



Comparative study of some physico-chemical characteristics for Northern Al-Hammar marsh waters before destroyed and after Rehabilitation 2004

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Abstract

Physico-chemical characteristics of water from three stations (1- Garmat bani saed , 2-Al-Hammar , 3- Al-Chebyesh northern Al-Hammar marsh were determined during the period (Jan. 2004), (April. 2004) and (Jul. 2004) and compared with studies before destroyed. Electrical conductivity (E.C)of water was increasing in station (1) ranging between (3.7-3.9) mS/cm² while in other station (2 , 3) were ranging(1.6-2.2) mm/cm², also salinity were increasing ranging between (2.36- 3.49), (1.28-1.40) and (1.02-1.28)%₀ for station (1- 3) and respectively. Highest total dissolved solids (TDS) were recorded in station(1) ranging between (2368-2400)mg/l. Sulphate (So₄)were distinctly higher in station (1) ranging between (1040-1250)mg/l compared with stations 2 and 3 that achieving (602-700), (361-400)mg/l respectively, Carbonate (Hco₃) were (220-313), (200-240) and (200-220)mg/l for station above. Chloride and calcium ions concentration were increasing in station 1 (1313-1350) mg/l and (144-133)mg/l for Cl and Ca⁺² respectively. Total hardness (T.H) and magnesium ions concentration were highest in station (3) ranging between (600-650) mg/l, (133-141)mg/l for (T.H) and Mg⁺². Nitrite levels ranging between (0.28-0.33), (0.27-0.36) and (0.31-0.41) µg-at N/l for station (1-3) respectively while Nitrate levels ranging between (27.6-35.5), (22.4-30.7)µg-at N/l for station 2 and 3 and lowest in station 1 ranging between (9.2-15.8) µg/l. phosphate (Po₄) values were highest in station 3 (13.11-15.87) µg-at P/l compared with station 1 and 2 ranging between (0.161-0.813) and (2.232-2.811) µg-at P /l for station 1 and 2 respectively . Dissolved oxygen (D.O) levels for water were ranging between (7-8.6) mg/l for all station during study. Biological Oxygen Demand (BOD)were very high achieving (3.9-4.8), (3.9-3.6) and (6.1-6.8)mg/l for stations 1-3 respectively. The increasing of nutrients levels (No₂, No₃, Po₄)and Biological Oxygen demand (BOD) refer to increasing of microorganisms activities after return of water to Al-Ham mar marsh and decomposition of dead bodies left due to desiccation.

1- Introduction

Iraqi marshland situated in south-east of Iraq, it is a shallow aquatic ponds, its depth unlimited between (2-7)m with unlimited area 8000-30000 Km² due to discharge level of Tigris and Euphrates rivers (Al-Kayat, 1975). Al-Hammar marsh, locally called Hor Al-Hammar is situated north-west Basrah city. It mainly receives its water from Euphrates river. Al-Hammar marsh has a large catchments area of 2000 Km² at normal conditions, which may increase to 3000Km² during the flooding season in spring (Al-Kayat, 1975). It extends for a distance of about 100Km from Suq-Al-Sheuok at west and Garmat Ali easterly in its southern part (Hussein et al., 1992). The marsh is greatly influenced by the rivers of Tigris and Euphrates (Al-Saadi et al., 1981). After 1991 about (90%)of Al-Hammar marsh were desiccated. In 2003 some part of Al-Hammar marsh was rehabilitated by water in north and south part. There are several ecological studies made to Al-Hammar marsh before desiccated including biotic and abiotic factors (Al-Saadi et al, 1981; Al-saadi and Al-Mousawi, 1988; Al-Aarajy, 1988; Hassan, 1988; Al-Zubidy, 1985; Al-Laami, 1986; Qaseem, 1986; and Al-Mousawi and Hussein, 1992). The present study is to compare Physico-Chemical characteristics for water northern of Al-Hammar marsh in (1-

Garmat bani Saed, 2-Al-Hammar, 3-Al-Cheibyesh) before and after Rehabilitation 2004.

2-Experimental and Methods

During 2004 waters return to some parts of Iraqi marshland the study area in this paper covered three stations northern Al-Hammar marsh.

- 1- Garmat Bani Saaed
- 2- Al-Hamma town
- 3- Al-chebayesh town. Fig (1) Depth of water in these station from (1-1.5)m.

Sub-Surface water samples were collected for different period during 2004 from selected stations by (2) liters polyethylene container and transfer to Lab for analysis. Electrical conductivity (E.C) and Total Dissolved solids (TDS) determined by conductivity meter model (CC-41/ELMETRON) while salinity calculated by Multiply ECx0.64 Sulfate (SO₄), Chloride (Cl), Sodium (Na⁺), Potassium (K⁺) and Biological oxygen demand(BOD) determined According to (APHA, 1979). Carbonate (HCO₃), Calcium (Ca⁺), Magnesium (Mg⁺²), total hardness (T.H) and dissolved oxygen were measured according to (Lind, 1979). While nutrients measured according to (parson *et al*, 1984).

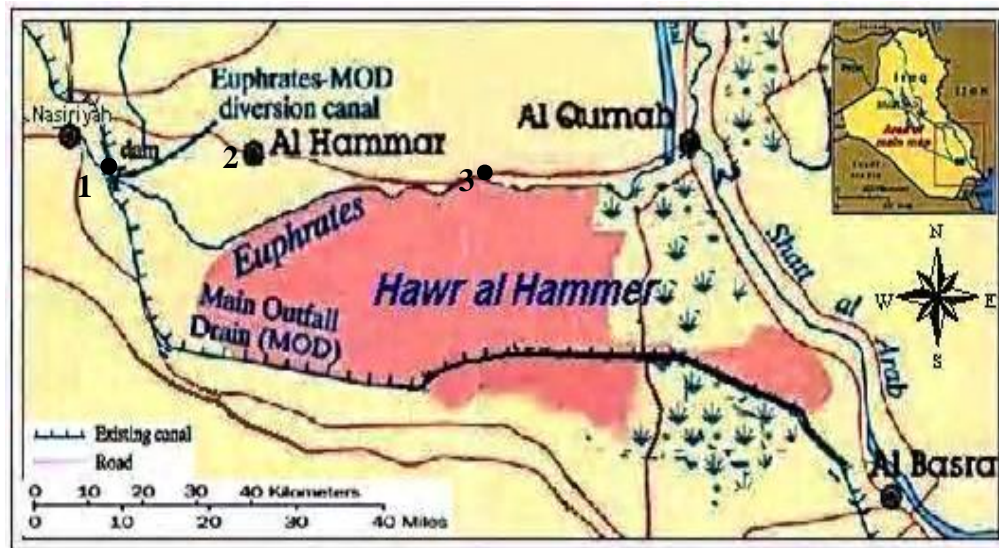


Fig. (1) Map of Al Hammar Marsh showing sampling stations.

3-Results and Discussion

All results in present study are shown in table (1).

Recorded (E. C) and salinity Range (1.6-3.9)mS/cm², (1.02-2.49‰) For (E.C) and salinity respectively, this results are not different from study before destroyed that achieving (3.09)mS/cm², (1.98‰) for (E.C) and salinity receptivity (Al-Aarajy, 1988) But the highest Values recorded in station (1) about (3.7-3.9), (2.36-2.49%) for E.C and salinity respectively, thus they may considered Al-Hammar marsh waters as oligohaline habitats according to (Reid,1961)that classified waters with salinity ranges from (0.2-5)‰ as oligohaline. Total Dissolved solids (TDS) were very high (2368-2400)mg/l in station 1, this results due to high current in this station led to release of chemical elements and clay particulate to the water, other values were less than station (1) Rang from (1280-1300), (1024-1200)mg/l for station 2, 3 respectively. Sulphate

determination in present study is the first measurement in Iraqi marshland because there is no study about sulphate in marshland environment, the Sulphate values (1040-1250), (604-700) and (361-421)mg/l for stations (1-3) respectively. Carbonate in water refer to alkalinity, in this study the values were high in the range (200-312), (200-240) and (200-220) mg/l for stations (1, 2 and 3) respectively, this results similar to other study of Iraqi internal waters. Total hardness in Iraqi water consist of mainly CaCO₃ and Mg(OH)₂ (Al-Issa, 1981). In present study total hardness were (500-600), (400-480) and (600-660)mg/l for station, (1, 2 and 3) respectively, these values are not different from data encountered in same station before desiccation by. (Al-Aarajy, 1988). When compared the total hardness values in present station north Al-Hammar marsh were very lowest than stations in middle Al-Hammar marsh (13765) mg/l in (Al-Zubiady, 1985), Wherever was (1808) mg/l in (Qassim,

1986;Al-Lammi,1986) these differences of total hardness between northern and southern Al-Hammar marsh according to nature of Soil. Thus all station of Al-Hammar marsh with very hard water according to (Lind, 1979). Calcium (Ca⁺²) and Magnesium (Mg⁺²) ions concentration were not different from studies before destroyed were to Calcium (144-165) (72-94) and (48-75) mg/l for station (1- 3) respectively while Magnesium were (86-105), (79-93) and (133-141) mg/l for station (1, 2 and 3) respectively, except in (Al-Zubaidy, 1985) calcium achieving (3264) mg/l in Al-Deer station. Tab.(2). Nutrients levels were very increasing compared with studies before destroy in present study Nitrite levels (0.27-0.41)µg-at N/l, Nitrate levels (9.70-35.5) µg-at N/l, phosphate levels (0.161-15.87) µg-at P/l while Nutrients levels in same station before destroyed were Nitrite levels (0.001-0.4) µg-at N/l, Nitrate levels (0.39-1.71) µg-at N/l, phosphate levels (0.072-1.82) µg-at P/l encountered in (Al-Aarajy,1988; Hassen,1988).

This increasing of Nutrients levels in present study due to important of biological decomposition by microorganisms for dead plants and other organisms that stifle in marshland area after drying by microorganisms (stirling, 1985). Dissolved oxygen concentration were (7.0-8.0), (7.0-8.0) and (8.3-8.5)mg/l for station 1, 2 and 3 respectively. The relative decreasing of dissolved oxygen in present study compared with studies before destroyed due to increasing of biological oxygen demand to decompose organic material. (Tayel *et al*, 1996), but biological oxygen demand were increasing in station (3) rang from (6.1-6.8)mg/l while in other station (3.9-4.0) and (3.9-4.0)mg/l for station 1 and 2 respectively, the highest values of station (3) may be due to increasing of biological degradation by bacteria and other microorganisms because of these station near to civil aggregation (Tayel *et al*, 1995). The values of (BOD) northern Al-Hammar Similar to data recorded in different studies of Iraqi marshland after rehabilitation (Al-Imarah et al. 2006).

Table (1): Range of some physico-chemical parameter of studied stations (1,2,3).

Parameters	Range	t.C	Satind (%)	TDS (mg/l)	So ₄ (mg/l)	Hco ₃ (mg/l)	Cl (mg/l)	Ca ¹⁺ (mg/l)	Mg ²⁺ (mg/l)	T.H (mg/l)	No ₂ (µg/l)	No ₃ (µg/l)	PO ₄ (µg/l)	D.O (Mgd)	BOD (mg/l)
Garraat Bani	Min.	3.7	2.36	2368	1040	220	1313	144	86	300	0.28	9.7	0.161	7.0	3.9
suaed (1)	Max.	3.9	2.49	2400	1250	312	1350	160	105	600	0.33	15.8	0.813	8.0	4.8
Al-Hammar	Min.	2.0	1.28	1280	604	200	426	72	79	400	0.27	17.6	2.332	7.0	3.9
Tawa (1)	Max.	2.2	1.40	1300	700	240	510	94	93	480	0.34	19.5	2.81	8.2	4.6
Al-Chebayesh	Min.	1.6	1.07	1074	761	200	532	48	173	600	0.31	22.4	17.11	8.7	6.16
Tawa (3)	Max.	2.0	1.28	1290	421	220	551	75	141	660	0.41	30.7	15.87	8.6	6.8

Table (2): Comparison between highest levels of physico-chemical characteristics reported in previous studies covered different station in Al-Hammar marsh and present study.

Station	Location	EC µm/cm	Salin ‰	TDS mg/l	SO ₄ mg/l	Cl ⁻ mg/l	Ca ²⁺ mg/l	Mg ²⁺ mg/l	Li ⁺ mg/l	NO ₃ µg-N/l	NO ₂ µg-N/l	PO ₄ µg-P/l	DO mg/l	BOD mg/l	Reference	
A- <i>Chebiyesh</i>	Northern	3.00	1.08	-	-	-	148	98	753	0.03	0.33	0.77	9.1	-	(Al-Aaraj, 1988)	
A- <i>Hammar</i>	Al-Hammar	2.14	1.56	-	-	-	128	77	810	0.001	0.20	0.08	8.3	-	(Jassan, 1983)	
A- <i>Imr</i>		1.72	1.11	-	-	-	158	79	591	0.001	0.01	0.01	8.1	-		
A- <i>Dargah</i>	Southern	2.77	1.33	-	-	-	210	250	1808	0.085	1.63	0.68	11.9	-	(Al-Lammi, 1986)	
Umm Al-Hawas	Al-Hammar	2.25	1.53	-	-	-	280	207	1522	2.051	3.63	0.78	9.8	-	(Qasbi, 1986)	
Iluzer		1.99	1.12	-	-	-	278	77	1128	0.035	9.200	0.888	9.8	-		
A- <i>Uder</i>	Middle	15.15	2.15	-	-	-	248	320	1760	0.100	3.39	1.88	10.0	-	(Al-Fuhalid, 1981)	
A- <i>Sady</i>	Al-Hammar	1.13	1.9	-	-	-	244	181	980	0.120	3.91	0.69	7.5	-		
Umm Al-Sawaish		1.82	2.22	-	-	-	86	88	417	0.030	1.20	1.37	8.5	-		
A- <i>Daboon</i>	Southern	-	-	-	-	-	440	224	1130	0.45	11.31	2.60	7.5	4.0	(Al-Imarah et al, 2006)	
A- <i>Nagarah</i>	Al-Hammar	-	-	-	-	-	308	151	1900	0.37	30.1	1.10	7.0	4.5		
A- <i>Dargah</i>		-	-	-	-	-	210	177	910	0.45	41.30	1.82	6.5	1.0		
Garmat haw saed	Northern	3.0	2.49	2400	1250	112	370	167	105	100	0.35	12.8	0.87	8.0	4.8	Present study
A- <i>Hammar</i>	Al-Hammar	2.2	1.49	1900	700	210	90	81	45	180	0.34	25.5	2.811	8.2	1.6	
A- <i>Chebiyesh</i>		2.0	1.28	1200	421	220	221	72	141	100	0.41	30.7	15.20	8.0	6.8	

4- Conclusion

The physico-chemical characteristics for water in Northern Al-Hammar marsh (1-Garmat Buni Saed, 2- Al-Hammar, 3 – Chebiayesh) are similar to internal Iraqi water parameter except increasing of nutrient levels and Biological oxygen demand.

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دراسة مقارنة لبعض الصفات الفيزيائية والكيميائية لمياه الجزء الشمالي لهور الحمار قبل التجفيف و بعد التأهيل 2004

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الملخص

تم تقدير بعض الصفات الفيزيائية والكيميائية لمياه الجزء الشمالي لهور الحمار لثلاثة محطات (1- كرمة بني سعيد، 2- الحمار و3- الجبايش) وقورنت النتائج مع الدراسات السابقة قبل التجفيف. ازدادت قيم التوصيلية الكهربائية في المحطة (1) إذ تراوحت ما بين (3.7 – 3.9) مليموز/سم² في حين تراوحت في المحطتين 2, 3 ما بين (1.6 – 2.2). وكذلك لوحظ زيادة في قيم الملوحة في المحطة (1) وتراوحت القيم في المحطات من 1 – 3 ما بين (2.36-3.49) ، (1.28 – 1.4) و (1.02-1.28) جزء بالألف على التوالي. سجلت قيم مرتفعة في الموقع (1) للمواد الذائبة الكلية (2368-2400) ملغم/لتر. تراوحت قيم الكبريتات المسجلة في المحطات (1-3) ما بين (1040-1250) ، (604-700) و (361-400) ملغم/لتر على التوالي، في حين كانت قيم الكربونات (220-313) ، (200-240) و (200-220) ملغم/لتر 1-3 على التوالي . سجلت قيم مرتفعة لتراكيز أيون الكلور (1313-1350) ملغم/لتر و أيون الكالسيوم (133-144) ملغم/لتر في المحطة (1) بينما سجل ارتفاع واضح لقيم العسرة الكلية (600-650) ملغم/لتر و تراكيز أيون المغنسيوم (133-141) ملغم/لتر في المحطة (3). تراوحت قيم النتريت المسجلة ما بين (0.28-0.33)، (0.27-0.34) و (0.31-0.41) مايكرو غرام. ذرة نتروجين/لتر للمحطات 1، 2 و 3 على التوالي. في حين كانت قيم النترات المسجلة أعلى من قيم النتريت وقد ازدادت مستوياتها في المحطتين 2 و 3 ووصلت الى (27.6 – 35.5) و (22.4-30.1) مايكرو غرام . ذرة نتروجين /لتر على التوالي ، في حين ارتفعت قيم الفوسفات في المحطة (3) وتراوحت (13.11-15.87) مايكرو غرام. ذرة فسفور/لتر مقارنة بالمحطتين 1 و 2 إذ تراوحت القيم المسجلة فيهما ما بين (0.161-0.813) و (2.23-2.81) مايكرو غرام. ذرة فسفور/لتر على التوالي. تراوحت قيم الأوكسجين المذاب بين (7-8.6) ملغرام/لتر و لجميع المحطات بينما كانت قيم المتطلب الحيوي للأوكسجين مرتفعة وقد وصلت بين (3.9-4.8)، (3.6-3.9) و (6.1-6.8) للمحطات 1-3 على التوالي . لوحظ خلال هذه الدراسة ارتفاع ملحوظ في قيم كل من المغذيات والمتطلب الحيوي للأوكسجين متزامناً مع نقصان قيم الأوكسجين المذاب مما يشير الى زيادة نشاط الكائنات الحية المجهرية بعد عودة المياه إلى هور الحمار التي تقوم بتكسير الأجسام الميتة المتبقية في منطقة هور الحمار بعد تجفيفه.