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THE EFFECT OF DRAINAGE WATER ON LAKE MARIUT'S FARMED SECTION.

BY

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ABSTRACT

Lake mariut environment and accordingly the farms constructed inside it have been affected recently by many external factors such as progressive increase of industrial, agricultural, and sewage drain water inflow which made the lake highly polluted. Therefore, the present work was conducted in Alexanderia Governorate Fish Farm in Lake Mariut to study the impact of drainage water on the water quality of fish ponds.

The results show that drainage water from El-Mohafza drain and Lake Mariut caused increase in water turbidity, temperature, total alkalinty. nutrients (phosphorus and nitrogen compounds) and heavy metals (Zn, Cu, Fe, Pb, and Cd), and a decrease in dissolved oxygen. Generally, all water parameters studied indicate the suitability of water quality criteria for aquaculture, except for the heavy metals (lead and cadmium concentrations) which proved to be harmful for human health. Also, the present study led to the following recommendations:

1-heavy metals concentrations in the derainage water should be in the safe limits before discharging in Lake mariut;

2- it is possible to take dissolved oxygen concentration in fish farm water as an index to define the maximum ammount of drainage water that could be discharged into Lake mariut without harmful effect to aquatic organisms.

INTRODUCTION

Lake mariut is one of four Nile Delte along the northern board of Egypt on the mediterranean Sea. It occupies a portion of the mediterranean foreshore plain adjoining the city of Alexandria at Latitude 31° 10" N and Longitude 29° 55" E. At present the 17, 768-feddan lake is divided into seven stations (Fig. 1).

USAID in cooperation with Alexandria Governorate , established a fish farm in Lake mariut (Fig 1) to create a network of ponds with independent water control system for fish production.

Recently, Lake mariut environmrnt has suffered from the progressive increase of industrial and agricultural drainage water inflow as well as sewage which turned the lake to a highly polluted habitat with toxic substances as heavy metals, nitrogenous compounds, and pesticides and that might in turn affect the water quality of Alexandria Governorate Fish Farm in Lake mariut.

The present work aimed to investigate the impact of drainage water (sewae, agricultural and industrial) on the water quality of the farm. The physical parameters (turbidity & temperature), the chemical parameters (PH , dissilved oxygen, total alkalinity, nitrite, nitrate, phosphorus), and the heavy metals (zinc, cupper, iron, lead and cadmium) were investigated.

MATERIALS AND METHODS

1- Area of investigation:

The present study was conducted at Alexandria Governorate Fish Farm in Lake Mariut (Fig. 1). The farm is about 120 feddan and was already divided into nine ponds of 13.3 feddan each. These ponds were put into fish culture operations and were supplied with water from lake Maruit by pumping. The ponds were stocked with tilapia and mullet species. Three stations: 1 (ponds 1,2,and 3); 2 (ponds 4, 5, and 6); and 3 (ponds 7,8,anf 9) were selected to represent the different habitats in the studied area.

2- Physico-chemical parameters:

Throughout the period from November, 1993 to October, 1994, monthly water samples were collected from the three previously mentioned stations. Sampling was carried out arround the middle of the month, in two successive days. Due to the shallowness of the ponds, only subsurface samples were collected. Samples were analysed on the same day of collection.

2-1-physical parameters:

i- Temperature: Air and water temperature were recorded at the same time of water sampling by 0.1 °c graduated thermometer.

ii- Turbidity (Transperancy) : Acircular black-white Secchi disc, 25 cm diameter, was used. Readings of Secchi disc depth represent the distance in cm of disappearance and reappearance of Secchi disc.

2-2- Chemical parameters:

i-pH: The pH values of water samples were determined by Accumt pH meter, model 830 .

ii- Total alkalinity : CO_3^{--} and HCO_3^{-} mg $CaCO_3/1$.

The amount of CO_3^{--} was determined by titration of water samples with a known normal H^2SO_4 in the presence of phenolphthaline as indicator. The amount of HCO_3^{-} was determined by further titration with the acid in the presence of methyl orange indicator (Strikland and parsons, 1965).

iii-Dissolved oxygen: Dissolved oxygen was determined according to winkler's method as reported by Boyd (1979).

iv- Nitrite (NO_2^- mg/1): Nitrite nitrogen was determined according the method described by Barnes and Folkards (1951). The technique is bassed on the formation of a reddish purple azodye, produced at pH 2.5, by coupling diazotized sulphoanic acid with N-(1-naphthyl)- ethylene-diamine dihypochloride in the presence of NO_2^-. The colour was measured colorimetrically at 540 nm by Milton Roy Spectronic Spectrophotometer, Model 601.

v- Nitrate (NO_3^- mg/1) : Nitrate nitrogen was colorimetrically determined according to the method described by Nydaki (1976).

vi- phosphorus (mg/1) : Orthophosphate was colorimetrically measured by the ascorbic acid method as reported by strikland and parson (1965).

vii- Heavy metals : Zinc, copper, iron, lead and cadmium concentrations were determined according to Allen et al. (1979).

RESULTS AND DISCUSSION

1- physical parameters:

1-1- Temperature:

Temperaature is one of the most important factors in aquatic environment. The results presented in Table (1) show a positive relationship between air and water temperature. This might be due to the low depth of pond water. Gaballah (1990) found insignificant differences between the surface and bottom water temperature of Lake Manzalah. The author attributed that to the shallowness of water.

Generally, the mininum temperature values (12.7°C) were recorded in January while the maximum ones (28.6-28.7°C) in July and August. Samaan and Abdallah (1981) and Beltagy (1985) found similar results in Lake Mariut and Borollus.

Moreover, the results revealed the effect of drainage water discharge on water temperarure. The temperatur values in ponds 7, 8, and 9 that received directly sewage and industrial wastes from El-Mohafza drain were higher than the other ponds. Samaan and Abd- allah (1980) found that the temperature of polluted water were higher with about 0.6°Cthan that of non polluted water. They attributed the reason to the putrefaction of organic detritus accumulated on the bottom.

1-2- Turbidity (Transparency):

Turbidity figures are presented in Table (2). As the Secchi disc readings determine the distance in cm at which the white disc disappear, the low readings indicate a high turbidity, while the high reading indicate a low turbidity. Thus, the data in Table (2) clearly indicate higher turbi dity in ponds 1, 2, and 3 (station 1) that received organic matter; and ponds 7, 8, and 9 (station 3) which received sewage and industrial waste. On the other hand, the minimum turbiddity values were recorded in ponds 4,5, and 6 (stattion 2) as the Secchi disc readings were the highest (average 37.33 cm) Table (2).

The high turbidity recorded in the ponds received organic matter and sewage and industrial wastes could be attributed to the flourishing of the phytoplankton rather than the suspended matter, since the Secchi disc technique is used to determine the quantity of phytoplankton in fish farms (Boyd, 1979).

Essa et al. (1988) found that the quantity of phytoplankton in the integrated duck-fish ponds were higher than in fish ponds only. Also, the present results (Table 2) show that the high tubidity values occured during spring. Similar results were found by other workers in Lakes Edku and Manzalah (Samaan and Abdel-Monem,1986 ; and El-Shebly,1994). Hepher and Allen (1978) reported that wastwater-fertilized ponds produced high yield because of the increase in phytoplankton by these wastewater.

2- Chemical parameters:

2-1- pH: The pH values in the tested ponds are suitable for aquaculture in accordance to the findings of the previous investigators (Alabaster and lioyd, 1980; Hepher and Pruginin, 1981 ; Essa et al., 1989). The average values of pH ranged from 8.22 to 8.33 with an annual average of 8.29 (Table 3). Beltagy (1985), in Lake Borollus, and El-Ghobashy (1990), in Lake Manzalah, recorded high pH values recorded in the present study may be due to the increase of photosynthetic activity. The higher pH Values in the ponds 7,8, and 9 , which received the drainage water discharge, were correlated with high plankton activity (Table 2) where large amount of Co_2 were consumed for photosynthesis leading to increrease pH. Similar results were reported by Sabbak et al. (1987) and Abdel-Baky and El-Ghobashy (1990).

2-2 Dissolved oxygen:

Dissolved oxygen values summarized in Table (4) show a reverse correlation with temperature values . The highest DO recorded in January (8.13 mg/1) was accompanied by the lowest water temperature (12.7°C). This may be due to the decrease of oxygen consumption and the continual mixing of the water by wind action during January. On the contrary, the lowest oxygen content (average 5.1 mg/1) coincided with the high temperature (average 28.7°C)recorded during August. Similar finding were reported by El-Hehyawi (1977) in Lake manzalah, Saad (1987) in El-nozha hydrom Farm and El-Ghobashy (1990) in Lake manzalah.

Generally, the oxygen values in all ponds were suitable for fish culture. The average values ranged from 5.97 to 6.84 (Table 4), which are in the safe margin (Huet, 1972).

However, the sewage and industrial drainage affected the oxygen levels. Oxygen content in ponds 7, 8, and 9 (station 3) was the lowest (5.97 mg/1) Table (4) due to the high discharge of polluted water where high amount of oxygen were consumed as

a result of organic matter decomposition. Hepher and pruginin (1981) and Sabbak et al. (1987) reported that pollution led to a decrease in DO content of water. Also. Wahby et al. (1972) and Beltagy (1985) found Similar resuults in Lakes Manzalah & Borollus.

2-3- Total alkalinity :

The data concerning the total alkalinity in the studied ponds are summarized in Table (5). The average values ranged from 166.98mg $CaCO_3$ /1 to 219.60mg $CaCO_3$ /1. The highest values were recorded in ponds 7,8,and 9 (station 3) which received the drainage inflow. Samaan and Abdallah (1981) stated that the polluted water showed high alkalinity values.

Also, the results showed that the lowest alkalinity values were recorded during the hot months, while the highest ones prevailed during cold months (Table 5). Similar results were found by helal (1981) on Damietta branch of the Nil, and Gaballah (1990).

2-4- Nitrite (No_2-N) :

The nitrite content showed irregular monthly variations during the period of investigation (Table 6). The nitrite content ranged from 0.008mg/1 in August to 0.035 mg/1 in November. Generally, these values are considered not harmful to fish; and the low nitrite concentrations may be due to its utilization by aquatic macrophytes, or its conversion to nitrate.

Moreover, the results show that the minimum nitrite values were recorded in ponds 4, 5, and 6 (station 2) and the maximum values in ponds 7, 8, and 9 (station 3) which received the drainage inflow. This might be attributed to the high concentration of organic matter discharged in the ponds.

2-5- Nitrate (NO_{3-N}) :

The nitrate concentration in pond water is considered an index of the productive capacity of water.

Nitrate values in the tested ponds ranged from 0.284mg/1 in December to 0.483 mg/1 in Septemper (Table 6). The nitrate content in ponds depends mainly on the amount of drainage water discharge, alkaline pH, and the nitrification process that convert ammonia to nitrite and

The present results show that the amount of nitrates in ponds 7, 8, and 9 (station 3) were higher than in other ponds due to the influence of sewage and agricultural drainage water discharged through El-Mohafza drain.

2-6- Total nitrogen :

The total nitrogen content in the ponds water showed irregular fluctuations during the period of study. The highest values were recorded during the hot months and the lowest ones durlng cold months (Table 6). This may be due to irregular discharge of organic matter through Lake Mariut water and El-Mohafza drain, and micoorgani sms activity.

Also, the highest nitrogen values were recorded in ponds 7, 8, and 9 (station 3) due to sewage and agricultural drainage water.

2-7- phosphorus (po_4-p /)

The results summarized in Thable (6), show that phosphorus content in the tested pond water ranged from 0.103to 1.322mg/1. The high values were recorded in Spring and Summer while the low content in Autumn and winter. The rise in water temperature and the shallowness of water might explain the increase in summer (Riley and Prepas, 1984 ; Abdel-Baky and El-Ghobashy, 1990). Similar results were found by Samaan (1974) in Lake Edku.

The present results demonstrated the effect of drainage water on the phosphorus content. The high phosphorus content in ponds 7, 8, and 9 supports this finding. Sabbak et al. (1987) reported that pollution increase, the phosphorus content.

2-8- Heavy metals :

Five heavy metals; namely : Zinc, copper, iron , lead, and cadmium were determined and the results are summarized in Table (7). The average concentrations ranged from 0.010to 0.027mg/1 for pb, and 0.013to 0.034mg/1 for cd, respectively. The maximum values were recorded during winter except Cd which showed its highest concentrations during autumn. These results agreee with these of Beltagy (1985) and El-Shebly (1994) on Lakes Borollus and Manzalah, respectively.

In addition, the ponds which received drainage water showed the highest heavy metals. Also, the irregular discharge of drainage water into the ponds may cause irregular fluctuation of heavy metals (Table 7).

Generally, the values of zn, Cu, and Fe in the present work, were well below the recommended standard values, while Pb and Cd concentrations were higher than the recommended standards, since the maximum levels of Zn, Cu, Fe, Pb, and Cd recommended in natural water are 1, 1, 1, 0.05, and 0.01 mg/1 , respectively.

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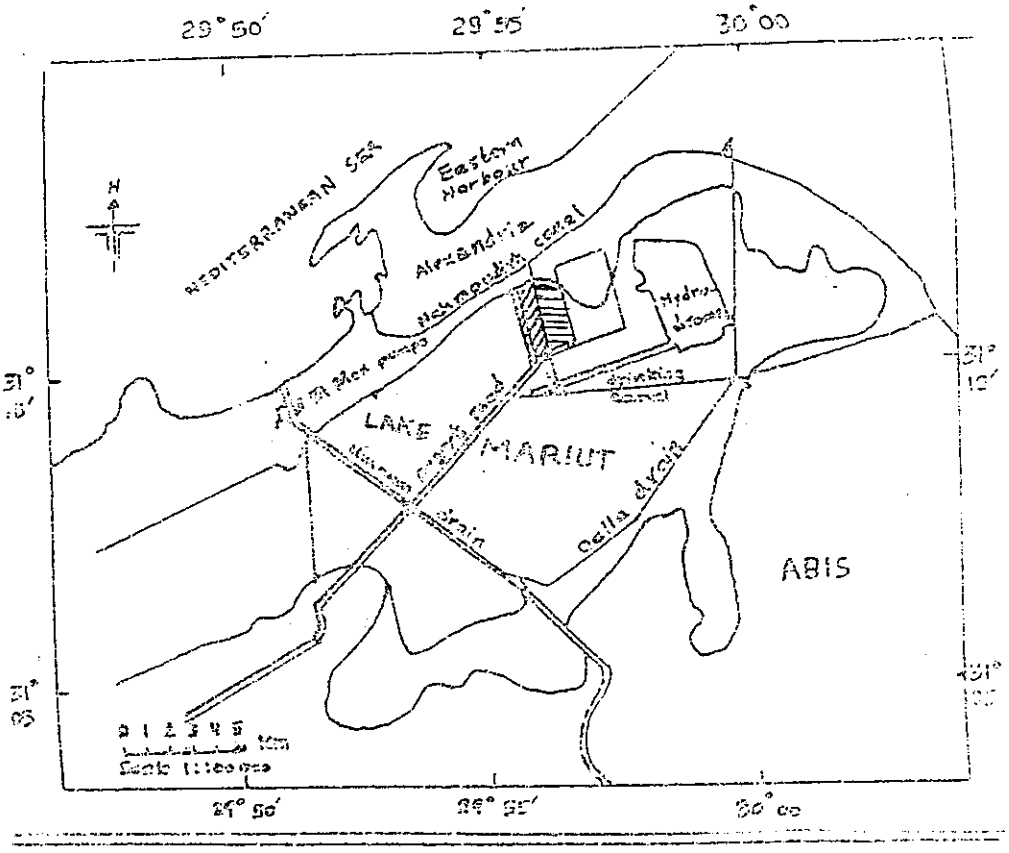

Figure 1. MAP of LAKE MARIUT

Lake Mariut Fish Farm

Table (1):

Average air and water temperatures (°C) recorded in 306 fish farm, Lake Mariut.

Month	Air	Water
Nov., 93	18.45	16.20
Dec.	14.70	13.10
Jan., 94	13.25	12.70
Feb.	15.10	13.90
Mar.	18.00	16.45
Apr.	19.40	18.50
May	24.00	23.40
Jun.	29.00	26.20
Jul.	29.10	28.60
Aug.	31.00	28.70
Sept.	29.30	27.00
Oct.	24.60	22.30
Average ± SE	22.16 ± 1.86	20.59 ±1.78

Table (2):

Monthly variations of the Secchi disc reading in cm recorded in Lake Mariut Fish Farm.

Month	Station			
	1	2	3	Average ± SE
Nov., 93	24	48	25	32.33 ± 7.84
Dec.	25	33	28	28.67 ±2.33
Jan., 94	28	44	30	34.00 ± 5.03
Feb.	20	40	25	28.33 ± 6.01
Mar.	18	30	35	27.67 ± 5.04
Apr.	15	35	15	21.67 ± 6.67
May	20	38	15	24.33 ± 6.98
Jun.	15	37	30	27.33 ± 6.49
Jul.	20	35	35	30.00 ± 5.00
Aug.	26	35	30	30.33 ± 2.60
Sept.	22	38	30	30.00 ± 4.62
Oct.	28	35	32	31.67 ± 2.03
Average ± SE	21.75 ± 1.31	37.33 ± 1.40	27.50 ± 1.91	28.86 ± 1.40

1-Station 1 comprised ponds 1, 2, and 3 , which received organic matter.
2- Station 2 comprised ponds 4, 5, and 6.
3- Station 3 comprised ponds 7, 8, and 9 , which received drainage water.

Table (3):

Monthly variations of pH values recorded in

Lake MariutFish Farm

Month	Station			
	1	2	3	Average ± SE
Nov., 93	7.90	8.10	8.40	8.13 ± 0.14
Dec.	8.00	8.00	8.50	8.17 ± 0.17
Jan., 94	8.60	8.50	8.30	8.47 ± 0.09
Feb.	8.20	8.40	8.70	8.43 ± 0.14
Mar.	8.80	8.70	8.60	8.70 ± 0.06
Apr.	8.20	8.50	8.30	8.33 ± 0.09
May	8.40	8.40	8.00	8.27 ± 0.13
Jun.	8.30	8.50	8.60	8.47 ± 0.09
Jul.	8.30	8.20	8.40	8.30 ± 0.06
Aug.	8.00	8.10	8.00	8.03 ± 0.03
Sept.	7.90	8.20	8.10	8.07 ± 0.09
Oct.	8.00	8.20	8.10	8.10 ± 0.06
Average ± SE	8.22 ± 0.08	8.32 ± 0.06	8.33 ± 0.07	8.29 ± 0.04

1- Station 1 comprised ponds 1, 2, and 3 , which received organic matter.
2- Station 2 comprised ponds 4, 5, and 6 .
3- Station 3 comprised ponds 7, 8, and 9 , which received dranage water and sewage .

Table (4):

Monthly variations of dissolved oxygen (mg/l)

recorded in Lake Mariut Fish Farm

Month	Station			Average ± SE
	1	2	3	
Nov., 93	7.33	7.83	6.42	7.19 ± 0.41
Dec.	8.63	8.12	7.18	7.98 ± 0.42
Jan., 94	8.15	8.31	7.93	8.13 ± 0.11
Feb.	8.86	7.70	6.08	7.55 ± 0.81
Mar.	7.67	7.26	5.82	6.92 ± 0.56
Apr.	5.27	6.74	5.10	5.70 ± 0.52
May	6.91	5.25	5.16	5.77 ± 0.57
Jun.	7.20	6.19	5.60	6.33 ± 0.47
Jul.	5.30	5.50	5.00	5.27 ± 0.14
Aug.	4.89	5.32	5.31	5.17 ± 0.14
Sept.	5.93	6.06	6.15	6.05 ± 0.06
Oct.	6.16	6.13	5.95	6.08 ± 0.06
Average ± SE	**6.84 ± 0.38**	**6.70 ± 0.32**	**5.97 ± 0.25**	**6.51 ± 0.19**

1- Station 1 comprised ponds 1, 2, and 3 , which received organic matter .
2- Station 2 comprised ponds 4, 5, and 6 .
3- Station 3 comprised ponds 7, 8, and 9 , which received drainage water.

Table (5):

Monthly variations of the total alkalinity (mg/l as $Ca\ CO_3$) recorded in Lake Mariut Fish Farm.

Month	Stations			Average ± SE
	1	2	3	
Nov., 93	101.03	123.48	280.64	168.38 ± 56.50
Dec.	103.08	127.33	113.28	114.56 ± 7.03
Jan., 94	172.90	265.45	303.22	247.19 ± 38.71
Feb.	195.87	212.80	272.65	227.11 ± 23.29
Mar.	209.70	305.90	270.11	261.90 ± 28.07
Apr.	189.50	159.60	174.00	174.37 ± 8.63
May	208.15	155.20	216.30	193.22 ± 19.15
Jun.	119.70	132.80	138.00	130.17 ± 5.44
Jul.	162.90	172.90	159.60	165.13 ± 4.00
Aug.	201.70	221.83	206.65	210.06 ± 6.05
Sept.	172.90	332.50	199.50	234.97 ± 49.37
Oct.	166.30	217.30	301.30	228.30 ± 39.36
Average ± SE	166.98±11.29	202.26 ± 20.22	219.60±18.87	196.28 ±10.35

1- Station 1 comprised ponds 1, 2, and 3 , which received organic matter.
2-Station 2 comprised ponds 4, 5, and 6 .
3-Station 3 comprised ponds 7, 8, and 9 , which received drainage water.

Table (6):

Monthly average variations of the nitrite, nitrate, total nitrogen and phosphorus concentrations (mg/l) in Lake Mariut Fish Farm.

Month	NO_2-N	NO_3-N	Total nitrogen	PO_3-P
Nov., 93	0.035 ± 0.017	0.411 ± 0.168	3.197 ± 1.93	0.149 ± 0.187
Dec.	0.032 ± 0.022	0.284 ± 0.174	4.577 ± 2.196	0.103 ± 0.076
Jan., 94	0.014 ± 0.012	0.349 ± 0.203	3.730 ± 3.253	0.462 ± 0.425
Feb.	0.017 ± 0.009	0.344 ± 0.262	2.648 ± 1.296	0.418 ± 0.305
Mar.	0.016 ± 0.008	0.360 ± 0.298	2.663 ± 1.408	0.427 ± 0.204
Apr.	0.013 ± 0.008	0.288 ± 0.204	2.808 ± 2.310	1.409 ± 0.710
May	0.014± 0.007	0.390 ± 0.239	4.120 ± 2.597	1.165 ± 0.668
Jun.	0.013 ± 0.009	0.417 ± 0.193	3.805 ± 2.320	1.113 ± 0.839
Jul.	0.011 ± 0.006	0.378 ± 0.272	4.227 ± 2.900	1.217 ± 0.562
Aug.	0.008 ± 0.003	0.402 ± 0.240	4.153 ± 1.970	1.322 ± 0.608
Sept.	0.013 ± 0.007	0.483 ± 0.221	5.025 ± 1.457	1.72 ± 0.382
Oct.	0.016 ± 0.009	0.380 ± 0.197	4.683 ± 3.117	0.633 ± 0.299

Table (7):

Monthly variations of heavy metals (mg/l) recorded in Lake Fish Farm.

Month	Zinc	Copper	Iron	Lead	Cadmium
Nov, 93	0.018	0.025	0.240	0.332	0.017
Dec.	0.010	0.025	0.207	0.152	0.015
Jan., 94	0.020	0.041	0.263	1.042	0.018
Feb.	0.020	0.037	0.368	0.907	0.018
Mar.	0.027	0.052	0.445	0.877	0.017
Apr.	0.013	0.03	0.123	0.205	0.017
May	0.013	0.045	0.147	0.280	0.013
Jun.	0.013	0.037	0.100	0.232	0.015
Jul.	0.010	0.035	0.210	0.282	0.013
Aug.	0.010	0.027	0.152	0.277	0.023
Sept.	0.018	0.031	0.173	0.157	0.024
Oct.	0.018	0.023	0.162	0.180	0.034

القلوية الكلية:-
أوضحت النتائج ارتفاع القلوية الكلية فى الاحواض التى استقبلت مياه الصرف حيث بلغت قميتها ٢١٩ مليجرام كربونات كالسيوم /لتر بينما كانت ٣٨و١٦٦ مليجرام كربونات كالسيوم فى التر فى الاحواض التى لم تستقبل مياه الصرف

النتريت NO N
أوضحت النتائج اختلاف تركيز النتريت على مدار العام وبلغ أقل تركيز (٠٨٠و.مليجرام /لتر فى شهر أغسطس بينما زاد التركيز (٣٥٠و. مليجرام /لتر)فى شهر نوفمبر وبصفة عامة زاد تركيز النتريت فى الاحواض التى استقبلت مياه الصرف الصحى .

النترات : NO N :-
تراوح تركيز النترات مابين ٢٨٤و. مليجرام/لتر فى شهر ديسمبر الى ٤٨٣و. مليجرام/لتر فى شهر ستمبر .كما زادت كميته النترات فى الاحواض التى استقبلت مياه الصرف عن الاحواض الاخرى.

النيتروجين الكلى :-
زادت كمية النيتروجين الكلى فى الاحواض المغذاه الصرف وكان اعلى تركيز له فى فصل الصيف بينما أقل تركيز كان فى فصل الشتاء وتراوح تركيز النيتروجين الكلى بين ٦٤٨و٢ الى ١٢٥و٥ مليجرام/لتر .

الفسفور po-p :-
أوضحت النتائج أن ارتفاع تركيز الفسفور كان أعلى مايمكن فى فصل الربيع والصيف بينما انخفض فى فصل الشتاء وتراوح التركيز مابين ١,٣و. الى٤,٩و١ مليجرام/لتر

المعادن الثقيلة :-
تراوح تركيز الزنك بين ١٠و. - ٢٧٠و. مليجرام /لتر ، النحاس بين ٠٢٣و٠- ٠٥٢و٠ مليجرام/لتر ، الحديد بين ١٠و٠ - ٤٤٥و٠ مليجرام /لتر ، الرصاص بين ١٥٢و٠ - ٠٤٢و١ مليجرام/لتر ، الكاديموم ٠١٣و٠-٠٣٤و٠ مليجرام/لتر فى الاحواض السمكية تحت الدراسة وواضحت النتائج أرتفاع تركيز هذه العناصر الثقيلة فى فصل الشتاء فيما عدا الكاديموم كان تركيزه مرتفعا فى الخريف. فى الخريف . أيضا اظهرت الدراسة ارتفاع تركيز العناصر الثقيلة فى الاحواض المغذاه بمياه الصرف عن الاحواض الاخرى.

من النتائج السابقة يوصى الباحث بالاتى :
١- ضرورة معالجة مياه الصرف الصناعى للتخلص من المعادن الثقيلة قبل صرفها فى البحيرة .
٢- يمكن أخذ تقدير الاكسجين الذائب فى الماء كمقياس يمكن الاعتماد عليه فى تحديد الكمية المناسبة من مياه الصرف التى لايخشى منها على النشاط الحيوى للكائنات الحية فى مياه البحيرة.

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تأثير مياة الصرف على خواص الجزء المنزرع من بحيرة مريوط

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تعتبر بحيرة مريوط بالاسكندرية من البحيرات الهامة وتبلغ مساحتها حاليا ١٧٤٦٨ فدان ،وحديثا أصبحت مياه هذه البحيرة ملوثة بسبب الصرف الصناعى والصرف الزراعى والصرفالصحى الامر الذى يمكن ان ينعكس تاثيره على الاراضى الزراعية والزراعية والمزارع السمكية المقامة بها.

ولذلك أجرى هذه البحث لدراسة الخواص الغير مائية والكيمائية لمياه المزارع السمكية المقامة فى هذه البحيرة للتعرف على مدى تاثرها بمياه الصرف ولقد أوضحت النتائج :-

الخواص الطبيعية :-

العكارة :

أدت مياة الصرف (الصحى-الزراعى-الصناعى) الى زيادة تركيز العكارة حيث بلغت قراءة Secchi Disc فى هذه الاحواض ٢١٧٥ سم فى حين كانت القراءة فى الاحواض التى لم يصب فيها مياة الصرف ٣٧٣٣ سم . ويرجع ذلك الى زيادة نمو الفيتوبلأكتون .

درجة الحرارة :

أظهرت النتائج مدى التاثير الموجب لمياة الصرف فى زيادة درجة حرارة مياة الاحواض السمكية المستقبلة لها بدرجة اكبر من نظيرهافى الاحواض الغير مستقبلة لمياة الصرف ،وعموما تراوحت درجات الحرارة مابين ١٢٧ - ٢٨٧م ، كما كان هناك تلازم موجب بين درجة حرارة كل من الماء والهواء.

الخواص الكيميائية :-

تركيز ايون الهيدروجين

تراوحت قيمة ال بين ٢٢و٨ ٣٣و٨ بمتوسط ٨و٢٩.

الاكسجين الذائب :-

أوضحت النتائج ارتباط عكس بين درجة حرارة الماء والاكسجين الذائب حيث كانت كمية الاكسجين الذائب منخفضة (٥١٧ومليجرام / لتر)عند درجات الحرارة المنخفضة (٧و١٢م)

أوضحت النتائج أيضا انخفاض معدل الاكسجين الذائب فى الاحواض التى استقبلت مياه الصرف الصحى .