

MUWAREC TOPIC 3:

EFFLUENT BIOFILM POLISHING FOR AQUIFER STORAGE & RECOVERY (ASR)

1. Background and Objective

Shortage of freshwater is a problem in cities in tropical countries and in all areas in arid countries. The aquifer offers a very large storage volume compared to ponds and lakes, without using surface land area and evaporative losses; thus is increasingly employed in several countries. However to protect groundwater quality, water for ASR has to be very clean; effluents should be tertiary treated or polished to remove trace nutrients and micropollutants. Research on biofilm processes and ASR have been on-going in UKM for about 15 and 5 years respectively; with respect to ASR much work still needs to be done to facilitate its implementation.

2. Work and Publications (select 5 only), if any

Biofilm water and wastewater treatments and polishing have focused on chemical free, biological removal of trace levels of organics, nutrients and heavy metals. Research on ASR has focused on use of hydrogeochemical and GIS data in modflow software to enable calculation of aquifer storage capacity for a particular area, where the UKM area was used as case study area. Selected related publications are listed below:

- 1) Al-Ajlouni M.F., Abd-Rahman R., Rafek A.G., Mokhtar M. and A-Basri N.E., 2007. Integrated Water Resources Management Advisory System Comprehensive Vision of Aquifer Storage and Recovery. *International Journal of Soft Computing Applications*. Issue 1: 50-54 (ISSN: 1453-2277).
- 2) Al-Ajlouni M.F., Abd-Rahman R., Rafek A.G., Mokhtar M. and A-Basri N.E., 2007. "Aquifer Storage in UKM Bangi as Sub Langat River Basin Water Resources Management". *International Journal of Soft Computing Applications*. Issue 1: 55-61 (ISSN: 1453-2277).
- 3) Rakmi Abd.Rahman, Abu-Zahrim Yaser and Azizah AbuBakar. 2006. Biological removal of chloroorganics from water and wastewater. IEM JURUTERA (Inst. of Engineers Malaysia) January 2006: 6-7 (Cover Story)
- 4) Abdul-Rahman, R., N. Zainol and A. Abu-Bakar, 2005. Performance of Dual-Media Expanded Bed Bioreactor, *J. Dev. Chem. Eng. Mineral Process.*13(5/6)1-10.
- 5) Abdul-Rahman, R., Ozaki H. and Zainol, N. 2003. Expanded bed column bioreactor performance and hydrodynamics. *Canadian J. Chem Eng*, 81(3-4) 867-874.

3. Brief Long Term Methodology and Way Forward

In each researcher's own country, biofilm polishing is applied to secondary effluents (industrial, greywater and domestic) and studied for micropollutants' removal with respect to nutrients, recalcitrant organics and selected heavy metals. The ASR is modeled for a selected area with well known shortage of water. Polished effluent is recharged into the aquifer. Recovery is made and studied with respect to quality, quantity (recoverability), and positive and negative impacts, on socioeconomics, planning and environment.

MUWAREC RESEARCH PROPOSAL (Format: 1-2 pages only, single spacing, font aerial narrow size 11)

To ensure dedication and focus, involvement should be limited to one or max. two topics per researcher

4. Researchers in MUWAREC Topic 3 (pls provide info)

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7.	MOHD FAWZI AL AJLUNI Dr	Jordan		
8.	FADEL ABOU ODEH Mr.	Palestine		
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