

Siwdo Automotive Maintenance and Repair Enclave Sanitation and Pollution of the Fosu Lagoon

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Abstract

The location of industries and facilities, to a great extent, can have negative influences on sanitation and pollution of aquatic environments, particularly, enclosed and partially-enclosed ones such as lagoons. The paper sought to access the views of health and sanitation workers with reference to pollution of the Fosu Lagoon in Cape Coast Metropolis, Ghana. The study was basically qualitative, used a questionnaire and employed a uni-step analytic technique. Respondents were of the view that the Siwdo automotive maintenance and repair enclave, in addition to other facilities, was the major source of pollution of the Fosu Lagoon; and that consumption of fish from the lagoon could pose health risks. It is recommended that the effects of pollution of the lagoon should be mitigated through relocation of the enclave, improved sanitation in the Metropolis and education using radio and or television through persuasions, dissuasions as well as enforcement of regulations, policies and bylaws.

Keywords: *Fish consumption; Lagoon management; Maintenance and repair; Pollution; Sanitation*

Introduction

The chemistry of many water bodies has been greatly altered as a result of human, and particularly, industrial activities (Baffour-Awuah, 2014a; Baffour-Awuah, 2014b; Agbotui et al., 2014; Berner & Berner, 1987). Studies have also shown that these changes caused by anthropogenic activities are through unsanitised waste disposal methods (Baffour-Awuah, 2014a; Baffour-Awuah & Tenkorang, 2014; Oluremi & Osuola, 2014; Ebong et al., 2007; Eja et al., 2003; Zauyah et al., 2004). Pollution of water bodies may emanate from several activities, including agricultural practices, exploration of natural resources, open dump site, underground storage facilities, and thermal power generating plants (Meegooda et al., 1992). Water bodies such as the oceans, rivers, streams and lagoons have all been influenced negatively through these practices of humans and the Fosu lagoon, located in the Central Region of Ghana has not been spared as such (Baffour-Awuah, 2014a; Baffour-Awuah, 2014b; Berner & Berner, 1987).

With particular reference to the Fosu lagoon, various activities have been identified to be located within its catchment area. Of great importance among these is the automobile repair and maintenance enclave. Various studies have shown that the enclave has negatively impacted on the lagoon most, though other insanitary methods from other sources also contribute to the pollution of the lagoon (Baffour-Awuah, 2014a; Baffour-Awuah, 2014b; Akwansah-Gilbert,

2007; Obodai et al., 2011; Kendie, 1999). For example solid waste from other parts of the municipality such as Bakano, Ola estates and Siwdo find their way into the lagoon. Other sources of waste are the St. Augustine's College and the Metropolitan Hospital located at Ola, among others. In spite of the promulgation of the National Environment Sanitation Policy and the presence of environmental health workers in the metropolis, it is on record that pollution of the lagoon, if not curbed, could lead to its extinction (Baffour-Awuah, 2014b; Kendie, 1999). The aim of this study was therefore to assess the contribution of the Siwdo Automobile Maintenance and Repair Enclave to the pollution of the Fosu Lagoon from the point of view of environmental health workers of the Cape Coast Metropolitan Area where the lagoon is located. The paper specifically discusses the perception of the environmental health workers with particular reference to general lagoon pollution, fish consumption and health effects of lagoon pollution and the views of the environmental health workers in terms of mitigation of insanitary activities polluting the lagoon in particular.

Effects of pollution

Solid waste disposal and liquid elements have contributed to pollution of water bodies in many locations on the globe (Ozomene et al., 2014), altering, to a large extent, the chemistry of these ecological environments (Baffour-Awuah, 2014b; Agbotui et al., 2004; Adesoji, 2004). Pollution has negative effects on the environment as well as human beings (Baffour-Awuah & Tenkorang, 2014). According to Okoye (2004), mismanagement of waste disposal sites can have effects on the environment, including water bodies, generating a harbor for disease carrying pathogens such as houseflies, mosquitoes, fleas and others. These organisms transmit diseases such as yellow fever, cholera, dysentery, malaria, etc. Even when such wastes are burnt, residues may contain toxic heavy metals that may eventually find their way into water bodies (Okoye, 2008). Environmental pollutants may also be non-communicable and carcinogenic in nature.

Pollution also reduces the potability of water, rendering it unpleasant for drinking, giving it a bad odour, making it turbid, unfit for bathing, washing and for other useful purposes (Sinha et al., 2005). Water pollution affects both plants and animals by causing health and welfare-related challenges. Tailings, metal scraps and waste sludge from workshops and garages as well as factories can contribute significantly to the pollution of water bodies. Through chemical, physical and biological pollution, these pollutants may cause serious health consequences to many living organisms. (Baffour-Awuah & Tenkorang, 2014; Baffour-Awuah, 2014a; Esummang et al., 2006; Sinha et al., 2005). Effluents and leachates containing substantial quantities of phosphates, nitrates (Esummang et al., 2006) and heavy metals from organic and inorganic sources (Akwansah-Gilbert, 2007) may also disrupt the entire chemistry of water bodies. Heavy metals such as lead and cadmium in water bodies could have negative health implications when ingested through consumption of aquatic animals or contact with polluted water (Baffour-Awuah & Tenkorang, 2014).

Effects of pollution on the Fosu lagoon

The siting of the Siwdo Automobile Maintenance and Repair Enclave has contributed immensely to the pollution of the Fosu Lagoon, according to various studies (Baffour-Awuah, 2014a, Baffour-Awuah, 2014b; Baffour-Awuah & Tenkorang, 2014; Armah et al., 2012; Darkwa & Smardon, 2010). Non-biodegradable wastes from the enclave such as plastics, polythene bags, scrap metals, oils, fuel etc. all find their way into the lagoon directly and indirectly. According to Akwansah-Gilbert (2007), the Fosu Lagoon is highly contaminated with cadmium and nickel, particularly in areas close to where the maintenance and repair enclave is located. In Akwansah-Gilbert (2007)'s opinion the enclave in the north-eastern part of the lagoon was the main source of cadmium and its associated polycyclic aromatic

hydrocarbon compounds such as nickel. He concluded that such pollutants can be detrimental to humans, terrestrial and aquatic animals.

Akwansah-Gilbert (2007) also observed some interrelationship between the activities in the enclave and the southern parts of the lagoon. He therefore concluded that the mechanical workshops and garages in the northern part of the lagoon could be a contributing agent to the pollution of the southern portion of the lagoon. He however did not disagree that the few maintenance and repair workshops and garages near the southern part of the lagoon could also contribute to the pollution of the lagoon with cadmium, nickel, zinc, manganese and iron concentrations. One of the significant findings of Akwansah-Gilbert (2007) was that cadmium presence in the lagoon was higher than 0.7 mg/kg which is the threshold by the Canadian Interim Marine/Estuarine Sediment Guidelines for the protection of aquatic lives.

The lagoon also poses health risk to both humans and other animals as a result of pollution. In a study by Armah et al. (2012), the authors concluded that there could be high risk level as a result of ingestion of arsenic and manganese through lagoon sediments. The study also found a high concentration of heavy metals and polycyclic aromatic hydrocarbons. The study warned that the situation should be of concern. The siting of the Siwdo Automobile Repair and Maintenance Enclave, has contributed to the reduction of lagoon surface area because of disposal of solid waste on the edges. Mangroves in the wetlands have virtually become extinct. Fish size, particularly, *saratherodon melanotheron* of the chichlid family, which constitute about 90% of zoological matter of the lagoon has systematically and continuously been reduced in size. Fishing activities in the lagoon has also been found to be unsustainable (Baffour-Awuah, 2014c; Darkwa & Smardon, 2010).

Consumption of fish from the lagoon could have negative effects on the health of humans. Dermal contact with water from the lagoon could also have adverse influence on the health of fishermen. Studies conducted by Baffour-Awuah (2014b) and Baffour-Awuah and Tenkorang (2014) revealed that cadmium and lead in *saratherodon melanotheron* (blackchin tilapia), and lagoon water sediments could have negative health implications on consumers and fishermen respectively. Specifically, 33.3 percent of fishermen had been diagnosed of painful bones while 28.3 percent diagnosed of wrist drop in the study which were attributed to consumption of tilapia from the lagoon. The study further revealed that thirty-five percent of fishermen had also been diagnosed of skin infections of one kind or the other since the previous two years preceding those studies, which may also be due to lagoon water contact. The negative effects of pollution on the lagoon, from the foregoing, demands that appropriate sanitation measures that are strategically implementable and could simultaneously stand the test of time be adopted.

Management and protection of the Fosu Lagoon

The management and protection of water bodies in Ghana as a means of protecting the environment is enshrined in the Environmental Sanitation Policy (ESP) of (1999). The Government of Ghana, having recognized the importance of environmental sanitation as an essential element that could contribute to the health, productivity and welfare of its people, identified environmental protection and efficient human settlement management as salient factors in settlement development as well as identifying the contribution of environmental sanitation to national development, developed the Environmental Sanitation Policy. The policy seeks to present a systematic approach and framework as a guideline to efficient allocation of resources within the sanitation subsector of the economy.

As a document to manage and protect the environment, the ESP contains extensive guidelines for the management and protection of lagoons in particular as well as metropolitan environments in general. The ESP objectives include the collection and sanitized disposal of wastes such as solid and liquid wastes, excreta, industrial wastes, storm waste drainage,

cleansing of public places, environmental sanitation education, inspection and enforcement of sanitary regulations and monitoring, and observation of environment standards, among others. The aim of the policy is to ensure the above responsibilities are reliably and continually discharged to prevent the negative effects of population growth, urbanization, social, economic and technological development on the environment. The ESP therefore recognizes the responsibility of all citizens, communities, private sector enterprises and institutions of government in ensuring that the environment is well managed and protected by providing the appropriate environmental sanitation so that the negative effects of domestic, industrial and commercial activities could be reduced to the minimum, if not prevented. The ESP also recognizes two types of agencies in the implementation of the policy: The principal sector agency (Lead Sector Agency) and the allied sector agencies. The Ministry of Local Government and Rural Development is a lead sector agency with the functions of coordination and formulation of environmental sanitation policies; developing and issuing technical guidelines on environmental sanitation services and their management; promulgation of national legislation and model bye-laws; and direction and supervision of the National Environmental Sanitation Policy Co-ordination Council.

It is important to note that in order to ensure effective and efficient co-ordination with the functions and activities involving environmental sanitation, the policy transfers the duties and responsibilities related to environment sanitation to metropolitans, municipals and district Assemblies (MMDAs). As a principal sector agency the policy also places much responsibility on the Cape Coast Metropolitan Assembly in terms of environmental sanitation. These include the management of waste in the metropolis including the Siwdo Automotive Maintenance and Repair enclave, public health management, environmental monitoring and planning, monitoring and public relations. Sub-metros/zonal urban councils, town/area councils and unit committees are expected to support the metropolitan assembly in performing these functions. Allied sector institutions include the Ministry of Environment, Science and Technology, educational institutions, Ministry of Health, the public and private sectors. According to the policy, therefore, the management and protection of the Metropolis and the Fosu Lagoon, for that matter, is directly under the ambit of the Cape Coast Metropolitan Assembly. In view of this, Environmental Sanitation workers in the metropolitan assembly are therefore indispensable enablers of proper sanitary conditions in the metropolis. Their perceptive opinions are essential in sanitation of the enclave and the management and protection of the lagoon in this regard.

Industrial activities at the Siwdo automotive maintenance enclave

Generally, automotive garages and repair shops may be categorized into four main groups: Auto parts stores who also engage in service operations; automobile repair workshops; specialized automobile repair shops and online automobile repair shops. The commonest category of automotive garages and repair shop in the metropolis (where vehicles are repaired and maintained) is the specialized automobile repair shops. They specialize in particular components of the automobile. For example, individual specialized automobile repair shops may maintain and repair any of the following; engine transmission; brakes; mufflers, and exhaust systems; automobile electrification; body parts; automotive air conditioner repairs; tires; automotive glass repairs and installation and wheel alignment or a combination of these. Shops may also deal with certain brands of vehicles or certain parts or brands from particular countries, regions or continents. Some may also specialize in customization and modification of vehicles. Repair facilities and infrastructure are usually variegated with technicians and mechanics having similar qualifications, in variation with the norm (Environmental Pollution Center, 2009).

In performing garaging and repair activities, automotive garage and repair shops pollute the environment through handling of chemicals, waste generation and waste management (Environmental Pollution Center, 2009). Solids, liquids as well as volatile fluids are discharged into the environment close to the shops. These include heavy metals such as lead and cadmium from batteries and paints, respectively; chlorinated solvents, petroleum hydrocarbons, heavy out shop pollution fluids such as heavy oil and glycol solutions (transmission and brake fluids); auto repair pollution washers (car washing fluids containing oils, heavy metals and detergents); auto repair pollution refrigerants such as Freon 12 (CFC 12) which is an ozone depleting substances and HFC 134 which is a greenhouse gas; auto shop pollution paints such as methyl ethyl ketone (MEK); auto repair pollution rags (containing oils; motor oil or hydraulic fluids, and heavy metals) and old replaced auto battery pollution which contain acid solutions and lead. Considering the proximity of the Siwdo Enclave and Sanitary conditions in the metropolis, the Fosu Lagoon has been a repository to these pollutants as well as those from domestic settings as various studies have shown (Baffour-Awuah, 2014b; Baffour-Awuah, 2014c; Armah et al, 2012; Darkwa & Smardon, 2010; Agyapong, 2008; Ahuahey, 2007; Akwansah-Gilbert, 2007; Essumang, 2000; Avi, 1998, Dadson, 1996; Mohammed 1993; Adjei, 1991; Tay, 1989)

Method

The study aimed at assessing the effect of the Siwdo automotive maintenance and repair enclave and sanitation in Cape Coast on the Fosu Lagoon, located in the Central Region of Ghana. The Cape Coast Metropolis is situated among other seventeen districts within the central region of Ghana

. The metropolis is bounded by the Twifo-Hemang-Lower Denkyira District (North), Gulf of Guinea (South), Abura-Asebu-Kwamankese (East) and Komenda-Edina- Eguafo-Abrem (West) Districts. The main economic and industrial activities in the metropolis include tree planting, agriculture, fishing, trading, soap making, palm kernel oil extraction, quarrying, paper-printing, textile printing, brewing, automobile maintenance and repair, among others. Though many of the automotive maintenance and repair activities are scattered within the metropolis a great chunk is located within the Siwdo enclave. Figure 1 is a map of Cape Coast showing the Siwdo automobile maintenance and repair enclave.

Figure1: Map of Cape Coast showing Fosu Lagoon



Figure 1: Map of Cape Coast showing the Fosu Lagoon and some settlements (Source: Arthur & Eshun, 2012)

The Siwdo automobile maintenance and repair enclave, made up of individual garages and workshops and people of different ethnic backgrounds, is located on the North-Eastern part of the Lagoon. It directly shares boundaries with the lagoon and Antem, a suburb also in the metropolis. The enclave is composed of garages and workshops principally involved in the repair and maintenance of automobile components and parts. Artisans, mechanics, craftsmen, technicians and technologists are engaged from Mondays to Saturdays; with some also performing duties on Sundays.

A self-completion questionnaire was developed to collect data for the study. The questionnaire was of four parts namely demographic; lagoon pollution; tilapia consumption and health implications; and pollution mitigation. A 43-item mixed-format instrument was developed comprising both open and closed-ended questions to collect primary information from participants. A pilot study was organized. Based on this, the mechanical structure of the instrument was adjusted through correction of unclear, misleading questions and re-arrangement of some of the questions. The questionnaire was set in English. Both primary and secondary data were employed for the study. Secondary data was mainly from journals, dissertations, theses and the internet.

The questionnaire was administered to nine environmental health sanitation workers of the Cape Coast Metropolitan Assembly in January 2015. Respondents were given a maximum of ten working days to respond to the questionnaire. Response rate was 100 percent. The purposive sampling method was employed. This is because the researchers, in their opinion, could get the needed information from the sampled subjects. They were found to be those knowledgeable, have the expertise and hence suitable for the study (in sanitation and environmental health issues). According to Gay and Airasian (2003) the sample size was adequate since the population size was almost irrelevant in this context. Key informant interviews were organized using an interview guide.

Participants of the study were all male. Age ranged between 25 and 46. Highest educational attainment include: University/Polytechnic, School of Hygiene, Training College, and SHS. Positions of respondents were identified as Senior Environmental Health Assistants, Leader of Sanitation Guards and Sanitation Guards. Participants had been in service between

six and eight years. Residential localities include Coronation, Adisadel, Aquarium, Amanful, Brofeyedur, Cape Coast and Akotokyir, all in Cape Coast Metropolis and within 2 kilometers of the lagoon, with respondents having stayed in these areas between 5 and 29 years.

Results and discussion

Lagoon pollution

With reference to lagoon pollution, respondents were of the view that the Fosu Lagoon was polluted. Sources and practices were identified as domestic and household waste discharge into the lagoon by residents in the metropolis; waste materials in and around the lagoon; siting of other industries such as block-making and car washing; choked gutters full of litter and waste materials of polyethylene nature; Medical waste from the metropolitan hospital: and oil and lubricant leachates from the Siwdo automobile garages and repair enclave. Lead and Cadmium were among the waste substances and chemicals that were found to wash into the lagoon. The respondents observed that the main source of lagoon pollution were the Adisadel estates, Ola metropolitan hospital, Siwdo automobile garages and repair enclave and Bakaano Township. Respondents also observed that domestic and household waste may also include faecal matter (Avi, 1998).

The findings corroborated most of the findings in earlier studies by Baffour-Awuah (2014a), Baffour-Awuah (2014b), Doodoo and Kendie (2006) and Akwansah-Gilbert (2007). Both fishermen and the general public appear to share similar views (Baffour-Awuah, 2015). Other researchers have similarly observed that the Fosu Lagoon is polluted and that these sources are some of the main contributors. Other main sources of pollution include the St Augustine's College and the former omnibus garage (current metro mass transit work-shop) (Avi, 1998; Mohammed, 1993; Hagan, 1986). Thus generally researchers and environmental health workers are of the opinion that the Fosu Lagoon is polluted with the main sources of pollution as indicated. Various studies have shown that metals and hydrocarbons have been found as either contaminants or pollutants of the lagoon (Armah, et al., 2012; Akwansah Gilbert, 2007; Esumang et al, 2006, Avi, 1998, Adjei, 1991; Dadson 1996).

Activities in the enclave are manifold. However, the shop category appears to be the main source of pollution within the enclave. For example, tire repairers usually burn waste tire close to the lagoon. Plastic ashes from these activities are washed into the lagoon. The main purpose of burning tire waste is to get access to re-enforced metal wires used in the construction industry to tie metal rods for concreting purposes. Battery repair activities could also contribute to pollution of the lagoon. Many vehicles use wet batteries to power them. In particular, lead-acid battery is the commonest battery used in the motor vehicle industry. When discarded, both lead cells and plastic encasement are considered waste. Around the enclave and close to the lagoon, these waste materials are discarded in refuse dumps near the lagoon. While the plastic encasement is burnt the lead component is not. Ashes from the plastic waste is washed into the lagoon while the lead component may come into other solvent or chemicals, dissolve and eventually wash or leach into the lagoon. Heavy runoff might also wash solid lead waste into the lagoon. Other metals such as iron, manganese, magnesium, tin, antimony, mercury, etc. found in other vehicle components may, through similar processes, get into the lagoon causing pollution. Spraying of vehicle body parts is one of the activities in the enclave. Cadmium has been found to be a principal constituent in vehicle body paints. As part of runoff or leached material, cadmium from these paints could also find its way into the lagoon, directly or indirectly.

Fish consumption and health risks

Environmental health workers agreed that fishing expeditions take place in the lagoon for both commercial and domestic purposes. The main aim of the fishermen, according to the

respondents was to look for blackchin tilapia (*Saratherodon melanotheron*), though other marine organisms such as mud fish and crabs are fished as well. They were of the view that fishing in the lagoon serves as an income generation outlet to both fishermen and fish mongers. It also serves as a source of food to fishermen, fish mongers and the general public, creating an economic avenue. Children's education and health are addressed through income from their activities. Thus fishermen and fish mongers use income from this source to support their families. In comparison (Baffour-Awuah, 2015) majority of fishermen agreed that income from fishing activities goes a long way to support the upkeep of their families. According to Baffour-Awuah (2015) and Darkwa and Smardon (2010) fishermen also agreed that tilapia is the main catch of their activities, comprising over 90% of daily fish catch in the lagoon.

Reasons given why people consumed tilapia from the lagoon, according to the present study, were variegated. Some of the respondents did not see anything wrong with consuming fish from the lagoon, siting to the fishes' delicacy, particularly the blackchin tilapia. Some were of the view that once the fish is caught, people will definitely patronize its consumption. The superstition that tilapia from the lagoon could be used for magical/juju powers to influence husbands and man-concubines, could be one of the main reasons for women patronizing it to prepare meals for their partners. Some of the respondents were also of the view that fish in general is a good source of protein and that could be one of the reasons for good patronage of tilapia from the lagoon.

In spite of these advantages, the respondents were of the view that fishing could have negative health risk to fishermen. Health effects mentioned include painful weakness of the wrist, skin diseases, painful bones, impotence, cancer and bluish line along the gum. They attributed reasons to pollutants from industries and the hospital on the shores of the lagoon. The Siwdo automotive workshop and garage enclave was the most attributable source. Respondents mentioned metals, oils, medical waste, "certain weeds," tiny organisms and waste minerals as waste that could become health risk to fishermen. With reference to Baffour-Awuah (2014a), ironically, fishermen were of the view that fish consumption by fishermen and the public does not pose any health risk. However, when fishermen (Baffour-Awuah & Tenkorang, 2014) were asked the likely health risks of those who consume tilapia from the lagoon, impotence, cancer, bluish line along the gum, painful weakness of the wrist were mentioned. They attributed their reasons to chemical, medical waste, lubricant and other waste materials in the lagoon and the tilapia feeding on these poisonous substances in the water. Medical investigations of fishermen, however, showed that fishermen who fished in the lagoon may have health risk factors in terms of painful bones and wrist as a result of cadmium and lead ingestion from the lagoon (Baffour-Awuah & Tenkorang, 2014).

Pollution mitigation

In ascertaining a means of mitigating pollution of the lagoon, respondents explained that radio and television were the best mass media instruments that could be used to educate the public on the need to keep good sanitation and to control waste disposal and management activities in the metropolis. As mass media tools, radio and television are two of the major means by which information could be passed from person to person apart from the internet. At present, radio and television are the main source of communication. According to Betty (2012) radio and television are two of the media communication technologies in vogue. The agreement of the respondents to using these two tools is an indication of them being abreast with time. Some of the reasons given were that radio, for example, cover every part of the world and that people usually listen to radio, at least once every day, and for television, the visual advantage provided was cited. Thus, whether in the urban or rural areas, towns or villages, one of these two communication tools were always available.

Majority of the respondents suggested that relocation of the Siwdo automotive workshop and garage enclave could be one of the best ways to control pollution of the lagoon. This is because the enclave as a major source of pollution to the lagoon, will then not exist anymore.

Education with respect to sanitation in the metropolis was vigorously highlighted. Education should include the sources of pollution and the actual pollutants. Driving home, the health risks of consuming polluted fish (tilapia) from the lagoon was also considered important in the education content to the people. It was further suggested that showing documentaries in relation to sanitation, pollution and health risks could go a long way to dissuade people from fishing and consumption of fish from the lagoon. It is noteworthy that majority of health and sanitation workers had on one occasion or the other used the radio to educate the public, dwelling on health education practices. The radio was used because of its availability and accessibility and its reach to a wide audience as a communication technology tool. These health and sanitation workers were however quick to add that the education appeared to have fallen on deaf ears as there was still not much change in people's sanitation behaviour.

Fortunately for the metropolis, the Environmental Sanitation Policy (1999) presents a systematic approach and framework as a guideline in managing sanitation in metropolises, municipalities and districts in the country. In managing sanitation in the metropolis in general and the enclave in particular, the principal onus lies on the Cape Coast Metropolitan Assembly as the cardinal sector agency. The management of the Fosu Lagoon for that matter is a responsibility of the Assembly. It is important that the Assembly galvanizes all resources, marshalls all forces and brings all stakeholders (including citizens of the metropolis, the private sector, NGO's such as Green star foundation, academic institutions and related institutions of Government such as Environmental Protection Agency) on board to find a permanent solution to sanitation in the metropolis in general and the enclave in particular. Relocating the enclave, though a good solution, should be done with care so that the pollution and its negative effects are not translated to the other environment to create similar consequences ("pollution translation").

The Environmental Sanitation Policy stipulates that the Health Inspectorate Division of the Metropolitan Assembly is the first line enforcement body. For that matter, the division should be actively visible playing its role through education, persuasion and dissuasion to achieve the objectives of the sanitation policy by encouraging citizens in the metropolis to promote the responsibilities relating to environmental sanitation. Legal action through the formal courts, community tribunal and traditional courts should be used by the health inspectorate division to achieve the desired purpose. The police and the higher courts should also be employed as stipulated by the policy to help enforce sanitation laws and bylaws within the metropolis.

Conclusion

Many research works have shown that the Fosu lagoon in the Cape Coast Metropolitan in the Central Region of Ghana is polluted. It is therefore important that environmental health workers whose duty it is to ensure that sanitary conditions exist in the metropolis are continually assessed of their knowledge of the state of the lagoon and the health risks to those who live in the metropolis, particularly those who fish and/or consume fish caught from the lagoon. The study has shown that sanitation workers in the metropolis are abreast with the state of the lagoon: that the lagoon is polluted. They are knowledgeable of the sources of pollution and most of the pollutants as found by researchers. Means of mitigation as suggested appear to be in line with those suggested by various researchers. The study therefore concludes that the Metropolitan Assembly and its enforcement division should use all available means including education, persuasion and dissuasion to ensure that sanitation management is highly

established to save the Metropolis in general and the Fosu Lagoon in particular from further pollution and consequential health risks.

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