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## The prospect of water supply in rural areas: A case study of Sabah, Malaysia

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Recent climate anomalies have brought Malaysia's water shortage to a new level. Particularly in the rural regions of Sabah, natives struggle to get access to clean water supply. This paper reviews the issues regarding water service, water source availability and water distribution strategies in Sabah. The main issue in water services in Sabah is the challenging terrain and geographic distance between populated areas in Sabah. This is further aggravated by aged pipelines that contribute to leaks and furthermore non-revenue water (NRW). Literature reviews reveal that apart from surface water as a water resource, Sabah receives abundant precipitation of 1,500 to 3,000 mm throughout the year which could be harvested for domestic uses. Several potential groundwater aquifers are found in the eastern and western part of Sabah with underlying sandstone and Quaternary Alluvium which provide significant groundwater reservoirs. In the coastal and islands areas, quaternary and recent alluvium aquifer gives sufficient water supplies. Due to minimal pollution in rural areas, the water quality is deemed acceptable under the National Water Standard of Malaysia with the exception of some contaminants coming from septic tanks and agricultural activities. A decentralized system that utilizes smaller range of piping networks is more advantageous for rural areas. Smaller size plants that collect and treat water at the point of need will remove the need for longer pipelines and lower cost of installation and maintenance. The review concluded that rural Sabah should utilize the surface water, rainwater, and groundwater based on availability and quality in the individual areas. A decentralized treatment system should be applied to serve small number of houses to ensure good water quality before consumption. However, the treatment unit may be limited to a simpler form of technology as semi-skilled or un-skilled personnel will be required to operate and maintain the system.

### Recent Publications

1. Lahin FA, Sarbatly R, Suali E (2016) Polishing of POME by *Chlorella sp*. in suspended an immobilized system. IOP Conference Series: Earth and Environmental Science 36(1), 012030
2. Janaun J, Sinin E, Hiew SF, Kong AMT., Lahin FA (2016) Synthesis, Characterization, and Catalytic Activity of Sulfonated Carbon-Based Catalysts Derived from Rubber Tree Leaves and Pulp and Paper Mill Waste. IOP Conference Series: Earth and Environmental Science 36 (1), 012019
3. Suali E, Sarbatly R, Shaleh SRM, Lahin FA, Anisuzzaman SM (2016) Correlation study of microalgae carbonation in membrane integrated photobioreactor. Source of the Document IOP Conference Series: Earth and Environmental Science 36 (1), 012043
4. Amirhossein Malakahmad, Farhana Abd Lahin, Witton Yee (2014) Biodegradation of High-Strength Palm Oil Mill Effluent (POME) through Anaerobes Partitioning in an Integrated Baffled Reactor Inoculated with Anaerobic Pond Sludge. Water Air Soil Pollution (2014) 225:1883
5. Rosalam Sarbatly, Emma Suali, Farhana Abd Lahin, Chiam CK (2015) Membrane Processes for Microalgae in Carbonation and Wastewater Treatment. In Advances in Bioprocess Technology. Pp 371-386. Springer US, 2015 (Chapter in a book)

### Biography

Farhana Abd Lahin has graduated her Civil Engineering Bachelor degree with honor in 2010 and Master's degree in 2014 both of which majoring in environmental

engineering. She has worked as an environmental consultant and has been involved in evaluating the environmental impact of palm oil plantations, sewage and water treatment plants and other urbanization projects in Sabah, Malaysia. She has joined the Engineering Faculty of Universiti Malaysia Sabah as a young lecturer since 2015. Her research works majorly revolves around water and wastewater treatment of which she is currently pursuing her PhD in. Her publication includes research papers in several reputed journals and book chapters.

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