Analyzing Spatial And Temporary Variation of Water Quality Parameters in Ogunpa River Watershed

CHAPTER ONE

INTRODUCTION

Water as a valuable component of the environment is important for human, economic and social development. Rivers serve as one of the sources of public drinking water and private wells. Others may include streams, lakes, reservoirs, springs, and ground water. Therefore, when these sources are polluted, wildlife is endangered, drinking water becomes unsafe, and by implication threatens the health of the users, due to its poor-quality status. The World Health Organization (WHO) estimated that up to 80 % of all sicknesses and diseases in the world are caused by inadequate sanitation, polluted water or unavailability of water. There are various criteria for water quality standards, i.e., safety of drinking water, acceptability of water quality for industrial use such as cooling water for boilers, water used for agriculture, fish farming, fishery, and for sustaining natural aquatic ecosystems. (Adeyefa *et al*., 2023).

Thus, information on water quality and pollution sources in such water bodies is important for the implementation of sustainable water use management strategies, have opined that for effective maintenance of water quality through appropriate control measures, continuous monitoring of a large number of quality parameters is essential. In addition, due to seasonal and regional characteristics of river water, assessing spatial variations has become an important aspect of river water quality at a watershed level as an important aspect for the physical and chemical characterization of aquatic environments. Unethical disposal habits and activities around river bodies have been largely responsible for the deteriorating nature of river water quality. Although,

deterioration of river water quality can result from natural processes, but more recently, it's due to anthropogenic activities through the discharge of industrial and domestic wastewater as well as agricultural drainage to the rivers. (Adeyefa *et al.*, 2023).

In Nigeria, the problem of water pollution is largely a result of an interplay of high population growth, accelerated urbanization and industrialization, and has become a complex issue due to a lack of a solid waste management approach.

As observed by Ayatomuno and Gobo 2004), estimation shows that each Nigerian generates about 0.85 kg of waste per day totaling about 119 million tons of municipal and industrial waste per annum. A substantial amount of this eventually found its way to the rivers. The activities of the people in waste generation and disposal at the upper course and even around Ogunpa River in Oyo state, are not different. As a result, the quality status of the river is unsafe for domestic purposes (cooking, washing of clothes, bathing, and recreation, amongst others) due to the unpleasant waste dumping habits.

The problem of how to manage these wastes is reaching a critical proportion. In the recent past, the government had gone extra the mile to invest in the services of waste management companies, especially in urban areas which has led to improvements in the level of urban cleanliness. But unfortunately, solid waste dumps keep on emerging and proliferating in different parts of the urban landscape. The choice of rivers and streams as dumpsites particularly in areas of proximity is becoming a major concern that merits special attention. This is essential because most of these surface water bodies still serve as sources of water supply to many urban and rural communities down-stream and are expected to maintain a certain level of quality for sustainable use by these populations.

Several studies have been undertaken generally on water quality assessments and environmental-related issues. River water quality assessments, specifically are also numerous among others. The rate at which the residents along the various points through which the river flows dispose faeces, domestic and industrial wastes, is alarming. This may have led to the pollution and contamination of the river. More importantly, many of the users of the river at the lower course assume they are not affected by the hazardous activities occurring at the upper course of the stream. This requires that knowledge of what is operational, and the quality status of the river at various points is made known.

Thus, the need for investigating, identifying and understanding the extent to which the menace has affected the river's water-quality status. Given the alarming rate at which Ogunpa River is mismanaged in terms of quality, quantity and utilization at different points as observed above, and the dearth of information on water quality assessments on the river, the knowledge of the spatial and temporal variations of the physicochemical properties of the river water is required. Apart from the examination of the variations in the river water properties, computation of the water quality index (WQI) for reaches along River Ogunpa should also be of consideration. All this is to ascertain its quality status.

Rivers come in contact with different types of rocks in their pathway which are weathered by physical, chemical and biological processes. The weathered elements by the natural processes add directly in to the river system. Various types of chemicals also added in the rivers by anthropogenic activities which contribute in changing the physical, chemical, and biological properties of the rivers water. Besides these human influences, river water quality is also affected by other natural activities viz. geological, hydrological and climatic factors. (Harendra & Shukla 2016).

The concentration of pollutants in water samples only indicate the situation at the time of sampling, while concentrations in the organism are the result of past as well as current pollution levels in the environment in which the organism lives (Ravera *et al.*, 2001). A previous study indicated that potential sources of elevated levels of heavy metals were sewage wastes, wastes from metal processing industries and other household refuse. Generally, the main natural source of heavy metals in water is weathering of minerals. Industrial effluents and non-point pollution sources, as well as changes in atmospheric precipitation can lead to local increase in heavy metals concentration water.

Also, total heavy metals concentrations in aquatic ecosystem can mirror the present pollution status of these areas. Tannery industry contributes significantly towards exports, employment generation and occupies an important role in Indian economy. Heavy metals released from tanneries are kept under environment pollutant category due to their toxic effects on plants, animals and human beings. They interfere with physiological activities of plants such as photosynthesis, gaseous exchange and nutrient absorption and cause reduction in plant growth, dry matter accumulation and yield. They cause direct toxicity, both to human and other living beings due to their presence beyond specified limits. The metals present in the soil can enter in the aquatic system by weathering, percolation, and surface runoff from agricultural land. Soil can also be polluted by wastewater irrigation. These contaminated soils may have an impact on water quality. Therefore, protection of the soil around the industrial region is of prime importance for the quality of soil and water. Temporal variations in precipitation, surface runoff, interflow, groundwater flow, and pumped in and outflows have a strong effect on river discharge and subsequently on the concentration of pollutants in river water (Haiyan and Stuanes, 2003).

The quantity of the river water may determine how well it is able to sustain its application for these services as well as the diversity and richness of its freshwater biota. This study was carried out to determine the general status of the physical and chemical water quality parameters of the river from its headwaters to the lower reach before discharge into the sea (Omoniyi *et al.,* (2017).

The outcome of this study therefore, will be useful in creating awareness, and educating the society at large as well as the appropriate authorities on the best way, manner and approach to manage water bodies within a given environment.

1.1 AIM AND OBJECTIVES

AIM

The aim is to investigate the impact of spatial and temporary variation of water quality parameters in Ogunpa, Oyo State.

OBJECTIVES

The objectives are to:

1. Analyze spatial variations in water quality parameters across different locations within the Ogunpa river watershed

2. Estimate the water quality parameters in Ogunpa river watershed.

1.2 SCOPE OF THE STUDY

The study will be focused on the impact of spatial and temporary variation of water quality parameters in Ogunpa river, Oyo State.

1.3 JUSTIFICATION OF STUDY

The study offered information on the impact of spatial and temporary variation of water quality parameters in Ogunpa river watershed. The outcome was useful for the sustainable management of the river and the protection of public health.

1.4 PROBLEM STATEMENT

The quality of water in Ogunpa River has been a major concern due to pollution from various sources. However, spatial and temporary variation of water quality parameters in ogunpa river has not been adequately investigated.