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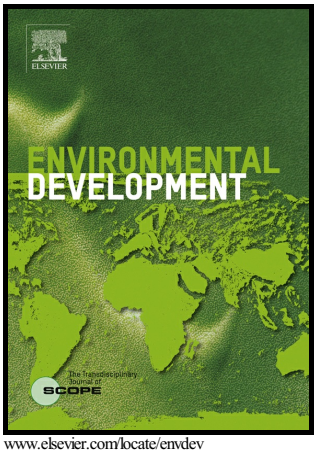

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Biosorbents for the removal of synthetic organics and emerging pollutants: opportunities and challenges for developing countries

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Abstract

Contamination of aquatic systems by synthetic organic contaminants and emerging pollutants poses significant public and environmental health risks in developing countries. These contaminants mainly originate from textile, agrochemical, and pharmaceutical industries. The removal of such contaminants is problematic in developing countries because advanced water treatment methods are still lacking in developing countries due to their high costs. The application of biosorption for removal of organic contaminants in developing countries is attractive for three reasons; (1) large quantities of biomaterials for use as biosorbents are readily available; (2) lack of advanced water and wastewater treatment systems for removal of organic contaminants; and (3) the technology is relatively cheap compared to advanced methods (e.g. membrane filtration) often used in developed countries. Overall, this has the potential to remove organic contaminants from aqueous systems while simultaneously reducing the public health and environmental impacts associated with the disposal of such biowastes. However, large-scale application of biosorption faces potential challenges including lack of funding, poor mechanical properties of biosorbants, complex adsorption mechanisms involved, and poor regeneration capacity. In addition, spent biosorbents present an environmental risk and their disposal is problematic due to the potential of contaminating surface and ground water. Possible disposal methods for spent biosorbent include use as a filler in road surfacing, as a soil amendment, and in phytoremediation cells where the organics are absorbed and broken down by plants. Overall, biosorption is a potentially viable alternative, but further research on its ability to remove pollutants from multi-component systems, its regeneration capacity, and plant design parameters is required before the benefits of the technology are realised in developing countries.

Keywords: biosorption; challenges; developing countries; large scale application; organic pollutants