

Ghana: Kumasi city's unplanned boom is destroying two rivers—sewage, heavy metals and chemical pollution detected

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Ghana's urban population has [more than tripled](#) in the past three decades, from 4 million to nearly 14 million people. Competition for land in cities

has increased among various land uses. These trends have led to encroachment in ecologically sensitive areas such as wetlands.

[Kumasi](#), Ghana's second largest city, has a high level of encroachment and this has led to the pollution of water bodies. Kumasi's population growth has been rapid because of its central and strategic location and its functions as a major commercial, traditional and administrative center. In 2022, the [population of Kumasi](#) was 3,630,326 with a growth rate of 4.02%. The city's growth puts pressure on its natural assets.

As scholars of urban planning and chemistry, we conducted a [study](#) in the [greater Kumasi metropolis](#) to understand the extent of encroachment and pollution of two rivers, Subin and Wiwi. We wanted to understand how cities can be developed and functional without destroying natural resources. We also wanted to know more about the extent of water pollution, land-use dynamics and water resources regulations, and how they influence the quality of water resources.

We found that people were building homes in informal settlements along the rivers. Liquid and solid waste was being dumped into the rivers. People were using land on the river banks for agriculture and industrial activities, which had a negative effect on water quality.

We recommend that the city authorities monitor what is happening better and do more to prevent degradation of Kumasi's water bodies.

Effects of land use on the quality of water bodies

We discovered that, in the greater Kumasi metropolis, more land alongside the rivers was being used for industrial, residential and commercial purposes than for green spaces. City authorities were ineffective in controlling development in these areas despite the fact that [Ghana's zoning guidelines](#) say there should be a buffer of 100 feet (30

meters) along water bodies.

Land values in Kumasi are increasing due to rapid [urban growth](#), but values are lower for wetlands. This difference has contributed to city residents building in wetlands. Also, the intense pressure of urbanization on the available land has resulted in a [high level of encroachment](#) in wetlands. The study revealed that 35.4% of the land uses within the [River Wiwi](#) buffers were [residential development](#).

This research further confirmed that the Wiwi and Subin rivers had been heavily polluted with fecal coliforms over the years. [Coliform counts](#) are an indicator of possible fecal contamination, and reflect hygiene standards.

The mean of the coliform counts surpassed the limits of 400 total coliforms/100ml and 10 fecal coliforms/100ml allowed by the [World Health Organization standard](#). The two rivers are extremely polluted with fecal matter.

The research also confirmed that [heavy metals](#) in the water bodies were above the [WHO's recommended standard](#) of 0.01mg/liter. For example, the average concentration of lead (Pb) recorded in the Wiwi and Subin rivers was 0.018–0.031 mg/l and 0.035–0.055, respectively. Exposure to lead is [dangerous](#) to health.

As a result of limited investment in sewage plants, most of the city's untreated waste water is discharged into the surface water bodies. This has implications for the quality and sustainability of these water bodies.

The study also showed that some city residents dump their [waste near the city's wetlands](#). During heavy rains, the refuse runs off into the water, affecting water quality and flow.

The inability of city authorities to enforce land-use regulations and legislation has allowed people to carry out agricultural activities close to the rivers. The use of agrochemicals threatens aquatic habitats. Chemicals such as pesticides, herbicides and fertilizers are likely to seep or be washed into the rivers. The use of polluted water from the rivers for irrigation also poses a threat to human health.

The industrial activities along the water bodies include washing bays, auto-mechanical activities, welding and wood processing. These pose a threat of chemical pollution due to likely seepage of petroleum products into the water.

Time for Kumasi to wake up

The development of sustainable cities relies on the ability of city authorities to plan for social, environmental and economic growth. Urban growth can coexist with natural resources if human activities located near water bodies don't threaten their quality and continued existence.

Our study shows that Kumasi has developed with little regard for its natural assets. This is a threat to the city's sustainability. City authorities ought to put in place measures to clean the water bodies and convert buffer areas into parks and green spaces. Environmentally friendly urban agriculture can also be promoted along the water bodies.

Activities such as disposal of liquid and solid waste must be stopped. [The "polluter must pay" principle](#) must be applied to people who contravene [environmental regulations](#).

Urban centers in Ghana need a water resource management policy. Regulatory institutions such as the Physical Planning Department and the [Environmental Protection Agency](#) should be restructured and equipped

to respond to emerging complex environmental problems in cities. There should be continuous environmental monitoring and regulations must be strictly enforced. The [River Thames Policing model](#) in the UK can be adopted to ensure the continuous monitoring of the water bodies. To monitor and enforce the zoning regulations, city authorities and policy-makers must invest in technologies such as drones.

The [Zoning Guideline and Planning Standards](#) provide standard setback average distances for a buffer zone of 50–100 feet from the water bodies. We recommend that the buffer should rather be 100 feet (30 meters) away from the wetland. The wetlands are an important [ecosystem service](#) that needs to be protected. Ecologically sensitive areas that are 100 feet away from wetlands should be compulsorily acquired as natural assets for the public interest.

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