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Comparative life cycle assessment of wastewater treatment plants based on different technologies in India

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Life cycle assessment can be used as a tool to evaluate the environmental impacts associated with wastewater treatment plants. The objective of the present study was to conduct a comparative life cycle assessment of five wastewater treatment plants: Sequencing batch reactor (SBR), moving bed biofilm reactor (MBBR), membrane bioreactor (MBR), activated sludge process (ASP) and constructed soil filter (CSF). The life cycle impact assessment was performed using Gabi software, CML baseline method. The impact categories that are affected the most, from the higher to the lower score are: Marine ecotoxicity potential, abiotic depletion potential (fossil), global warming potential, human toxicity potential, terrestrial ecotoxicity potential, acidification potential, freshwater ecotoxicity potential, eutrophication potential, photochemical ozone creation potential, abiotic depletion potential (elements) and ozone layer depletion potential. The characterization results indicate that the constructed soil filter system has a better environmental performance in the most of the impact categories analyzed. The environmental impact is caused mainly by the amount of electricity consumed, whereas the impact of producing the chemicals is comparatively low. Further, two scenarios were assessed: (1) Wastewater is treated and discharged, (2) 25%, 50% and 100% of treated effluent is reused for non-potable applications. The results show the reuse rate significantly affects environmental performance of the system and using the reclaimed water for higher value applications results in larger environmental credit. The total life cycle benefit from reuse of the tertiary treatment effluent is much higher than the life cycle energy consumption for the tertiary treatment.

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Efficacy beliefs, collective actions and waste recycling behavior: An empirical study in Hong Kong

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Efficacy of waste recycling is one of the essential factors affecting a city's environmental sustainability. It is particularly true when the city is running out of landfill space. Like many other pro-environmental initiatives like energy and water saving, waste recycling cannot be successfully accomplished by just one or two people, but only by a concerted effort of the community. This necessitates collective actions contributed by members of the society. However, the collective-action dilemma creates a common underlying difficulty in formulating workable solutions to many environmental problems. With a view to the non-excludability of the outcome, rationality drives people to free-ride others' efforts in waste recycling. In spite of the Olsonian view which expects rational individual will not participate in a collective action which provides no positive net benefit for him or her, quite many individuals do actively engage in waste recycling in the domestic setting. Thus, it is worthwhile to examine why some participate and others do not. Building on the collective interest model (CIM) which has been widely applied in explaining political participation and environmental activism, this research develops an analytic framework for elucidating individuals' participation behavior in waste recycling. The explanatory analysis which is based on the findings of a structured questionnaire survey in Hong Kong corroborates the central propositions of the CIM and provides a theoretical account of waste recycling participation. In brief, waste recycling participation is a function of beliefs about personal and group efficacy, the value of the collective good and the selective benefits and costs of participation. These findings have far-reaching implications for the formulation of government policies promoting waste recycling in a domestic setting in Hong Kong and other megacities.

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