

شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلو

بسم الله الرحمن الرحيم





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شبكة المعلومات الجامعية التوثيق الإلكتروني والميكرونيله



شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



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شبكة المعلومات الجامعية التوثيق الإلكترونى والميكروفيلم

جامعة عين شمس التوثيق الإلكتروني والميكروفيلم قسم

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كليه العلوم - قسم الكيمياء



Infiltration of Nile River Water into Ground Water Investigation and Modelling of Hydraulic and Geochemical Process during Bank Filtration

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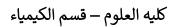
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Abstract

In natural environments, riverbank filtration is accomplished by decreasing the groundwater stream below the surface water level, either through the use of hydraulic barriers such as a bank of channels or through groundwater abstraction at pumping wells. A study has also been conducted on the mixing of infiltrated river water with groundwater at the pumping outlet well and the retention time of the bank filtrate, which has been identified as critical parameters that influence the efficiency of riverbank filtration and the quality of the Water quality is improved significantly when organic micropollutants (OMPs) are removed from surface river water using riverbank filtration (RBF) technology. This technique produces highquality water at a reasonable cost. El-Qurain (Conventional Water Treatment Plant) and El Muzainin RBF plants were investigated to learn more about the presence of OMP's (pesticides, herbicides, and polyaromatic hydrocarbons) in the water. Both plants are geographically adjacent to one another and the El Saadia canal. The study concluded that the RBF water production technique was more effective than the traditional treatment for the 17 OMPs (5 polyaromatic hydrocarbons (PAHs), 6 herbicides, 3 pesticides, and 3 insecticides) were investigated in the El Saadia canal's raw surface water. To investigate and evaluate the treatment and removal of 17 OMPs from the El Saadia canal water source in the laboratory, batch experiments were carried out using fine silica sand at different temperatures (20, 25, and 30 °C). Additionally, experiments were carried out to investigate and evaluate the efficacy of the riverbank soil's biodegradation and adsorption process in reducing most cases, high-hydrophobicity chemicals such pendimethalin, bisphenol A, simetryn, diazinon, and 5 of the PAHs (naphthalenediphenyl acetaldehyde, anthracenediphenyl acetaldehyde, phenanthrene, pyrene, and fluoranthene) are highly adsorbed onto sand grains (removal percentage >90 percent). The findings demonstrated that hydrophobic chemical compounds are cleared and removed during RBF, regardless of the environmental variables under consideration. The first goal of the study was to learn more about the presence of iron, manganese, microbiological parameters, and OMPs (disinfection byproducts, pesticides, herbicides, and polyaromatic hydrocarbons) at Al-Qurain (Conventional Water Treatment Plant), Al Muzainin RBF Plants, and groundwater wells, all of which are located near the El Saadia Canal. The second goal of the study was to learn more about the presence of iron. According to the water quality results from the RBF water, the water quality was excellent, particularly in terms of Fe and Mn values, as well as microbiological parameters; the FPs of disinfection by-product (THMs, HAAs, and HANs) for Al Muzainin RBF provided more significant reductions than the Al Qurian water Plant; and the 17 OMPs (5 polyaromatic hydrocarbons (PAHs), 6 herbicides, 3 pesticides, and 3 Second, using batch experiments with fine silica sand at different temperatures (20, 25, and 30 degrees Celsius), the researchers investigated and evaluated the treatment and removal of 17 organic pollutants from the El Saadia canal water source, as well as the effectiveness of the riverbank soil's biodegradation and adsorption process in the reduction of OMPs. According to the findings, hydrophobic chemical compounds are destroyed and removed during RBF, independent of the environmental circumstances (removal percentage >90 percent). Developing a modeling system for biodegrading organic matter traveling through the riverbed was the study's third objective, and the findings revealed that the correlation coefficient between DOC measured and DOC calculated washigh (r was 0.94).

Keywords: River bank filtration water quality, Dynamic model, OMPs, DBPs, Pesticides, Herbicides, PAHs, Sharkyia Governorate, and Egypt.

Supervisors:

Prof. Dr. Eglal Myriam Raymond Souaya

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LIST OF ABBERVIATION

| No. | Abbreviations | Meaning |
|-----|-------------------|--------------------------------------|
| 1 | DBPs | Disinfectant By-Products |
| 2 | THMs | Trihalomethanes |
| 3 | HAAs | Haloacetic Acids |
| 4 | TOC | Total Organic Carbon |
| 5 | WHO | World Health Organization |
| 6 | km | Kilometer |
| 7 | TDS | Total dissolved solids |
| 8 | NOM | Natural Organic Material |
| 9 | HAAs | Haloacetic Acids |
| 10 | WTPs | Water Treatment Plants |
| 11 | NOM | Natural Organic Material |
| 12 | DOC | Dissolved Organic Carbon |
| 13 | UV | Ultraviolet Irradiation |
| 14 | HANs | Haloacetonitriles |
| 15 | EPA | Environmental Protection Agency |
| 16 | OSE | On-Site Electrochlorination |
| 17 | DCAA | Dichloro-Acetic Acid |
| 18 | TCAA | Trichloro-Acetic Acid |
| 19 | mm | Millimeter |
| 20 | μm | micrometer |
| 21 | MTBE | methyl-tert-butyl-ether |
| 22 | min | Minute |
| 23 | μL | Micro Littre |
| 24 | μg/l | Microgram per Littre |
| 25 | mg/l | Milligram per Littre |
| 26 | IC | Ion chromatography |
| 27 | BDCM | bromodichloromethane |
| 28 | CHCl ₃ | chloroform |
| 29 | CHBr ₃ | bromoform |
| 30 | DBCM | dibromochloromethane |
| 31 | ppm | Part per million |
| 32 | GC | Gas chromatography |
| 33 | BF | Bank Filtration |
| 34 | EfOM | The fate of effluent organic matter |
| 35 | HCWW | Water and Wastewater Holding Company |
| 36 | RBF | River Bank Filtration |
| 37 | m ³ | cubic meter |

I

| 38 | BM^3 | Billion cubic meter |
|----|--------|---------------------------|
| 39 | AHD | Aswan High Dam |
| 40 | COD | Chemical Oxygen Demand |
| 41 | BOD | Biochemical Oxygen Demand |
| 42 | DO | Dissolved Oxygen |
| 43 | OC | OrganoChlorine |
| 44 | OP | OrganoPhosphorus |
| 45 | MCL | Maximum Contaminant Level |
| 46 | PAH | Poly Aromatic Hydrocarbon |

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