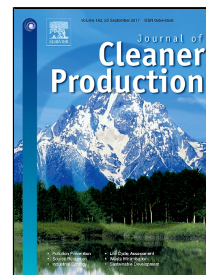


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An investigation of the feasibility of proposed solutions for water sustainability and security in water-stressed environment

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Abstract

In this paper, the possible solutions aimed at ensuring water security and sustainability in the UAE are proposed and assessed. The proposed solutions include the introduction of cost-reflective water price regimes, sustainable building codes, total wastewater reuse, leakage reduction, and diversification of supply sources in terms of renewable energy-powered desalination and cloud seeding. The feasibility of these solutions is assessed in terms of the drivers and barriers to their implementation. From the assessments, it is observed that the implementation of the actual cost of water (AED10.32/m³) would reduce water consumption by expats by 5.4%. Significant reduction in water consumption by locals could also be achieved. Domestic water savings, up to 19.8%, would be achieved by water-efficient household fixtures. Irrigation can be achieved through complete wastewater reuse and water leakage can be reduced to 10% through noise loggers, automated pumps, and pressure relief valves. A water management approach that integrates these solutions is crucial and strategic to the attainment of sustainable water balance.

Keywords: Water security; Sustainability; Water use efficiency; Cloud seeding; Photovoltaic-powered reverse osmosis; United Arab Emirates.

1. Introduction

The United Nations (UN) requires all countries to ensure sustainable production and consumption through resource efficiency, energy efficiency, and sustainable infrastructure by 2030. This is contained in the sustainable development goal No. 12 of the UN. Closely related to this goal is goal No. 13 which addresses the control of climate change through sustainable production and consumption. One of the most important products is clean water because it is essential for the sustenance of mankind. However, many countries are water-stressed and lack access to abundant natural freshwater sources. A country is said to be “water stressed” where the country’s annual freshwater supply is less than 1,700 m³ per capita (White, 2012). A country is

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