Comparative Life Cycle Environmental Impact and Cost Assessment of Use of PET Bottles and Portable Water Purifiers in Drinking Water Supply in Remote Areas

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Abstract:

Improper waste management in remote areas leads to significant environmental problems, including littering and open burning. Although some studies have analyzed the waste management of PET bottles, few have examined alternatives to reduce such waste in remote areas. This study evaluates the life cycle environmental impacts and costs of providing drinking water using PET bottles and portable water purifiers in remote areas. Portable water purifiers present a promising solution, as they do not require energy and can be used wherever water is available. A field study in a remote Malaysian village, located four hours' drive from Sibu City having no electricity and water facilities, found that one portable water purifier per household of four adults and two children could reduce annual CO_2 emissions by 96.8% compared to PET bottled water. These findings highlight the potential of portable water purifiers as a sustainable alternative for water supply in areas with poor infrastructure. Furthermore, this approach could be applied globally to other remote or disaster-affected areas to promote sustainable practices. By providing a comprehensive life cycle assessment, the study contributes to developing innovative solutions for global challenges in water supply and waste management, focusing on environmental benefits and cost efficiency.

Keywords:

PET bottle, Life cycle assessment, Waste management, Remote areas, water supply.