Reuse-oriented decentralized wastewater and sewage sludge treatment for rural settlements in Brazil: a cost–benefit analysis

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ABSTRACT

Decentralized sanitation and reuse (DESAR) solutions can contribute significantly to the improvement of wastewater treatment in small urbanized rural settlements (SURUS). Amongst the advantages of DESAR solutions for SURUS is a reduction in final treatment costs because they allow for water reclamation and sewage sludge reuse; predominantly for agriculture. In the present work, a cost–benefit analysis on a DESAR system installed into a rural community in Rio de Janeiro State, Brazil, was conducted. The net present value (NPV) method was applied to assign a monetary value to the economical and environmental benefits associated with water reclamation, sewage sludge reuse and the avoided cost of 5-d biological oxygen demand (BOD5) discharges. The NPV results of this case study revealed that the proposed DESAR solution could recover up to 73% of the total operating and maintenance costs. These findings suggest that DESAR solutions can respond to the need to reduce costs and improve the nutrient recovery capabilities of sanitation interventions in rural communities.

Keywords: Decentralized sanitation and reuse solutions; Sewage sludge reuse; Rural development; Nutrient recovery; INTECRAL