Selection and evaluation of rural wastewater treatment technology in arid regions of Northwest China

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A B S T R A C T

The arid regions of Northwest China (ARNC) are characterized by water shortage, drought, and sandstorms. This study aims to propose an effective technical plan for rural sewage in the arid area of Northwest China for reference. This study adopted the analytic hierarchy process method to calculate various parameters of ARNC wastewater treatment. By optimizing the preliminary indicator group of ARNC rural sewage treatment indicators, the optimized standard layer and indicator layer are obtained, and the weights of indicators at all levels are analyzed to obtain the results. Fuzzy comprehensive evaluation combined with the weighted summation method was used to determine the applicability of technology choices, and establish a review set and evaluation matrix. Studies have shown that the most suitable technical solutions for concentrated areas, scattered areas, and water source areas in the arid area of Northwest China are as follows: (1) sequential batch reactor (SBR) activity treatment + constructed wetland technology (CWT), (2) soil infiltration technology (SIT) + constructed wetland technology (CWT), (3) constructed wetland technology (CWT) + oxidation tank technology (OTT). Constructed wetland technology is very effective in all three areas, showing its adaptability and superiority to the environment. The research results provide a certain reference basis for decision makers of wastewater treatment technology in arid regions.

Keywords: Wastewater treatment; Combination model; Rural; Arid areas

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