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Degrees:

BSc, MPhil (Ghana) Active Affiliations

Profile

Research Scientist, Environmental Chemistry and Sanitation Engineering Division,

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Mr. William Ekow Arko is a Research Scientist at the Environmental Chemistry and Sanitation Engineering Division of the Council for Scientific and Industrial Research - Water Research Institute (CSIR-WRI). He obtained his Bachelor's degree in Chemistry at the University of Cape Coast in 2007, Master of Philosophy degree in Environmental Science in 2012 at the University of Ghana.

He is a water quality expert; working on environmental matrices in Accra and Tema Metropolis.

He monitors pollution of inland, coastal and marine waters and recommend pollution control strategies.

He undertakes ecological studies of water dams and other water bodies in the catchment areas of mining companies (Newmont Gold Ghana Ltd and AngloGold Ashanti, Obuasi mines)

Analysis of raw sewage, marine and coastal waters, as well as analyses of sachet, bottled and

other portable water samples.

He also has a copyright to his name, Water quality data on drinking water, sachet water, bottled water and tap water in Ghana, 2015. Copyright certificate No. 00-578/2015.

Research Interests:

1. 1. Water quality monitoring:

Water pollution from industry, agriculture and urban settings is a major global pressure on human and ecological health. Effective monitoring of water quality is vital to safeguard our water supply and managing the health of our aquatic ecosystems.

1. 2. E-waste burning concerns:

The uncontrollable large quantities of electrical and electronic equipment are of particular concern as these equipment contain a wide range of hazardous substances (eg. Heavy metals such as mercury and lead, as well as endocrine disrupting substances such as brominated flame retardants). Emissions from informal recycling activities (including burning) are problematic and negatively impact on human health and the environment. Such activities releases toxic emissions including dioxins and persistent organic pollutants which are carcinogenic.

1. 3. Emerging pollutants in water and wastewater:

Good quality water is essential to sustain human health, livelihoods and a healthy environment. Polluted water supplies pose serious human health risks in addition to threats to the ecosystem sustainability. There is an urgent need to reverse the declining water quality globally and to improve wastewater management and safe reuse. The Sustainable Development Goals (SDGs) bring water quality issues to the forefront of international agenda. The SDG Target 6.3 calls on countries *“to improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally*”, as well as Targets 6.1

and 6.2 urge action to ensure access to safe water, sanitation and hygiene for all. Improving water quality and wastewater management, including safe reuse, brings multiple benefits for poverty reduction, health improvement, food security, ecosystems integrity and biodiversity protection.

Research is documenting with increasing frequency that many inorganic, organic and microbial constituents that have not historically been considered as contaminants are present in the environment at low quantities on a global scale. These “emerging contaminants” are commonly derived from municipal, agricultural, and industrial wastewater sources and pathways. These newly recognized contaminants represent a shift in traditional thinking as many are produced industrially yet are dispersed to the environment from domestic, commercial, and industrial uses. Emerging contaminants will affect current and future treatment technologies utilized by the drinking water community.

Current Research:

Management of e-waste for sustainable environment and human health.

The use and sale of second-hand electronic equipment is a highly booming business sector in Ghana for both formal and informal systems. The sector enjoys high patronage from all levels of societal spectrum in Ghana. Due to the fact that most Ghanaians are unable to afford brand new products, as such large consignments of used and old fashioned electronic and electrical equipment (EEE) discarded mainly in Europe and North America are imported into the country. Some of the products such as computers and accessories enjoy a free import duty regime, thus, further boosting the import trade.

Also, the unregulated or unrestricted import regime for second hand electronic products gives a further boost to booming business in Ghana. Equally worrying is the fact, under the ICT policy a considerable effort was made to encourage the importation of second-hand ICT equipment into the country. Even in the case of the importation and sale of used air conditioners, refrigerators, refrigerator-freezers and freezers which are prohibited by LI 1932 (2008), there is no enforcement. Any consignment of e-waste could therefore enter the country under the guise of second hand EEE without restriction or detection, at the present. Thus, it is difficult to know about the status of actual WEEE import into Ghana, if any. This has led to high rate of e waste generation (from the imports that is consigned for disposal), a significant amount of cannibalization is undertaken by commercial importers or as most of them EEE are near their

useful lifespan and hence are discarded as waste.

Primitive methods used for e-waste recycling include informal dismantling of electronic equipment and open burning of the electronic products to recover metals like copper wires. Not much work has been done on measuring the levels of toxic chemicals in the Agbogbloshie scrap yard, except a study conducted (Wong et al., 2007; Wong et al., 2007). Their investigation focused on quantification of chemical contamination in and around the workplace and did not attempt to quantify the damage likely to occur to human beings from these activities.

Some conducted studies in Ghana, have documented the impacts of informal recycling of e-waste on the environment. For example, Asante et al., (2011, 2012), Fujimori et al., 2016 measured different levels of heavy metals, BFRs, dioxins, etc. in different environmental and biota matrix such as breast milk, urine and soil, and highlighted the negative health related problems by improper management of e-waste in the country. It is therefore in the right direction that some interventions have been initiated (Asante et al., 2016).

There is evidence that e-waste is transported internationally from developed countries to developing countries where informal recycling and disposal take place, often in small workshops with open burning of plastics and wires, and acid leaching of printed circuit boards. These have contributed to the release of hazardous chemicals such as heavy metals (e.g. Pb, Cd, Cr, Cu, etc.) polycyclic aromatic hydrocarbons (PAHs), polybrominated diphenyls ethers (PBDEs), polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs).

Research projects undertaken include:

- Assessment of water quality at Dodowa in the Dangme East district of the Greater-Accra region.
- Water quality assessment of Nungua seawater desalination plant, Accra.
- Water quality assessment of Sansu community in Obuasi.

- Water Quality and Fish Quality Assessment of the Fosu Lagoon, Cape Coast.
- Ecological study of a water dam and other water bodies in the catchment area of Newmont Ghana Gold Limited, Kenyasi.

