1. INTRODUCTION

Water quality is a term used to describe the chemical, physical, and biological characteristics of water, generally in terms of suitability for a particular or designated use. The quality of a water body in most cases a river is the best indicator of what's going on in the rest of the watershed, both uphill and upstream. Water quality is also a function of the geology of the watershed. For example, highly mineralized soils and rock may result in highly mineralized water. Water-quality monitoring is the process of sampling and analyzing water conditions and characteristics. Water characteristics, such as dissolved oxygen, pH, nutrients, and temperature, are known as parameters. Parameters can be physical, chemical or biological in nature. Some of the physical characteristics of water quality include but are not limited to temperature, dissolved oxygen and suspended solids. Chemical parameters are a measure of substances, such as nutrients, heavy metals and pesticides, which are dissolved in the water or are in particulate form. Biological parameters refer to aspects of the living environment, from microscopic algae and invertebrates to macrophytes and fish. Monitoring different aspects of water quality over time enables changes to the aquatic environment to be detected, and an understanding of ecosystem health to develop. Measuring a combination of these parameters allows a complete picture of the status of a water resource to emerge. If only physical or chemical parameters are measured, it is difficult to gauge the impact they have on the life in or using the water. Similarly, measuring biological parameters can tell you if the ecosystem is under stress, but not necessarily what is causing the stress. The combined data can be used to generate information essential for those managing and protecting natural resources, allowing them to determine if the conditions of the water resource are improving or worsening with time and human use. (1)

Water resources in Egypt are becoming scarce. Surface-water resources originating from the Nile are currently fully exploited, while groundwater sources are being brought into full production. Egypt is facing increasing water needs, demanded by rapidly growing population, increased urbanization, higher standards of living and by an agricultural policy which emphasizes expanding production in order to feed the growing population. The population is currently increasing by more than one million persons a year. With a population of approximately 74 million in 2008, Egypt is expected to see an increase to some 100 million by 2025. The most critical constraint facing Egypt is the growing shortage of water resources accompanied by the deterioration of water quality. Water resources in Egypt are limited to the Nile River, rainfall and lash loods, deep groundwater in the deserts and Sinai, and potential desalination of sea and brackish water. Each resource has its usage limitation, whether these limitations are related to quantity, quality, space, time, or exploitation cost. Egypt receives about 98% of its fresh water resources from outside its national borders. This is considered to be the main challenge for water policy and decision makers in the country as the Nile River provides the country with more than 95% of its various water requirements. Per capita fresh water availability in Egypt dropped from 1893 cubic meters in 1959 to 900-950 cubic meters in 2000 and tends to decline further to the values of 670 cubic meter by 2017 and 536 by 2025. The main reason behind this rapid fall is the fixed water resources and the rising pressure from population growth. However, there are other more important factors in escalating the water issues in Egypt. They do not show direct linkages to the problem but have great contribution in establishing water stress conditions. (2)

Al-Mahmoudia canal in northern edge of Beheira Governorate, west part of Nile Delta, has important role in the economic development and prosperity of the people in Beheira and Alexandria Governorates. It has been exploited to support agriculture, fisheries, public water supply, industry, hydroelectric power and recreation. The continuing deterioration of water quality in the canal has become a routine water pollution case. Therefore, it is necessary to solve the canal pollution problems and upgrade the water quality. (3)

Nubaria canal is the largest main canal in West Delta Region. It irrigates 1.12 million feddans. The water supplies mounted to roughly 254 m^3/ s of which 228 m^3/ s are received from the Nile, and 26 m3/ s are from drainage water.(4)

Heavy metals constitute a very heterogeneous group of elements widely varied in their chemical properties and biological functions. The term "heavy metals" defined as commonly held for those metals, which have specific weights more than 5g cm^{-3}. Heavy metals are kept under environmental pollutant category due to their toxic effects in plants, human and food. Some of the heavy metals i.e. Cadmium (Cd), Lead (Pb), Mercury (Hg) are cumulative poison. These heavy metals are persistent, accumulated and not metabolized in other intermediate compounds and do not easily breakdown in environment. These metals are accumulating in food chain through uptake at primary producer level and than through consumption at consumer level. Metals are entering the human body either through inhalation or injection. Heavy metals such as Cd, Ni, Pb pose a number of hazards to humans. These metals are also potent carcinogenic and mutagenic. Copper and zinc serve either as cofactor as a activator biochemical reactions & enzymatic for information of enzyme substrate metal complex. The high concentration intake of cadmium cause itai itai disease and mercury intake lead to minamita disease and other heavy metals cause poisoning due to drinking water contamination. Heavy metals have largest availability in soil and aquatic ecosystem and to relatively smaller proportion in atmosphere at particular vapors. Metal toxicity to plants varies with plants species, specific metals, concentration, chemical form, soil composition, pH and many metals considered to be essential for plants growth. (5)

Heavy metals pollution can originate from natural and anthropogenic sources. Activities such as mining & smelting operation and agriculture have contaminated extensive area of world such as Japan, Indonesia, and China mostly such as Cd, Cu and Zn, Cu and Pb in north Greece Cu, Pb, Cu, Ni, Zn, and Cd in Austrilia. In animal body, metals are entering through animal's feeds, green fodder, drinking water and pharmaceutical medicines etc. Other sources are accidental access to limed field, mineral supplements with high content of trace metal and licking of painted surfaced containing metallic pigments.(5)

Detection of microbial contaminants of fecal origin is a major priority in assessing the quality of drinking water. Water from different sources i.e. river, lakes, reservoirs and groundwater aquifers are subjected to varying degrees of fecal pollution, and consequently freshwater is a vector of transmission of many pathogenic bacteria, viruses and protozoa. Despite the world-wide efforts and modern technologies utilized for safe water, but the transmission of waterborne diseases is still a matter of major concern. For decades the fecal coliform groups of bacteria has been used as an indicator of water quality with respect to the presence of human pathogens, and will remain of fundamental importance in the control of waterborne diseases. Many studies have been conducted for the determination of contaminants of drinking water to prevent the water borne diseases throughout the world. (6)

AIM OF WORK

The objective of this study is to monitor the physico-chemical and bacteriological water quality parameters in Nubaria and Mahmoudia canals through one year and to compare the quality with that reported on Egyptian and International standards.