



Senior Research Scientist

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Degrees

PhD (University of Johannesburg)

MSc (Mid-Sweden University)

BSc (University of Cape Coast)

2018 – To date: Senior Research Scientist

Profile

Dr. Michael Kumi is a Senior Research Scientist in the Environmental Chemistry and Sanitation Engineering Division of the Council for Scientific and Industrial Research-Water Research Institute (CSIR-WRI). He earned his Bachelor's degree in Biological Sciences with a major in Chemistry from the University of Cape Coast in 2001, followed by a Master's degree in Ecotechnology from Mid Sweden University Östersund, Sweden, in 2007. He obtained his PhD in Chemistry from the University of Johannesburg, South Africa. Dr. Kumi possesses extensive experience in water quality monitoring and assessment, specializing in contamination and remediation, risk assessment, and water quality modeling. His research focuses on heavy metal assessment, nutrient analysis, modeling, climate change impacts on water quality, and phytoremediation.

Dr. Kumi has contributed significantly to academia, teaching at the master's level and supervising numerous students at both bachelor's and master's levels in two Ghanaian universities. He has also served as a reviewer for various international journals such as Water Science and Technology, Environmental Monitoring and Assessment, and Applied Water Science. Additionally, he has coordinated consultancy services for governmental and non-governmental agencies, companies, communities, and private individuals, particularly in water quality assessment, phytoremediation, and ensuring water quality for aquaculture farming in Northern Ghana. In addition to his research and teaching responsibilities, he supervises technical staff.

With over 16 peer-reviewed articles published in international journals including Water and Environment, Water Resource and Protection, and Earth and Climate Change, Dr. Kumi's contributions to the field are widely recognized.

Research Interests:

- Water technology development
- Use of bone char and biochar for water treatment
- Geochemical contaminations and deterioration of groundwater quality

- Pollution and ecological studies of Ramsar sites
- Emerging contaminants in water: Sources, fate, and occurrence
- Hydrological response to climate change
- Water quality monitoring and modeling
- Optimization of water quality monitoring networks
- Ecohydrology

Current Research:

Dr. Kumi's current research focuses on water technology development, particularly the utilization of bone char and biochar for water treatment. His research encompasses physio-chemical assessments of water quality for aquaculture, wastewater, and drinking water, with a specific emphasis on trace metals and ecotechnology. Through the use of multi-tracers, computational chemistry techniques, and isotopic tracer technology, he aims to characterize sources of surface and groundwater contamination, addressing the long-term deterioration of water quality. His research methodology combines desktop studies, laboratory experiments, and fieldwork to prevent environmental water deterioration and its subsequent effects on human health, crucial for effective water resource management in the 21st century.

Ongoing research projects include:

1. Treatment of contaminated groundwater using integrated bone char and biochar.
2. Pollution and ecological studies of two Ramsar sites: Sakumo I and Sakumo II in Ghana.
3. Monthly effluents quality monitoring of a pharmaceutical facility in Accra.
4. Robot-aided chemical synthesis.

Publications

(1) Kumi Michael. Anku William Wilson, Penny Poomani Govender, and Franklin Obiri-Nyarko. Bench-scale integrated bone and biochar bed treatment of geogenic fluoride contaminated groundwater from Bongo in Ghana. Groundwater for Sustainable Development 21

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(2) Kumi, Michael., Anku, William Wilson., Antwi, Boniface Yeboah and Penny, Poomani Govender. Evaluation of the suitability of integrated bone char and biochar treated groundwater for drinking using single factor, Nemerow and heavy metal pollution indexes. *Environmental Monitoring and Assessment* 195, 647 (2023). <https://doi.org/10.1007/s10661-023-11249-y>

(3) Kumi Michael, Anku William Wilson, and Poomani Penny Govender. Modelling of manganese-contaminated groundwater through batch experiments: Implications for bone char remediation. *Environmental Advances*, 10, 100323. <https://doi.org/10.1016/j.envadv.2022.100323>

(4) Araya, D., Podgorski, J., Kumi, M., Mainoo, P. A., & Berg, M. (2022). Fluoride contamination of groundwater resources in Ghana: Country-wide hazard modeling and estimated population at risk. *Water Research*, 212, 118083. <https://doi.org/10.1016/j.watres.2022.118083>

(5) Dorleku, M. K., Tay, C., Kumi, M., Amoah, D. K., Yawson, L., & Hodgson, I. O. (2021). Assessment of trace metal contamination by geochemical normalisation in sediments of two lagoons: A comparative study of the Kpeshie and Muni lagoons, Ghana. *Ghana Journal of Science*, 62(1), 37-50.

(6) Yeboah, F., Awotwi A., Forkuo, E.K., and Kumi, M. (2017). Assessing Land Use and Land Cover Changes due to Urban Growth in Accra, Ghana. *Journal of Basic and Applied Research International* . Vol. 22. No. 2. Pp 43 – 50

(7) Awotwi, A., Kumi, M., Jansson, P. E., Yeboah, F., and Nti, I.K. (2015). Predicting Hydrological Response to Climate Change in the White Volta Catchment, West Africa.

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(8) Quainoo, A. K., Konadu, A., and Kumi, M. (2015). The Potential of Shea Nut Shells in Phytoremediation of Heavy Metals in Contaminated Soil Using Lettuce (*Lactuca sativa*) as a Test Crop.

Journal of Bioremediation and Biodegradation

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(9) Awotwi, A., Yeboah, F, and Kumi, M. (2014). Assessing the impact of land cover changes on water balance components of the White Volta Basin in West Africa. *Water and Environment Journal*.

Vol. 29. No. 2. Pp. 1 – 9

(10) Nkoom, M., Cobbina, S. J., and Kumi, M. (2013). Assessment of Endocrine Disrupting Trace Metals in River Samre at Samreboi in the Wassa Amenfi West District of the Western Region of Ghana. *Journal of Water Resources and Protection*. Vol. 5. No.10. Pp. 983-992.

(11) Cobbina, S.J., Kumi, M., and Abdul-Latif, S. (2013). Water Quality Assessment of the Bontanga Reservoir. *Journal of Environment and Earth Science*. Vol. 3. No. 4. Pp.112 – 121

(12) Kumi, M., Quainoo, A. K., and Antwi, C. K. (2013). The Role of Maize Tassels in Amelioration of Heavy Metal from Contaminated Soils and its Effects on Vegetables. *Journal of Environment and Earth Science*. Vol. 3. No. 1. Pp.192-199

(13) Anim-Gyampo, M., Kumi, M., and Musah, S. Z. (2013). Heavy Metals Concentrations in some selected Fish Species in Tono Irrigation Reservoir in Navrongo, Ghana. *Journal of Environment and Earth Science*. Vol. 3. No. 1. Pp.109-119

(14) Cobbina, S.J., Kumi, M., Salifu, L., and Duwiejua, A.B. (2013). Rainwater Quality Assessment in the Tamale Municipality. *International Journal of Scientific and Technology Research* . Vol. 2. No. 5. Pp.1-5.

(15) Cobbina, S.J., Myilla, M, and Kumi, M. (2013). Small Scale Gold Mining and Heavy Metal Pollution: Assessment of Drinking Water Sources in Datuku in the Talensi-Nabdam District. *International Journal of Scientific and Technology Research* . Vol. 2. No. 1. Pp. 96-100.

(16) Anim-Gyampo, M., Apori, N., and Kumi, M. (2012). Assessment of Heavy Metals in Waste Water Irrigated Lettuce in Ghana: The Case of Tamale Municipality. *Journal of Sustainable Development* . Vol.5. No.11. Pp. 93-102.

(17) Boamponsem, G.A., Kumi, M. and Debrah, I. (2012). Heavy Metal Accumulation in Cabbage, Lettuce and Carrot Irrigated with Wastewater from Nagodi Mining Site in Ghana. *International Journal of Scientific and Technology Research* . Vol. 1. No. 11. Pp.124-129.

CSIR-Water Research Institute

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