

5. SUMMARY

Water quality monitoring is the process of sampling and analyzing water conditions and characteristics water provides some essential elements, but when polluted it may become the source of undesirable substances dangerous to human health and causes diseases such as, various cancers, Alzheimer's, Parkinson, amyotrophic lateral sclerosis and neurological disease.

Al- Mahmoudia canal has important role in the economic development and prosperity of the people in Beheira and Alexandria Governorates. The continuing deterioration of water quality in the canal has become a routine water pollution case. The actual served area for the canal is 130.200 heactare.

Nubaria canal is the largest main canal in West Delta Region. It serves a total area of 373.800 heactare.

Metals make up a large portion of the inorganic pollutant found in water. Heavy metals are kept under environmental pollutant category due to their toxic effects in plants, human and food.

High concentrations of Al in water can cause mental diseases such as Alzheimer's. Cd is generally classified as toxic trace element. Cu deficiency can include anemia, low numbers of white blood cells, osteoporosis in infants and children. Fe is an essential element in human nutrition. High concentrations of Mn can cause of immediate and delayed hypersensitivity noticed in occupationally exposed as well in the general population. Pb is a poisonous metal and may cause headache, kidney damage, blood pressure, lung cancer and stomach cancer. Zn occurs in small amounts in almost all igneous rocks.

Other types of inorganic pollutants happen to be nonmetals and they also, cause adverse healyh effects to humans and affect the environment such as (NO_3 , PO_4 , F and NH_4). Nitates and fluorides can influence human health, while nitrates and phosphate can also cause environmental damages in the form of euroghication of lakes and ponds.

Total Coliform bacteria are commonly found in the environment (e.g. soil or vegetation) and are generally harmless.

A 12 month study chosen from October 2012 to September 2013. Selected sites were Nubaria and Mahmoudia canals. Samples were collected from these sites. Physic-chemical characteristics, heavy metals and bacteriological parameters were determined in this study. Temperature and Dissolved Oxygen were determined in the field. Color was determined by Lovibond. Turbidity was determined by HACH 2100AN turbidity meter. pH was determined by HACH HQ11d. EC was determined by HACH HQ14d. Chloride, Alkalinity and Total hardness were measured by Solarus Digital Burette. Temperature was determined by HACH HQ40 portable meter. DO was determined by HACH HQ40d portable DO. BOD was determined by HACH BOD Track. COD was determined by COD Reactor HACH. Ammonia was determined by Sulphate, Fluoride, Nitrate, Silica and Phosphate were determined by spectrophotometer lambda 25 (Double beam UV/visible)

PerkinElmer. Heavy metals (Al, Cd, Co, Cu, Fe, Mn, Ni, Pb and Zn) were determined by (ICP-OES) PerkinElmer 5300DV.

Results obtained from analysis of water samples from two canals were:

EC values for water samples in Mahmoudia canal results were ranged between 368 $\mu\text{S/cm}$ 811 $\mu\text{S/cm}$ and in Nubaria canal results were ranged between 291 $\mu\text{S/cm}$ 2986 $\mu\text{S/cm}$.

Chloride results were ranged between 22.9 mg/l 100.5 mg/l in Mahmoudia canal and were ranged between 12.9 mg/ to 699 mg/l in Nubaria canal.

TDS in all water samples were ranged between 220.8 mg/l to 486 mg/l in in Mahmoudia canal. That means all results in the studied canal below the Egyptian limits and FDA. In Nubaria canal TDS not detected in some sample sites and recorded high result in sample site N10 which 1792 mg/l.

pH in all water sample were ranged between 7.31 to 7.95 in Mahmoudia canal and were ranged between 7.38 to 8.38 in Nubaria canal.

Alkalinity results were ranged between 133 mg/l to 262.2 mg/l in Mahmoudia canal and were ranged between 110 mg/l to 326 mg/l in Nubaria canal.

Ammonia results of water samples were ranged between 0.05 mg/l to 9.84 mg/l in Mahmoudia canal and were ranged between 0.01 mg/l to 4.8 mg/l in Nubaria canal.

DO value attained its maximum in sample site H01 (9.01 mg/l) in Mahmoudia canal. On the other hand, DO reach its minimum in sample site N07 (0.25 mg/l) in Nubaria canal.

The concentration of COD in water samples varied from 6.2 mg/l to 61.7 mg/l in Mahmoudia canal and varied from 3.2 mg/l to 470 mg/l in Nubaria canal.

The concentration of BOD in water samples varied from 0.09 mg/l to 3.4 mg/l in Mahmoudia canal and not detected in sample site N04 in Nubaria canal. On the other hand BOD recorded high result (8.3 mg/l) in sample site N14.

Total coliform in all water samples varied from 400 CFU/100 ml to 39000 CFU/100 ml in sample site H02 in Mahmoudia canal and varied from 450 CFU/100 ml to 280000 CFU/100 ml in in Nubaria canal.

Fecal Coliform counts exceeded the WHO Guidelines of 1000 CFU/100 ml in almost water samples sites; the median is 12500 CFU/100 ml. This is an indication of the discharge of human wastes in Mahmoudia and Nubaria canals.

Fluoride (F^-) concentration in raw water samples not detected in some sample sites and recorded 0.83 mg /l (high concentration) in sample site H06 in Mahmoudia canal. In Nubaria canal fluoride concentration not detected in some sample sites and recoded high concentration 1.89 mg/l in sample site N10.

Nitrite results of water samples were ranged between 0.049 mg/l to 2.8 mg/l in Mahmoudia canal and were ranged between 0.002 mg/l to 1.5 mg/l in Nubaria canal.

Nitrate was ranged from 0.62 mg/l to 12.4 mg/l in Mahmoudia canal and was ranged between 0.75 mg/l to 32.4mg/l in Nubaria canal.

TSS concentrations were varied from 0.5 mg/l to 40.2 mg/l in Mahmoudia canal and varied from 0.4 mg/l to 43 mg/l in Nubaria canal.

Turbidity values of water samples were ranged between 1.31 NTU to 83.2 NTU in Mahmoudia canal and were ranged between 1.4 NTU to 88.9 NTU in Nubaria canal.

Concentrations of iron in all water samples were not detected in some sample sides and were recorded 1.778 mg/l in sample site N01 in Nubaria canal and were not detected in some sample sites and were recorded 6.6 mg/l in sample site H01 in Mahmoudia canal.

Results of hardness in water samples were ranged between 128 mg/l to 278.4 mg/l in Mahmoudia canal and were ranged between 117.8 mg/l to 1962 mg/l in Nubaria canal.

Sulphate (SO_4^{-2}) in all water samples were ranged between 27.18 mg/l to 100.9 mg/l in Mahmoudia canal and were ranged between 20.26 mg/l to 481 mg/l in Nubaria canal.

Phosphate in some sample sites were not detected and high concentration 5.23 mg/l were recorded in sample site H08 in Mahmoudia canal. In Nubaria canal phosphate were not detected in some samples sites but high concentration 1.04 mg/l were recorded in sample site N11.

Concentrations of copper were not detected in some sample sites in Nubaria and Mahmoudia canal usually in summer and were recorded high concentration 0.174 mg/l in sample site H08 and 0.0288 mg/l in sample site N10 in Mahmoudia and Nubaria canal.

Concentrations of cadmium were not detected in some sample sites in Nubaria and Mahmoudia canal and were recorded high concentration 0.006 mg/l in almost water samples and 0.009 mg/l in sample sites N12, N13 and N14 in Mahmoudia and Nubaria canals.

Concentrations of cobalt were not detected in some samples sites in Nubaria canal. On the other hand cobalt was recorded high concentration 0.009 mg/l in sample site N10. In Mahmoudia canal concentrations of cobalt were not detected in sample site H08 and were recorded high concentration 0.007 mg/l in sample sites H01 and H03.

In all water samples manganese concentrations were varied between 0.0025 mg/l in sample site N04 to 0.099 mg/l in sample site N06 in Nubaria canal and were varied between 0.001mg/l in sample site H09 to 0.092 mg/l in sample site H07 in Mahmoudia canal.

Concentrations of nickle were not detected in some samples sites in Nubaria canal. On the other hand nickle was recorded high concentration 0.1248 mg/l in sample site N11. In Mahmoudia canal concentrations of nickle were not detected in some sample sites in and were recorded high concentration 0.1248 mg/l in sample site H01.

In Nubaria canal lead not detected in some samples sides and recorded high concentration (0.014 mg/l) in sample site N14. On the other hand lead concentrations were ranged between 0.0015 mg/l to 0.262 mg/l in Mahmoudia canal.

In all water samples Zn concentrations were not detected in some sample sites in Nubaria and Mahmoudia canals and were recorded high concentrations 0.997mg/l in sample sites N11 and H01 in Nubaria and Mahmoudia canals.