

# ENERGY GENERATION THROUGH WASTE WATER – A PANACEA FOR SUSTAINABLE CITIES: A CASE STUDY OF THE CITY OF LAGOS, NIGERIA

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## **Abstract**

As Nigeria's economic capital and commercial nerve centre, the city of Lagos is undergoing speedy urbanization. With an estimated population of over seventeen million people, Lagos is one of the world's fastest growing cities. One of the prominent natural endowments that has borne the brunt of this rapid expansion is the Lagos Lagoon, a water body that has been used for sewage disposal for more than half a century. The large volume of sewage deposited in the lagoon on a daily basis has escalated due to the rapid growth in the city's population.

Besides adding beauty to the city, the Lagos Lagoon is a veritable source of seafood for Lagosians. As is the case with other sewage-rich, densely-populated cities, the city of Lagos has not fully utilized its bounteous sewage resources to upscale its energy supply needs. Instead, the inhabitants of the city keep contaminating the lagoon. The thrust of this paper is to explicate the repercussions of wanton sewage disposal into the Lagos Lagoon and to highlight the potential which Lagos has to generate massive energy from sewage waste in order to meet its energy challenges and ensure better governance.

From ten separate stations across the Lagos Lagoon, water samples were collected and analyzed to ascertain the existence of pathogenic entities using the techniques of sedimentation, microscopy and culture. These pH levels and Biochemical Oxygen Demand (BOD) of the samples were tested using the pH meter and BOD test apparatus correspondingly. The average numbers of sewage tankers who offload waste on a daily basis in all the sewage disposal sites were recorded. This was used to calculate the average daily sewage waste volume disposed.

The analysis showed that pathogenic organisms like hookworms, Klebsiella spp., Salmonella spp., Escherichia coli, Giardia intestinalis and Ascaris lumbricoides were present. Also, the test revealed a pH of 7.9-8.5 and a BOD level of 95-225mg/l at 20°C for 5 days. The general outcome is that on the average, tankers in Lagos deposit 720,000 litres of sewage wastes (mostly faecal sludge), and sixty-six per cent of these goes directly or indirectly into the Lagos Lagoon.

This paper shows that sewage disposal into the Lagos Lagoon has made the water body ecologically unhealthy for aquatic plants and animals. It has also decreased the visual appearance of the environment. Further, this cruel practice has exposed some persons that come in contact to the lagoon's waters to pathogenic infections. Extant studies have pointed to the fact that sewage waste is a key energy source, with 1 kilogramme of dry faecal sludge having a calorific value of 17.3 millijoule. The implication of this discovery is that with a daily average of 720,000 litres of faecal sludge disposal into the lagoon, Lagos has what it takes to meet its growing energy demand. The absence of steady energy supply has reduced the quality of life and governance in the city. Thus, the onus lies on government to effectually surmount the energy crisis and improve the life of the denizens. This paper strongly recommends the dynamic use of faecal sludge to save the Lagos Lagoon from sewage pollution and upscale energy supply in Lagos.

**Keywords:** Sewage, energy, Water, lagoon, Sewage tanker, Governance panacea.