

EFFECT OF CHEMICAL AND PHYSICAL PARAMETERS OF ALMASAB ALAAM DRAINAGE ON PROPERTIES OF MARSH WATER IN SOUTH OF IRAQ

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Abstract

This present study evaluated the restoration of marsh water which occurred by mixing Almasab Alaam Drainage with Euphrates river as resources for feeding water to marsh water in southern of Iraq. Four samples of restored southern marshes (S2: Kurmashia, S3: Sunaf Marsh, S4: Al- Hemidi region and S5: Hammar marsh) were selected during the period from November 2010 to July 2011. The physical properties (Electrical Conductivity (Ec), Total Dissolved Solids(TDS) and pH) were studied, it was found that all regions are polluted with high values of EC and TDS concentration affected by the mixing process and strongly deviated from Water Health Organisation (WHO) levels, while pH values indicated that marsh water with alkalinity range and within guide levels according to (WHO). Also chemical parameters (cationic and ionic) were investigated in this study. It was found that Almasab Alaam drainage quality affected these parameters (Calcium, Magnesium, Sulphate, chloride and Potassium) and appeared in high concentrations exceeded the permitted levels according to WHO for the same studied period. Trace elements were presented for Copper (Cu), Zinc (Zn), Manganese (Mn) and Chromium (Cr) and obtained a results with unpolluted area of these marshes water except for manganese and chromium during some months. Results showed that it is dangerous to continue with this mixing process and Al masab Alaam Drainage should be stop to use as resource for restoration of marsh water in southern of Iraq.

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تأثير الخصائص الفيزيائية والكيميائية لمياه مزل المصب العام على خصائص مياه

الأهوار في جنوب العراق

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الخلاصة

تمثل هذه الدراسة تقييم عملية غمر مياه الاهوار التي حصلت من خلال عملية الخلط لمياه مزل المصب العام مع مياه الفرات كمغذي مياه لمناطق الاهوار في جنوب العراق. اربعة مواقع لمياه الاهوار المغمورة (S2 :منطقة الكرماشية، S3 :هور السناف، S4 : منطقة الحميدي، S5 :هور الحمار) اختيرت للدراسة خلال الفترة من تشرين الثاني 2010 – شهر تموز 2011 . درست الخصائص الفيزيائية (التوصيلية الكهربائية، الاملاح الكلية الذائبة و الدالة الحامضية) والتي وجدت بان مناطق الدراسة قد احتوت على تراكيز عالية من التوصيلية الكهربائية و الاملاح الكلية الذائبة و الدالة الحامضية. وجد ان المناطق المدروسة ملوثة بتراكيز عالية من التوصيلية الكهربائية و الاملاح الكلية الذائبة متأثرة بعملية الخلط و متباعدة بانحراف قوي عن القيم المسموحة بها حسب دليل منظمة الصحة العالمية. بينما قيم الدالة الحامضية اوضحت بان مياه المناطق المدروسة اتخذت صفة القاعدية و ضمن الحدود المسموح بها. كذلك درست تاثير الصفات الكيميائية (الايونات الموجبة و السالبة) و اوضحت النتائج ان نوعية مياه المصب العام قد اثرت على تراكيز الايونات (الكالسيوم ، المغنيسيوم ، الكبريتات ، الكلوريدات و البوتاسيوم) والتي ظهرت بتراكيز عالية تجاوزت الحدود المسموحة بها لنفس فترة الدراسة. درست العناصر النزرة متمثلة بـ (النحاس ، الخارصين ، المنغنيز و الكروم) لمناطق الدراسة و وجد ان تلك المناطق لم تتاثر بعملية الخلط و غير ملوثة بتلك العناصر النزرة ماعدا بعض الاشهر لعناصر المنغنيز و الكروم. بينت النتائج انه من الخطر الاستمرار بعملية الخلط و اتخاذ نهر المصب العام كمصدر تغذية لمياه مناطق الاهوار في جنوب العراق وكذا يجب التوقف من تلك العملية .

1. Introduction:

The southern marshes of Iraq known by their high biological productivity caused by the thick aquatic plants growth. The Iraqi waters were known by their alkalinity and hardness (Bedair 2006). The water of the marshes is resultant of the mixing of Tigres and Euphrates especially in the middle marshes while the western marshes derived its waters from Euphrates (Al-Hilli, 1977).

The quality of water at the present time is important and fundamental that must be taken care of because of their close relationship in various uses, including agricultural,

drinking, industrial and animal uses, as well as for use in nutrition and rehabilitation of the marshes(Mauloodet.al1979).

These imperatives take its importance at the present time in Iraq, especially so because of the scarcity of current revenue water, poor quality, resulting from the control of the upper basin water resources and not to give Iraq its share of assessments of the water and the problems of drought and global warming, and corresponds to the scarcity of water the growing demand for water as a result to increase the rates of population growth and development of agricultural activities and economic and social development (Abbas J. 2005), (Hussien1994).

That the phenomenon of deterioration of water quality appeared more pronounced and urgent in the areas of central and southern Iraq, which has affected all aspects mentioned was shown clearly in the marshes, where the amount reaching the marshes declined significantly and this adversely affecting the rehabilitation of the marshlands and environmental changes, agriculturalandsocial(SaifandF.Abbas2005).

The scarcity of water Thi Qar city plays a negative role on re-flooding the marshes water. The presence of an aqueous stock represented by Al-Masab Alaam river(drainage river) present an alternative source for feeding water to the marsh in south of Iraq.

This research aims to evaluate the process of mixing the drainage river water with water marshes to determine the impact of the physical , chemical properties resulting from the mixing process on marsh water quality.

2. Experimental Procedure:

Sampling was done (at open water and near the vegetations) of the water bodies to assess their physical and chemical qualities at monthly intervals, with five replicates. Sample sites were represented by S1 (Al Masab Alaam river) ,

The other sites were distributed and representative of S2 (Alsunaf marsh), S3 & S4 (Central marshes) and S5 (Hammar marsh) , which is expected to reach the effects of the process of mixing the water to it. These samples were shown by figure (1). Table (1) represents the keys to symbols and the coordinates of water sites

Water conductivity, Total Dissolved Solids(TDS) and pH were measured using multi parameter water quality sonde model (6820-25 M-O U.S.A). cationic , an ionic content and trace elements(Cu, Zn, Cr, Mn, Ni) were measured using multi parameter model HI83200.

Table (1) Symbols and coordinates of studied samples.

Coordinates	Sample Name	Symbol	
38R0637237 Utm3412005	Al Masab Alaam(Drainage river)	S1	1
38R0652260 Utm3409794	Sunaf marsh (Kurmashia site)	S2	2
38R0659559 Utm3412817	Right Security barrier (Al Hemidi)	S3	3
38R0652260 Utm340979	Left Security barrier	S ₄	4
38r0677360 Utm3424551	Hamar Marsh	S5	5

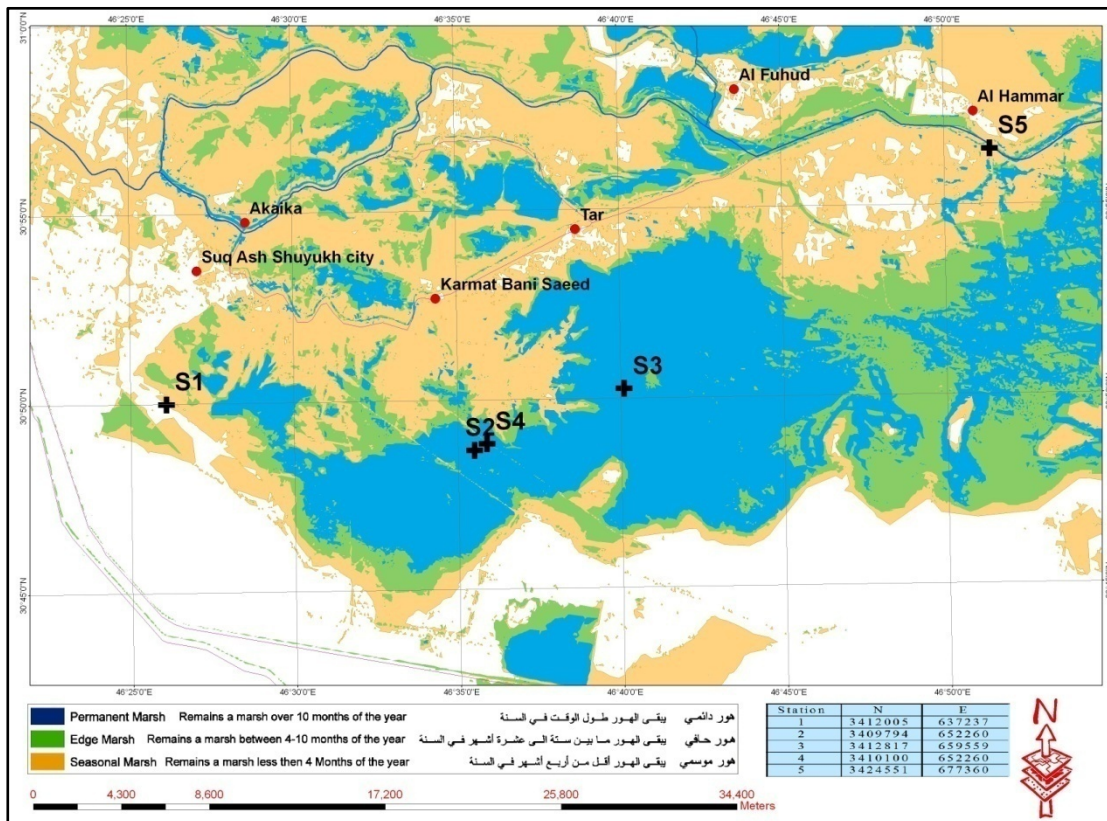


Figure (1) Thi Qar Map represents Sample Sites in Marshes Region .

3- Results and Discussions:

Figure (2) shows monthly variation of Electrical Conductivity (EC) values for the collected samples. EC values of these studied samples are very high in every month of studied period. It is clear from the figure in general that the values of EC of S3, S4, S5 are high value than the EC values of feeder region S1 (Al Masab Alaam river) for above regions, while the EC values of S2 which take Euphrate river as a source for water feeding are in range between them. All these values are decreasing with months, these was due to an increase in the flow of water and quantity of this month at these stations which has served to reduce electrical conductivity compared to the quantities in other months.

In general, the increase in pumping the water of the Euphrate river for S2 sample and S1 with rains tended to reduce the EC values of other samples.

Figure (3) proposed the values of TDS for the same variation of EC with months. It has been seen that TDS values were affected in the values of EC. In general these values in higher range which exceed the guide level. These high concentration of TDS were due to stop feeding of the water to the stations, increasing the temperature values, the speed of evaporation and breadth of surfaces exposed of the sun.

The study of the values of the PH of the water were done in figure (4), the pH values ranged between (7.90 -6.96), where was the least which tend to be neutral low-alkaline. Water in stations is contained of calcium carbonate, which works as an organizer direction baseband and this is reflected on the status of the water. It is worth mentioning that the PH values fall within the international standards and that most changes between months are minor changes that have no little importance in their effects on water quality and characteristics.

It is clear from Figures (5) & (6), the concentration of cations (Ca & Mg) are in high values within the first months (April to July 2011) than the other months. These high concentrations due to the mixing of east Euphrates Drainage water which contain high pollutant concentrations in high quantities with the source water (Almasab Alaam Drainage) during these months. It has been seen that Ca & Mg concentrations in marsh water station are higher than the source of feeding the water to them. This means, the drainage river is not environmental suitable for restoration of marsh area in the collected samples. Another reasons for this polluted cations like increased temperature then evaporated the water.

The variation of anionic (Sulphate and chloride) concentrations with months are shown in figures (7) & (8). The low values occurred during the first variation in months

(Nov. 2010 to March 2011) while the high values within the rest months of this study. These changes in behavior tended to the same reasons which remember above and the soil of these stations are contained on these anions which dissolved in the water and increased these values.

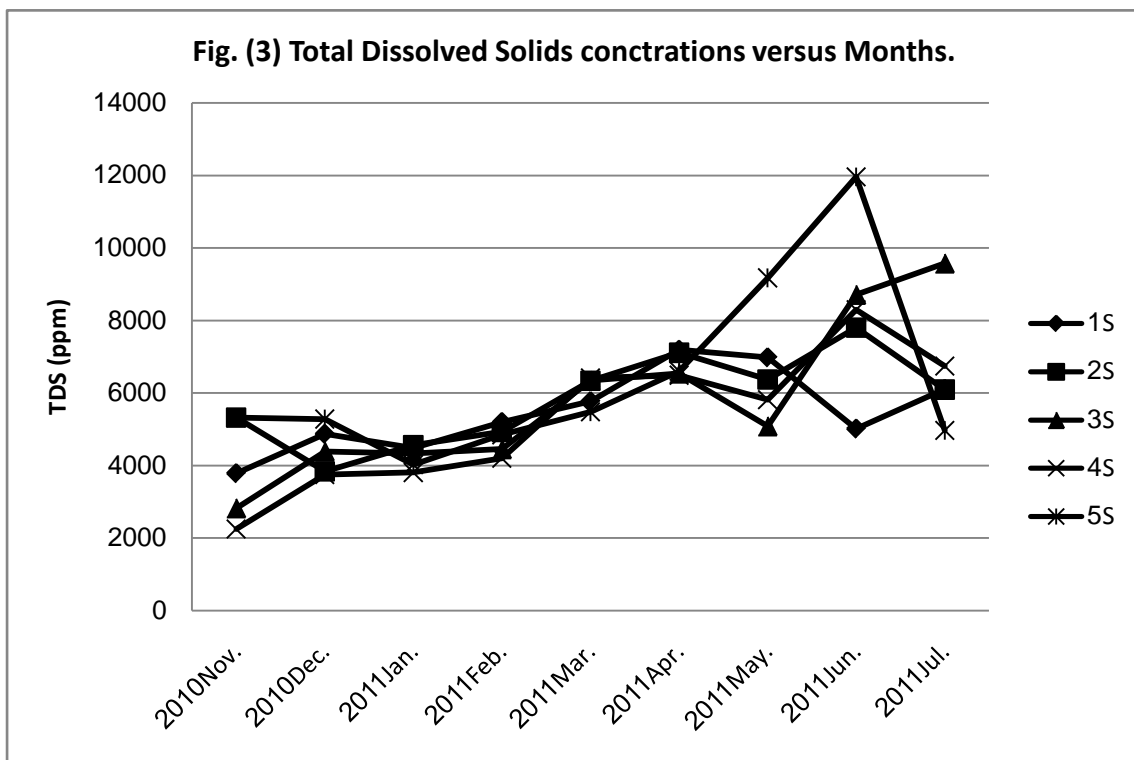
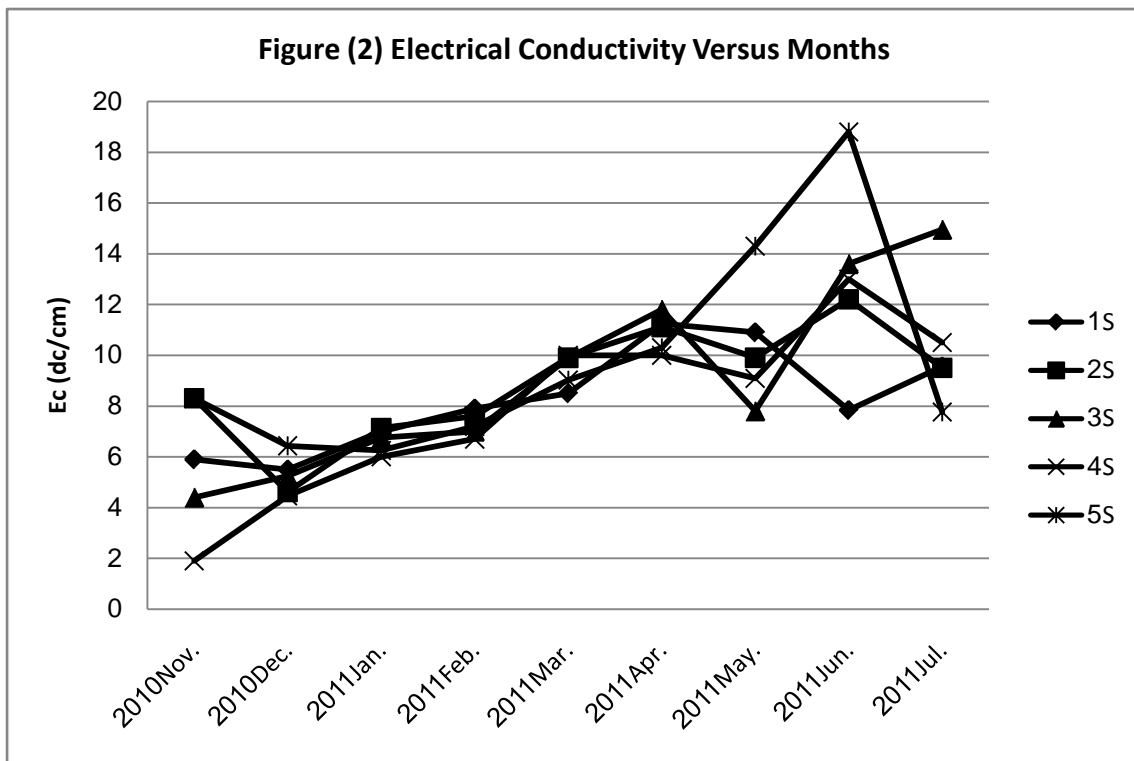
Potassium concentrations are shown with different behavior in figure (9) during months (Nov. & Dec. 2010) which indicated a high values, this tend to feeding a high salinity water by East Euphrate drainage with Al masab Alaam drainage as a source to restoration the selected samples in south Iraqi marshes.

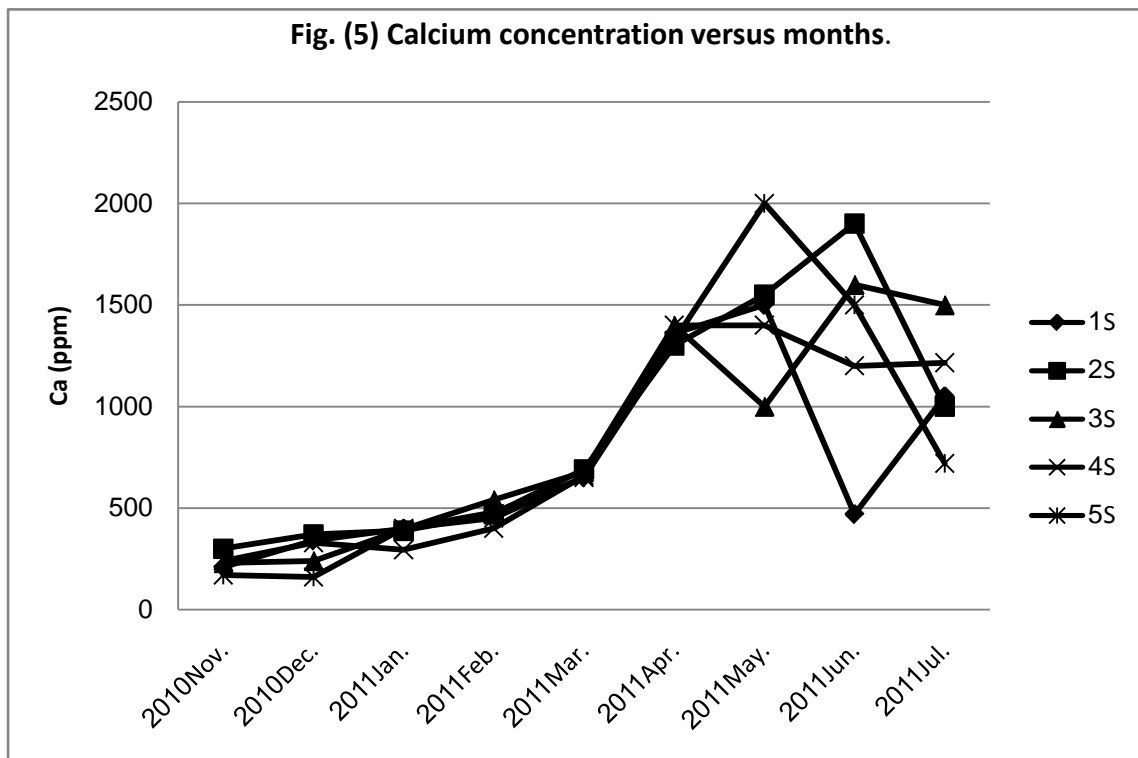
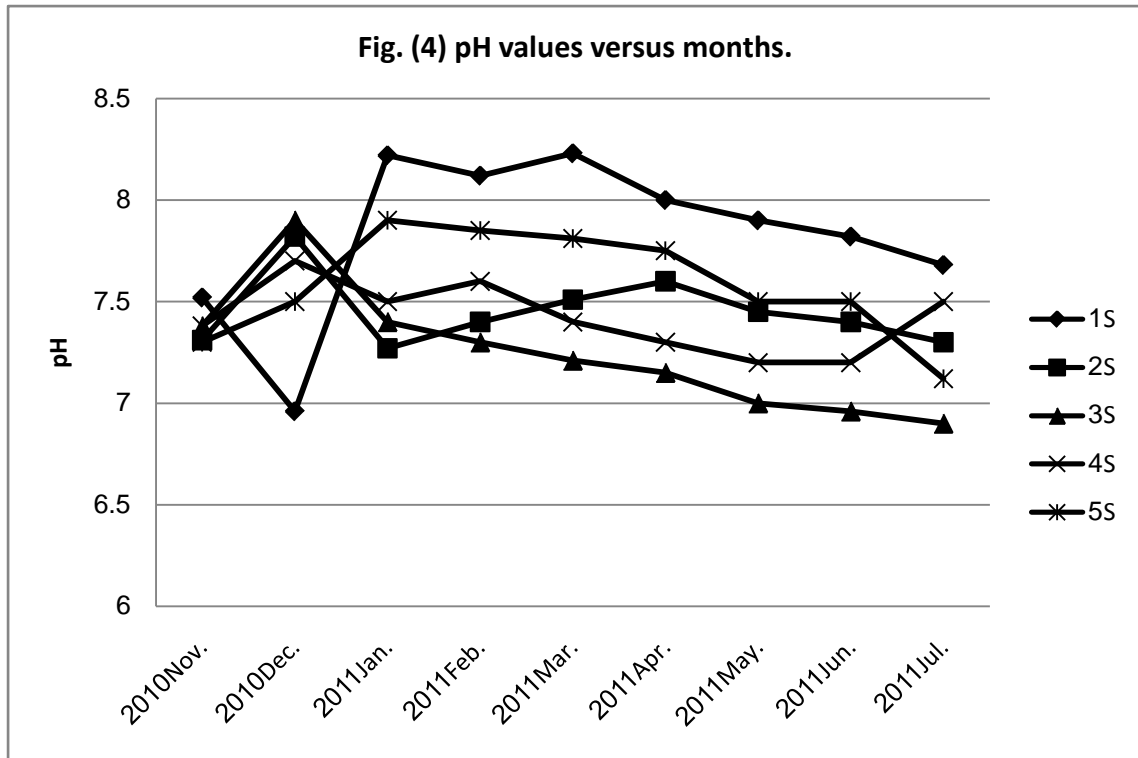
From the results above, we approached to the fact that all physical and chemical properties with cationic and anionic with concentrations deviated from levels according to Water Health Organization (WHO) which affected with Al masab Alaam drainage properties.

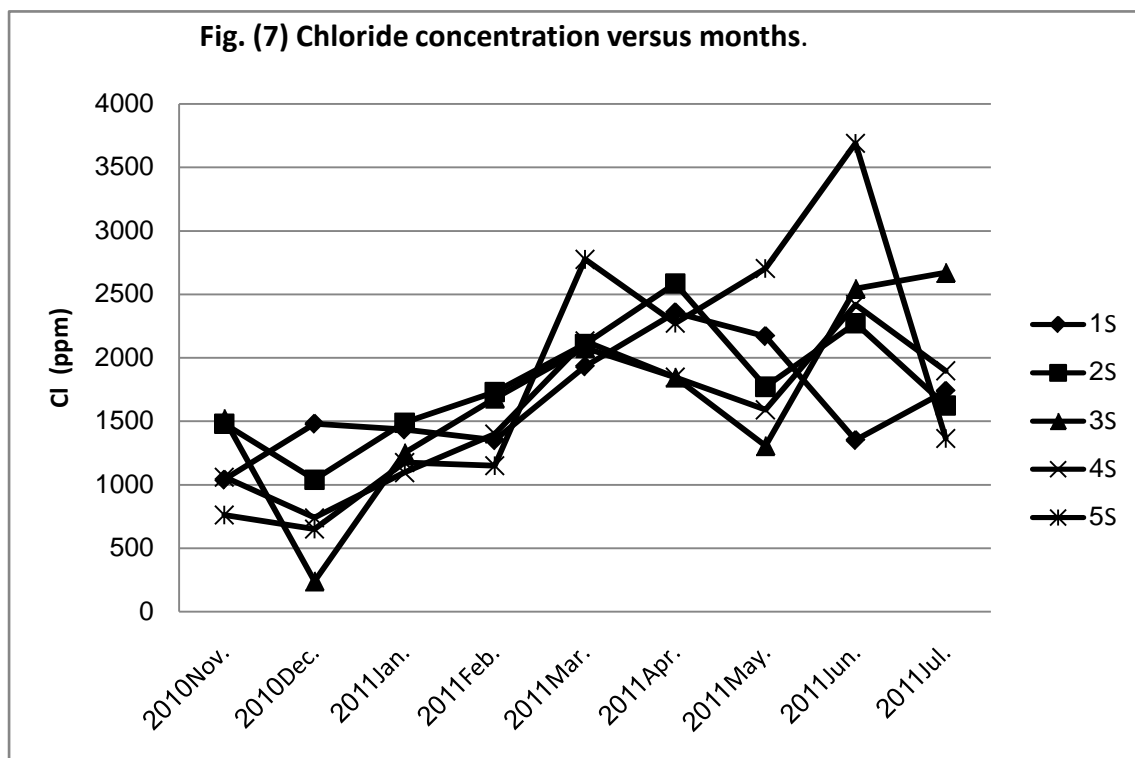
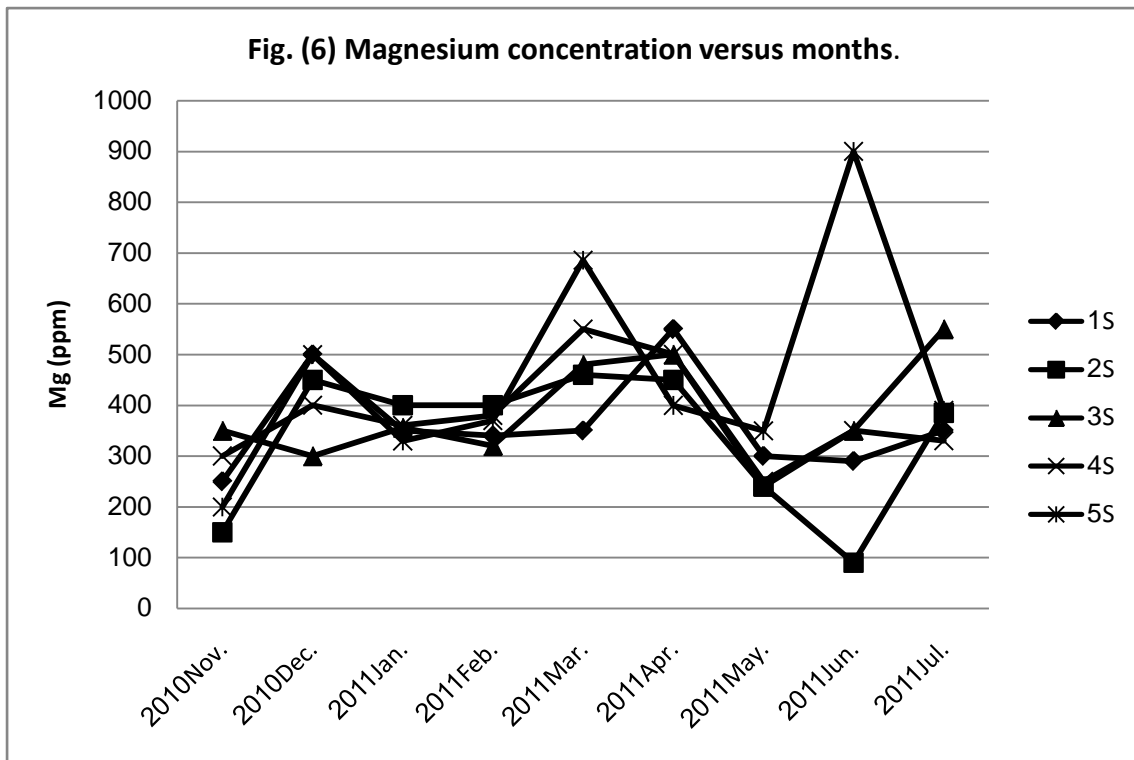
Figures (10) & (11) described the monthly changes of Trace elements of copper and zinc concentrations of water samples for Al Masab Alaam drainage and other stations after mixing process. As can be seen that, these concentrations are increased with months and within the guide levels according to Water Health Organization (WHO). It is shown that copper concentrations are in high range than the zinc concentrations. This is due to the fact, that the soils of these marsh stations are worked as adsorpted medium to these metals (Al-saad, H.T. and Mustafa , Y.Z., 1994) , also the plants existed in high amounts in these stations, acted as filtering bed for these trace metals.

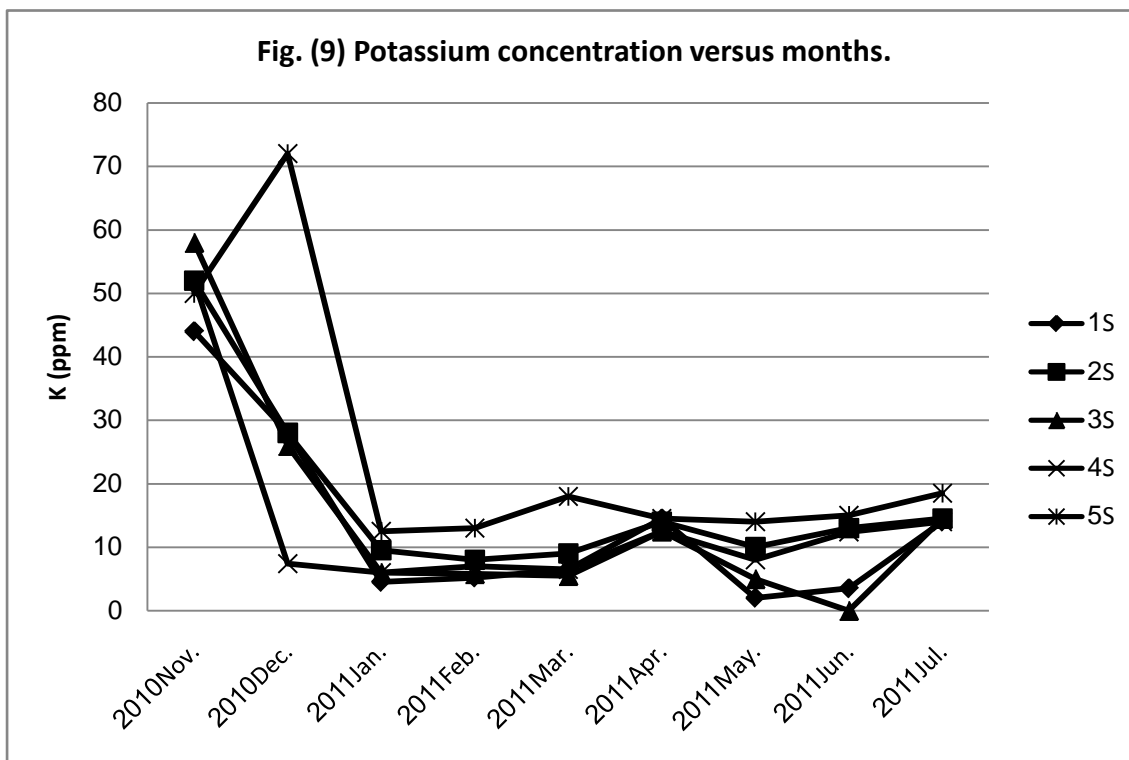
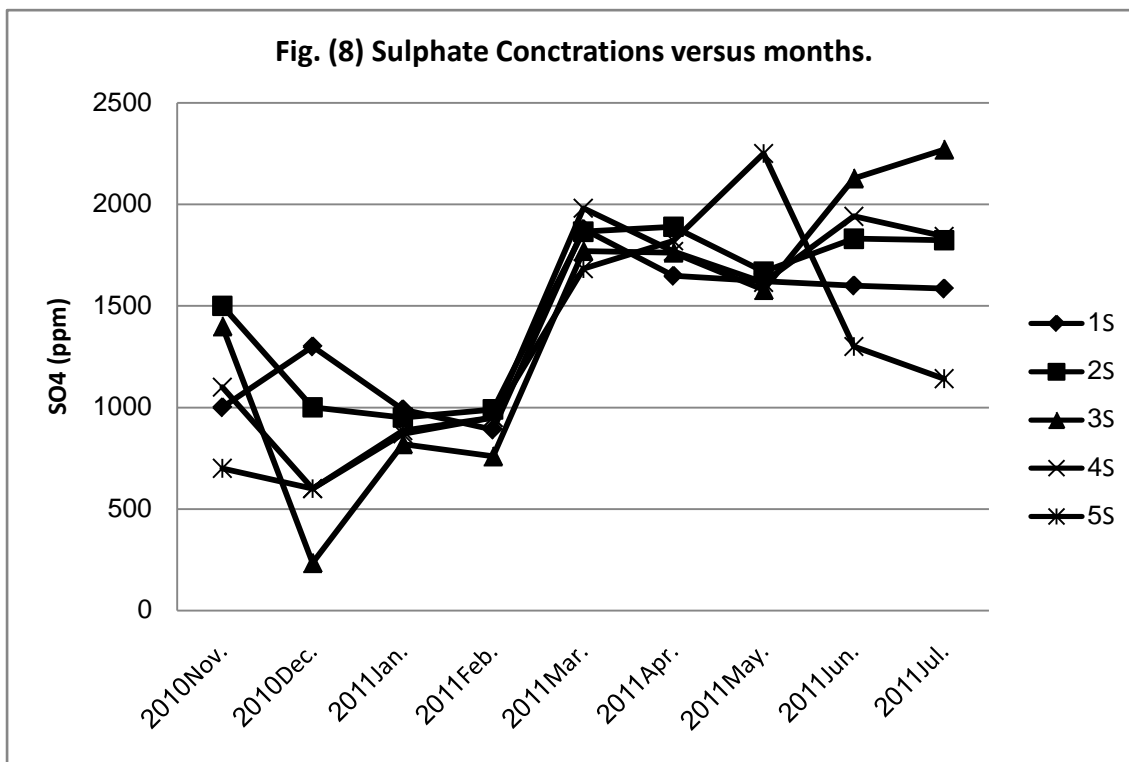
The concentrations variation of trace elements of chromium and manganese are characterized by figures (12) & (13) respectively. In general, it can be seen that chromium concentrations are increased with months especially for S2and S5 for some months which exceeded the permitted levels according to WHO. These high values as shown in figure (12) are due to the high concentrations of this metal in Euphrates river which the wastewater played a major role for this effect.

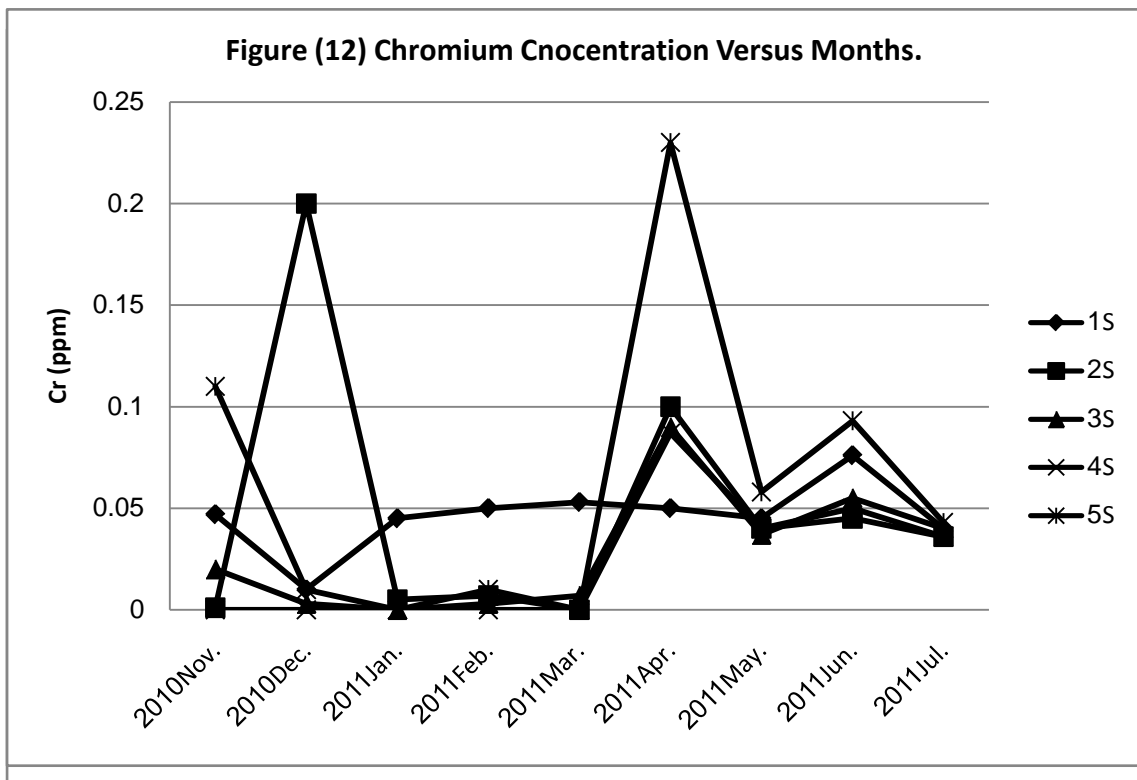
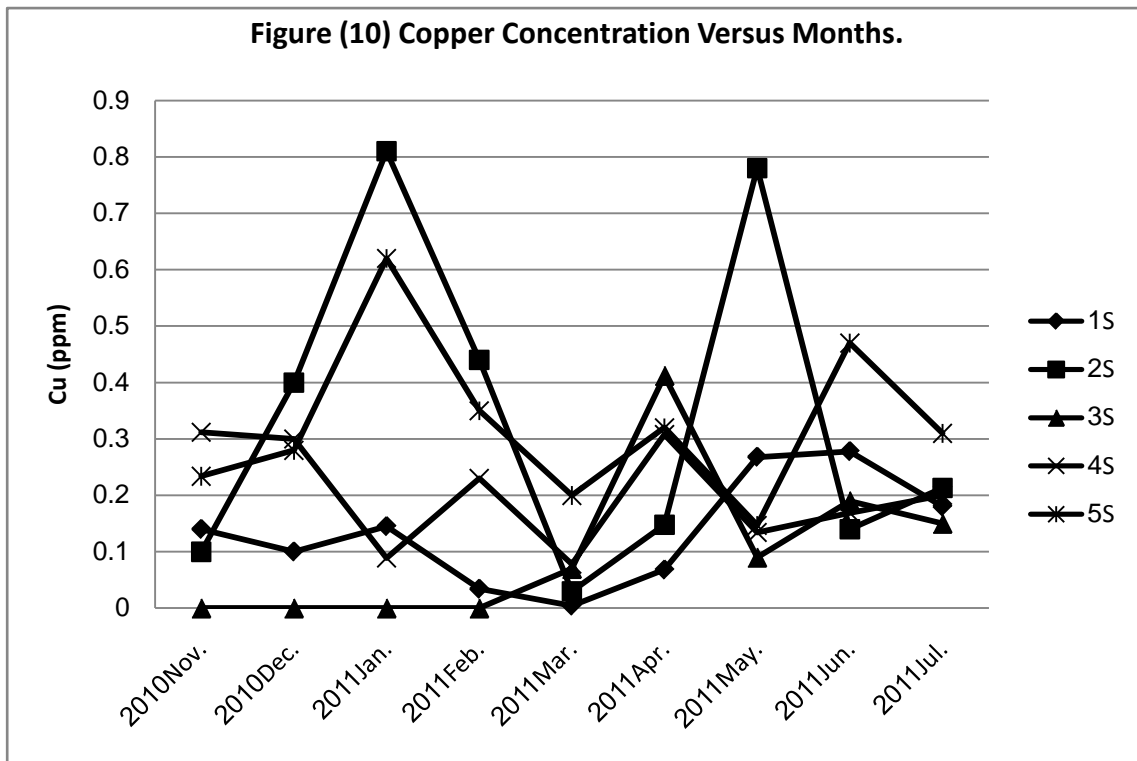
As can be seen from the results in figure (13), the concentration of Manganese are increased after March 2011. These increased concentrations exceeded the guide level because of discharging of concentrate wastewater with manganese metal into the feeding water (Euphrates river and Almasab Alaam drainage). also the S5 station is far away from mixing point of water (Al Masab Alaam drainage & Euphrates river) , while the first months of this study represented a lower range than the WHO level for manganese.











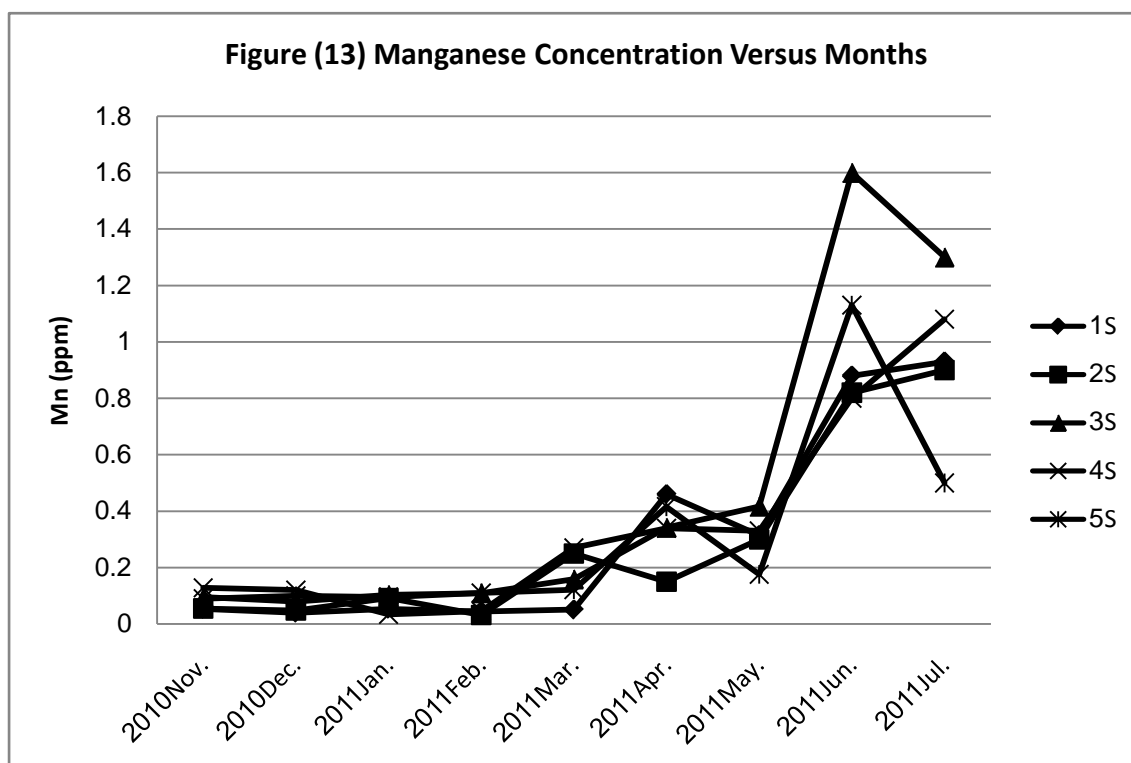


Table (2) WHO Guide Levels (1993).

<i>parameters</i>	<i>Guide Level</i>	<i>parameters</i>	<i>Guide Level (ppm)</i>	<i>parameters</i>	<i>Guide Level (ppm)</i>
<i>EC(mhoms/cm)</i>	-----	<i>Mg</i>	50	<i>Cu</i>	2
<i>TDS(ppm)</i>	1000	<i>SO4</i>	250	<i>Zn</i>	2
<i>pH</i>	7.5-8.5	<i>Cl</i>	250	<i>Mn</i>	0.4
<i>Ca(ppm)</i>	50	<i>K</i>	12	<i>Cr</i>	0.05

4- Conclusions:

It was concluded that:

- 1-The water bodies recognized in the monitored marshes different in their water quality parameters, depending on the major resources and the months.
- 2- Physical parameters (EC and TDS) are deviated from WHO levels with high ranges. Cationic and ionic concentration for the selected samples were in higher values than WHO values which indicated a great pollution index.

3- The study regions were unpolluted with heavy metals for studied samples except for Mn at Apri 2011 for S1, June 2011 for all sites and July 2011 for (S1, S2, S3 and S4) & Cr for S5 and S2 at NOV.2010 and Dec. 2010 respectively, at April 2011 for (S2, S3, S4 and S5) and (S1 & S5) at Jun. 2011 which exceeded the permit values according to WHO.

4- Mixing process between Almasab Alaam drainage and Euphrates river that took place as resources for restoration of the study regions was not good step for improving the water quality of marsh area.

5- References:

- 1- Abbas Jawad Kadhim (2005) "**Water quality monitoring of Abu Zirig marsh in southern in Iraq (after drying)**" M.Sc. thesis Environmental Dept. College of Engineering .Al-Mustansiriya Un.
- 2- Al-Hilli,M.R. 1977, "**Studies on the plantecology of the Ahwar region in Southern Iraq**" Ph.D. Thesis , Cairo University,Egypt.
- 3- Al-saad, H.T. and Mustafa , Y.Z., 1994, "**Pollutants in the sediment of Iraqi marshes : A review in Ahwar of Iraq Environmental Approach**" , Hussain, N.A., (ed). Marina Science Centre Puplication, No.18.
- 4- Hussien N. A. (1994),"**Ahwar of Iraq Environmental approach**" Seas Researches Center: Number 18, 149p.central of scientific seas.
- 5- **et.al**: A case study. Marsh Bulletin, 2(1): 99-126.
- 6- Maulood, B.K., Hinton, G.C.F., Kamees, H.S., Saleh, F. A. K., Shaban, A. A., and Al-Shahwani, S.M.H. (1979)" **An ecological survey of some aquatic ecosystems in southern Iraq**". Tropical Ecology 20 (1): 27-40.
- 7- Saif ,Fr.Abbas (2005) "**Application of hydrodynamic model in Abu Zirig marshland**" M.Sc .thesis Environmental Dept. College of Engineering .Al-Mustansiriya Un.