

Decentralized Wastewater Treatment System for Safe Reuse of Wastewater as Business Model in Rural Area.

Suhas P Wani, Mukund D Patil, Aviraj Datta, and Amey Tilak
International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), India

Abstract:

A large portion of fresh water supplied for domestic use gets converted into wastewater, which could be diverted for agriculture purpose. A business model comprising decentralized wastewater treatment (DWT) system and reuse of treated wastewater in agriculture has developed by ICRISAT led consortium of research institutes. The DWT system provides a solution for safe reuse of domestic wastewater at community scale. Constructed wetland is the key component of DWT, which is in fact less expensive and requires less maintenance. The implementation and management of the DWT system and reuse of the treated wastewater can be handled by community based organization (women self-help groups) as an income generating activity. ICRISAT has introduced DWT system as an activity of integrated watershed management program (IWMP) in Kothapally village in Telangana state of India. At ICRISAT's research facility, performance of DWT vegetated with various combinations of wetland plant species for improving wastewater treatment efficiency is evaluated with respect to nutrient dynamics in plant, filter media (coarse sand), and wastewater. Results showed reduction in total suspended solids, $\text{NH}_4\text{-N}$, $\text{NO}_3\text{-N}$, sulfate, phosphate, and chemical oxygen demand, by 98%, 54%, 45%, 72%, 85%, and 81% respectively. However the high sodium adsorption ratio (SAR) of the treated wastewater poses a key challenge for constructed wetland systems. Coupling wastewater treatment along with IWMP is not only helpful in enhancing agriculture production and income of small holder farmers but also in improving water quality of groundwater wells and downstream water bodies, better soil quality through carbon sequestration.

Keywords: Domestic wastewater, Decentralized Wastewater Treatment system, constructed wetland, wastewater treatment efficiency, integrated watershed management program