the greenhouses and surrounding area is channeled down towards the bottom of the farm where a dam holds the water back and stores it in a manmade pond. The dam has no foliage and hence the water either evaporates or infiltrates into the soil, contributing to local groundwater recharge.

Ultimately, nearly all of the other water used on the farm either infiltrates the soil within the farm boundaries after treatment or converts through evapotranspiration. Only during periods of heavy rain does some water spill beyond the dam and leave the farm, otherwise there is no waste water discharge from the entire facility that occurs outside the boundaries of the property.

CURRENT SITUATION AND THE WAY FORWARD

Red Lands Roses has already put in place a number of initiatives to keep their water footprint to a minimum. Water is a shared resource, however, and the source of the farm's main water supply is also the source of water for many other users in the area.

With increasing urban development and land use changes in the region, particularly around Tatu City, there will be an ever greater demand for water, intensifying pressure on the shared resource. Reducing the need for abstracting water is one way forward. This can be achieved by first taking a closer look at the entire water cycle on the farm using comprehensive water mapping to identify all relevant water uses.

Red Lands Roses is already working on plans to recover more of the rain and storm water that is currently not being recovered for any use on the farm. Beyond initiatives on their own farm, joining the local Water Resources User Association (WRUA) is another option to start engaging with other water users in their catchment to address communal challenges affecting water including pollution and distribution.

KENYA INDUSTRIAL WATER ALLIANCE

Launched in September 2016, the Kenya Industrial Water Alliance (KIWA) is a partnership of public, private and civil society organizations collectively addressing major water-related risks to industrial growth.

Spearheaded by the Kenya Association of Manufacturers (KAM) and the Water Resources Authority (WRA), and supported by the International Water Stewardship Program (IWaSP) and the 2030 Water Resources Group (2030 WRG), KIWA provides an action-oriented forum for stakeholders to discuss, plan, design and implement activities to increase water security, initially in the Nairobi sub-catchment. The partnership is developing initiatives aimed at closing the water demand and supply gap and reducing water wastage.

KIAMBU WATER STEWARDSHIP PARTNERSHIP

The Kiambu Water Stewardship Partnership (KIWASP) is a subsidiary partnership under KIWA that was established under the leadership of the Kiambu County Government and supported by the IWaSP.

KIWASP focusses on effective water service delivery by the water companies, promoting water use efficiency in industries, restoring and protecting water catchments, minimizing pollution levels in water resources and strengthening governance and policy frameworks.

CONTACTS

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