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https://kuey.net/ **Research Article**

Ecosystem and Its Geographical Effects on the Marshes of Southern Iraq (An Analytical Study)

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Introduction

It seems that the ecosystem of the marshes of southern Iraq has been exposed to fundamental changes in its various elements, and this is due to two factors, natural and human, as the continuous rise in temperatures has led to an increase in the amount of evaporation and the intensity of the demand for water, which led to both Syria and Iran building dams to store water at the sources to reduce the amount of water coming to Iraq from the two rivers, which is considered the most important reason for not submerging areas of the marshes whose features were visible on the map in the seventies and eighties of the last century, as in the central marshes. On the other hand, the region was exposed to the application of the idea of the old project that called for drying up the marshes by cutting off all sources of water supply coming to them, especially the Hawizeh and Hammar marshes, which are the largest marshes in Iraq in terms of area, so that those areas would turn into exposed lands devoid of any plant, animal or human presence.
The combination of these two factors led to the dismantling of the ecosystem of this region, and the situation continued until after April 9, 2003, when the residents tried to re-flood the marshes again after the dams were broken to open the feeding channels.
marsh area was stable, and its distinctive feature was its ability to self-regulate all its barometers within the limits of critical values. The plant species of this region are at the forefront of the biological variables affecting this stability and the extent of its adaptation , as the stability of this region is largely linked to the stability of the regions adjacent to it, as it constantly exchanges energy and other materials with them under the influence of the processes of gravitational movement, evaporation, and the migration of living organisms, including birds and mammals originally present in the region and others.
All the changes that occurred in the marshlands region during that time have been tracked , The extent of its relationship with a number of variables was clarified, such as population density, the type and size of production, the exploitation of the environment, and the extent of its impact on it and its transformation into other environmental characteristics when some of its features are changed.
Some scholars believe that the marshes have negative effects . Because it forms a harmful region that draws river water into it , However , this point of view does not have many supporters. The majority confirm that it is an element of control and regulation of river waters , and not a destructive element . Some of them also point out that it is harmful to the climate because of its scattering. This may concern the central marshes, which were studied only to highlight some of their features without adopting them as an integrated region , as is the case with the Hammar and Hawizeh marshes, which are distinguished by multiple characteristics, as they are considered a model that must be subjected to For protection, because they form an integrated region , all of whose parts are in a mutual relationship. They must be protected regardless of their dimensions and shapes.
It seems that the ecosystem of the marshes of southern Iraq has undergone fundamental changes in its various elements, and this is due to two natural and human factors, as the continuous rise in temperatures led to an increase in the amount of evaporation and the intensity of the demand for water, which led to the establishment of dams by Syria and Iran to store the water at the sources to reduce the water that comes to Iraq from the two rivers, to be considered the most important reason for not flooding areas of the marshes whose features were visible on the map in the seventies and eighties of the last century as in the middle marshes. Cut off all sources of water feeding incoming to it, especially the Al-Hawiza and Al-Hammar marshes, which are considered the largest marshes in Iraq, so that these areas will be turned into open lands devoid of any plant, animal or human presence

The combination of these two factors led to the dismantling of the ecosystem of this area, and the situation continued until after the ninth of April 2003, when the residents tried to re-flood the marshes again after breaking the dams to open the feeding channels The area of the marshes before its identification was stable (stability) and its distinguishing feature is its ability to self-regulate all its parameters within the limits of critical values. It is constantly exchanging energy and other materials with it under the influence of the processes of attractive movement, evaporation and migration of living organisms from birds and mammals that are already in the region and others. All the changes that occurred in the marshlands during that time have has been traced, and it has been clarified to what extent they are related to a number of variables such as population density, quality and volume of production in exploiting the environment and the extent to which it is affected and transformed into other environmental characteristics when changing some of its features Some Scholars go to the fact that the marshes have negative effects, as they constitute a harmful region that draws river waters into it, but this view does not have many supporters. This may pertain to the central marshes, which have been studied only to highlight some of their features without adopting them as an integrated region, as is the case for the Hammar and Al-Hawizeh marshes, which are characterized by multiple characteristics. Make them protected regardless of their sizes and shapes

• Research problem

Why is the geographical dimension of the marshlands of southern Iraq affected by the change in its water levels in time and space

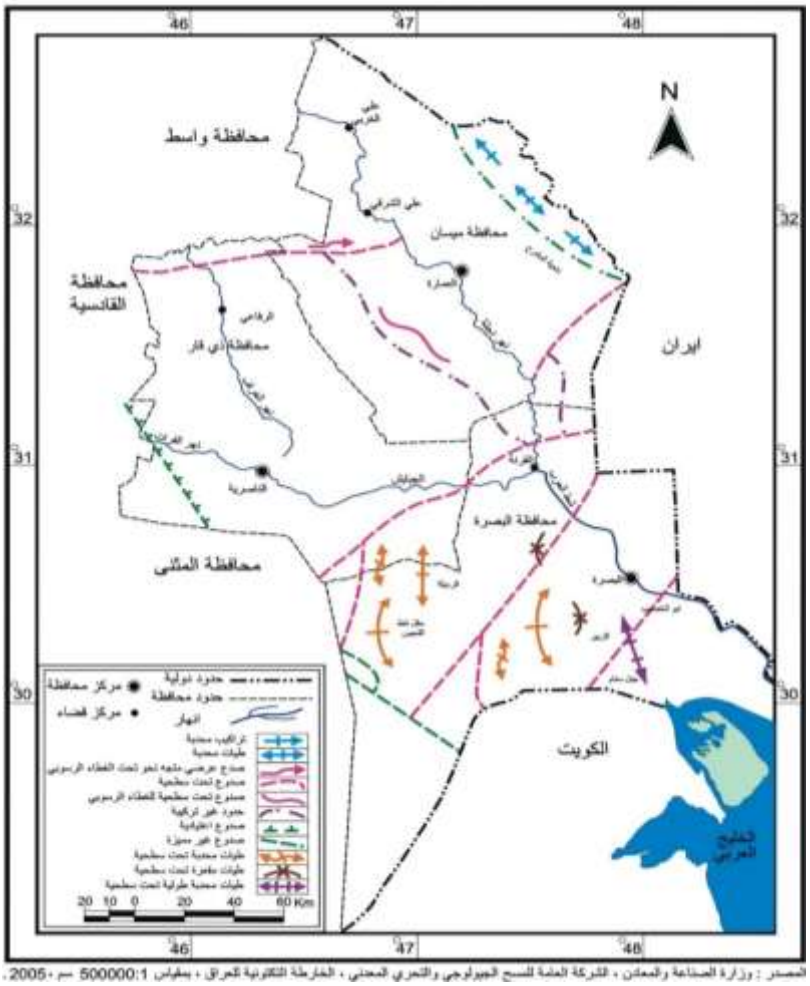
• Research hypothesis

Geographical variables are formed according to the environment in which they exist. Any change that occurs in one of them affects the other accordingly. No towards that change.

• Research objective

It aims to reveal the impact of Hori (Hawizeh and Hammar) as a model for regime change. environmental, Because they are the largest bodies of water in terms of area and impact on the environment in particular . And parts of its water returned after the submersion . To bring the ecosystem back with it, It also aims to identify the changes in the areas of the marshes of the study area and their impact on the geographical environment during the study period.

Map (1) Tectonics of the study area



المصدر : وزارة الصناعة والمعادن ، الشركة العامة للمسح الجيولوجي والتحري المعدني ، الخارطة التكتونية للعراق ، بمقياس 1:500000 سم ، 2005 .

Population distribution in the study area

Population is the focus of geographical studies, as it has a great impact on economic, industrial and agricultural activities. Studying its characteristics may help to know how its natural environment was formed, which represents the environment in which it lives, in a manner that is compatible with its demographic, cultural and educational status. Therefore, the population will be a product of the environment, just as it produces its human environment with its data that overlap with the natural place to draw its cultural, civilizational and intellectual status. From this standpoint, it was necessary to pay attention to the population aspect, which represents one of the important geographical elements in the Marshlands region and how it is distributed to reveal the levels of natural impacts in the event of an environmental imbalance on the population and its activities and the repercussions resulting from this imbalance.

The population of the marshlands region is distributed in three governorates, and this distribution varies from one governorate to another according to the area of the marshes in one governorate or another on the one hand and the size of the rural population in each governorate on the other hand. Accordingly, we can follow the population situation in the study area:

Population distribution according to the 1977 census

The population of the marshes is distributed unevenly among the governorates of the study area, but the percentages are almost high in that period because they represent the natural situation of the population in light of the exceptional circumstances that the region was exposed to in the subsequent years of drying operations, war conditions, and displacement cases.

From Table (1), we note that Maysan Governorate outperforms the rest of the governorates in terms of the number of marsh residents, constituting a percentage of (61%), i.e. more than half, due to the marsh areas extending within the governorate's borders. As for Dhi Qar Governorate, the percentage of marsh residents constitutes (22%), with most of them concentrated in specific water areas extending along the Euphrates River, while the lowest percentage of marsh residents is in Basra Governorate, constituting (16%).

As for the distribution of the population according to the districts, it appears from Table (1) that the highest percentages of the marsh population in Maysan Governorate were concentrated in Al-Maymouna District, forming a percentage of (27%) due to the vast area of the marshes in the natural phase within this district. As for Al-Majar Al-Kabir District, the percentage of the population reached (22%), because it is an urban attraction area for the governorate where job opportunities and services are available, and their concentration rates are lower in the districts of Qalaat Saleh and Al-Amara, reaching (19%, 18%) respectively. As for the lowest percentages, they were in Al-Kahla District (15%) due to its distance from the governorate center and the small areas of marshes in it. As for the districts affiliated with Dhi Qar Governorate, Suq Al-Shuyukh District had the highest concentration of marsh population in it, forming a percentage of (65%) due to the vastness of the land in this district compared to Al-Chibayish District, which is characterized by the small area of land compared to the area of the surrounding marshes, forming a percentage of (35%). As for Basra Governorate, the percentages of the marsh population varied between its districts, except for the Al-Qurna District The city has the highest concentration of marshland residents, at a rate of (48%, 43%), due to the vast area of the marshes within this district. The lowest rate appeared in Shatt al-Arab district (9%). Map (2)

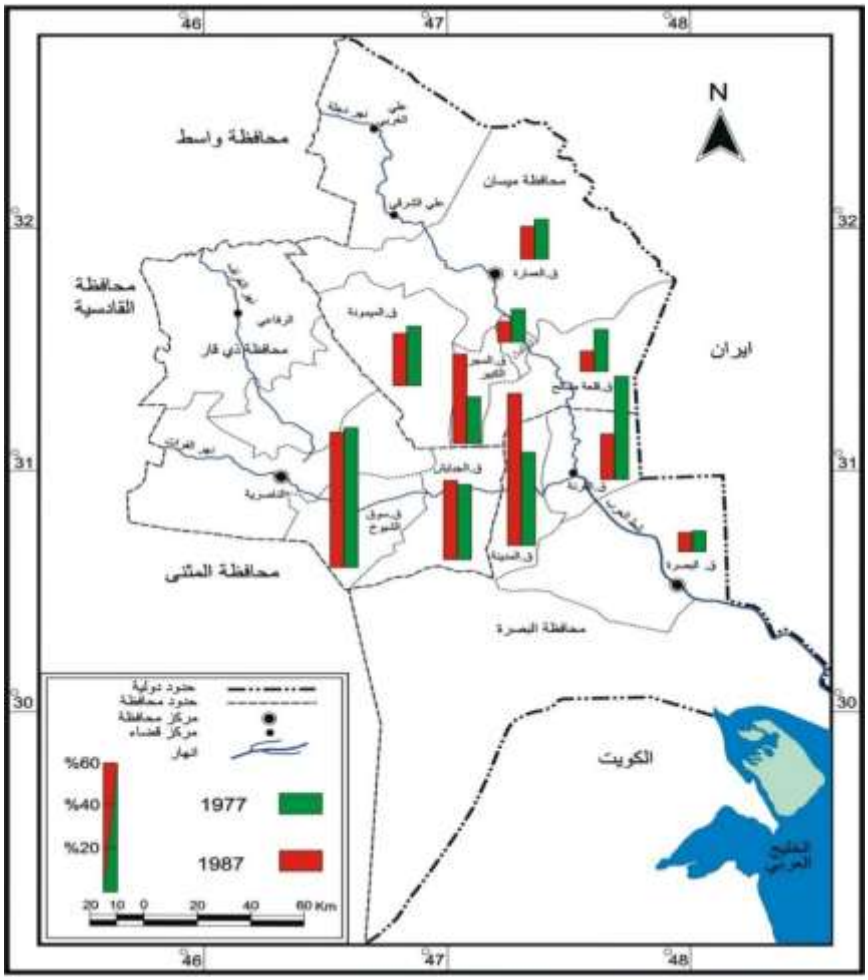
Table (1) Geographical distribution of the population of the marshes of the study area according to the 1977 census

The percentage of the population of the marshes of the district or sub-district to the population of the marshes of the governorate%	Population of districts (Naseema)		Percentage of the population of the governorate's marshes to the total population of the governorate's marshes %	Percentage of the population of the marshes in the governorate %	Population of marshes in the governorate (Naseema)	Population of the province (Naseema)	السكان / المحافظة
%18	39843	Architecture	43	61	227144	372075	Maysan
%27	61824	The auspicious one					
%19	42291	Saleh Castle					
%22	49553	Great Hungary					
%14	33633	The dark-					

		skinned					
	227144	the total					
%65	89245	Sheikhs Market	26	22	137541	622971	Dhi Qar
%35	48296	The Chebayish					
	137541	the total					
%48	79523	The horn	31	17	166441	1008626	Basra the total
%43	71502	The city			531126		
%9	15416	Shatt al-Arab					
	166441	the total					

Source: Ministry of Planning, Central Statistical Agency, Results of the General Population Census for the year 1977, pp. 72-73.

Map (2) Relative distribution of the population of the marshes of southern Iraq according to the districts according to the 1977 and 1987 censuses



Source: Based on Table No. (1)

2- Population distribution according to census 1987

The population distribution in the study area differs in size from one governorate to another. Dhi Qar governorate had the highest size compared to Basra and Maysan governorates, Table (2). It is worth noting that Basra governorate had a population size less than the mentioned size for media and security reasons during the Iran-Iraq war. However, the inhabitants of the marshes belonging to Dhi Qar governorate are the smallest in number because they are spread among a limited number of districts and sub-districts within the governorate's borders, while the population size of Maysan and Basra governorates is high compared to the first because they occupy larger areas of districts and sub-districts within the borders of each governorate. These two areas were not only exposed to bombing, but they also became combat zones where battles took

place because they are border cities, to be a no man's land empty except for military units.

Table (2) Geographical distribution of the population of the marshes of the study area according to the 1987 census

The percentage of the population of the marshes of the district or sub-district to the population of the marshes of the governorate %	Population of districts (Naseema)		Percentage of the population of the governorate's marshes to the total population of the governorate's marshes %	Percentage of the population of the marshes in the governorate %	Population of marshes in the governorate (Naseema)	Population of the province (Naseema)	
%15	37326	Architecture	38	50	243577	487448	Maysan
%24	58092	The auspicious one					
%10	21849	Saleh Castle					
%42	103216	Great Hungary					
%9	23094	The dark-skinned					
	243577	the total					
%63	119552	Sheikhs Market	29	21	189781	921066	Dhi Qar
%37	70229	The Chebayish					
	189781	the total					
%21	44033	The horn	33	24	210616	872176	Basra
%71	149712	The city			643974		the total
%8	16871	Shatt al-Arab					
	210616	the total					

Source: Ministry of Planning, Central Statistical Agency, Results of the General Population Census for the year 1987, pp. 76-78.

The data in the table show that the population of the marshes in Maysan Governorate reached (50%) of the total population of the governorate, while the population of the marshes in Dhi Qar Governorate reached (21%) of its total population, while the population of the marshes in Basra Governorate was (24%) of its total population. These percentages attract attention at first glance, as Dhi Qar Governorate had a low population, but most of the marshes located north of the Euphrates River had dried up and nothing remained in them except scattered pools of water, which led to a decrease in the percentage of its population, while Maysan Governorate still has submerged water areas capable of absorbing a population size to support them, as well as Basra Governorate to some extent.

When extrapolating the population of the marshes of the three governorates, it appears that the highest percentage of the population of the marshes of the governorates to their total is in Maysan Governorate, forming (38%), and the lowest percentage of the population of the marshes of Dhi Qar (29%), and in the middle of them is the population of the marshes of Basra Governorate (33%).

The table shows that the ratio of the population of the marshes of the districts to the population of the marshes of the governorate varies within the governorate itself. In Maysan Governorate, the ratio of the population of the marshes of Al-Majar Al-Kabir reached its highest at (42%), and the reason for this is due to its proximity to the sugar cane cultivation area and the presence of the Maysan Sugar Factory, which contributes significantly to increasing the population size in this district, as some residents of the marsh areas practiced their work within the sugar cane farms and also in the sugar production factory, in addition to their environment in which they practiced their various activities of fishing, harvesting cane and selling it, in addition to raising sheep and buffaloes and marketing their products to the market of the city of Amara and some of them to the market of Al-Majar Al-Kabir despite its limitations, while the second ratio of the

population size of the marshes of Al-Maymouna district was (24%), as it is located between Umm Al-Baq Marsh to the north and Awda Marsh to the south, but its relatively distant location compared to the district of Al-Majar Al-Kabir from the main street that connects the governorates of Amara and Basra had a relative impact on the population centers in the marsh area. As for the residents of The Marshes of Amara, their percentage reached (15%), and this depends on the population of the Marshes of Al-Mashrah, and the decrease in this percentage is due to the Iran-Iraq war and its proximity to the Al-Hawizeh Marsh, which is the dividing line between Iraq and Iran. Its effects were also reflected on the population of the Marshes of Qalaat Saleh and Al-Kahla, whose percentage reached (9%), as they are also close to the marsh, where a group of scattered villages inhabit it, and it was greatly affected by the war See Map (2).

As for the distribution of the percentages of the population of the marshes of the districts of Dhi Qar Governorate, the highest percentage was in Suq Al-Shuyukh, amounting to (63%), while it reached (37%) in Al-Chibayish. The reason for this disparity is evident in the distance of Suq Al-Shuyukh from the effects of the war, which attracted large numbers of people who migrated to it from the rest of the tense areas, which contributed to increasing the size of its population compared to the percentages of the population of Al-Chibayish, which is almost close to the battlefield, so it remained conservative in its population because this region has a special environmental situation.

In Basra Governorate, the clearly different distribution can be observed between the city, Al-Qurna and Shatt al-Arab. While the percentage of the city's marsh population rises to (71%) due to its relative distance compared to Shatt al-Arab from the effects of war and the vast area of the marshes compared to the mainland, which increased the concentration of the marsh population in the district center and its affiliated districts (Al-Uzair and Talha), as it is a commercial center where social services (health and education) are available, it decreases in Al-Qurna to (21%), as it was with Shatt al-Arab, whose population percentage dropped to (8%), a scene of major fighting that contributed to a large degree to the displacement of the residents on foot to get rid of the ferocity of the bombing and attack that helped evacuate these areas of their residents, which also included the residents of the marshes, in addition to the small area of the marshes in this district, with the exception of parts of the Al-Dayr area.

3-Population distribution according to the 1997 census

The governorates of the study area witnessed population growth due to the continuation of fertility operations to restore part of the balance to those areas with a high population density in the marshes. However, the period between (1987-1997) is considered a continuation of the Iran-Iraq war and coincides with the drying operations that affected these governorates. The population size of Maysan Governorate witnessed an increase in this stage compared to the previous one, but it is low compared to other governorates due to its exposure to enemy shelling to turn it into a military area, as it is a border area, which reduced the size of its population.

As for the population of Dhi Qar and Basra governorates, their numbers have increased, due to the former's distance from the Iranian border, making it an attractive area for residents.

As for the inhabitants of the marshes, it appears from Table (3) that their percentage is still high in Maysan Governorate, constituting (49%) of the total population of the governorate, while the percentage of the inhabitants of the marshes in Dhi Qar Governorate reached (14%), decreasing in Basra Governorate to (13%), as it appears that the percentages are high despite the drying operations that affected the marsh areas, and the reason may be due to the transformation of areas of land submerged in marsh water into dry lands that were used in agricultural projects by reclaiming the land and planting it with wheat, barley and rice crops to meet the needs of the local market (1) , especially since Iraq was exposed to a period of economic blockade imposed on it during the nineties until April 2003, which helped the inhabitants of the marshes to cling to their land and transform it from a marsh environment into agricultural areas, especially in the first stages of drying, since its soil is still saturated with water, which encouraged agriculture, and some of the remaining water can be transferred to the lands designated for rice cultivation by dividing them into agricultural contracts However, the final stages of drying did not succeed in allowing farmers to continue cultivating this crop due to the dryness of the soil, its lack of organic matter, and the spread of salts due to evaporation, which led to a decrease in the level of productivity year after year. The population of the marshes of Maysan Governorate constitutes (46%) of the total population of the marshes of the three governorates, the lowest of which is in Dhi Qar Governorate (24%), and in between them is the population of the marshes of Basra Governorate at (30%).

Table (3) Geographical distribution of the population of the marshes of the study area according to the 1997 census

The percentage of the population of the marshes of the district or sub-district to the population of the marshes of the governorate %	Population of districts (Naseema)		Percentage of the population of the governorate's marshes to the total population of the governorate's marshes %	Percentage of the population of the marshes in the governorate %	Population of marshes in the governorate (Naseema)	Population of the province (Naseema)	السكان / المحافظة
%17	52940	Architecture	46	49	313637	637126	Maysan
%22	70433	The auspicious one					
%21	66138	Saleh Castle					
%28	85952	Great Hungary					
%12	38174	The dark-skinned					
	313637	the total					
%71	113822	Sheikhs Market	24	14	161209	1184796	Dhi Qar
%29	47387	The Chebayish					
	161209	the total					
%29	59182	The horn	30	13	204905	1556445	Basra the total
%62	127495	The city			679751		
%9	18228	Shatt al-Arab					
	204905	the total					

Source: Ministry of Planning, Central Statistical Agency, Results of the General Population Census for the year 1997, pp. 77-79.

The table also shows that the percentage of the marsh population varies according to the districts within the governorate. In Maysan Governorate, Al-Majar Al-Kabir District still accounts for the largest percentage (24%) of the governorate's marsh population , as it is a center for attracting a number of immigrants from the marsh areas to the district centers, in addition to the natural population increase. Meanwhile, the population concentration in Al-Kahla District is lower due to the migration of most of its residents to the nearby district and sub-district centers, the lack of service projects provided to the residents, and its distance from the governorate center. The population of Al-Amara District Center also decreases to reach (17 %) due to its distance from the marsh areas, with the districts and sub-districts (Qalaat Saleh and Al-Maymouna) in between them , at a rate of (21, 23%), respectively, due to the lack of population density in them, in addition to the lack of economic activities and services compared to the governorate center Map (3).

As for Dhi Qar Governorate, the population of Suq Al-Shuyukh District constituted (71%) of the total population of the governorate's marshes, decreasing to less than half in Al-Chibayish District at (29%) due to the vast areas of the marshes in Suq Al-Shuyukh District, in addition to it being a commercial center for its affiliated districts and providing social services to the population. As for Basra Governorate, the population of the city's marshes constitutes the highest percentage, reaching (62%), decreasing to half in Al-Qurna District, forming (29%), while the lowest is in Shatt Al-Arab at (9%).

4-Population distribution according to the 2007 census

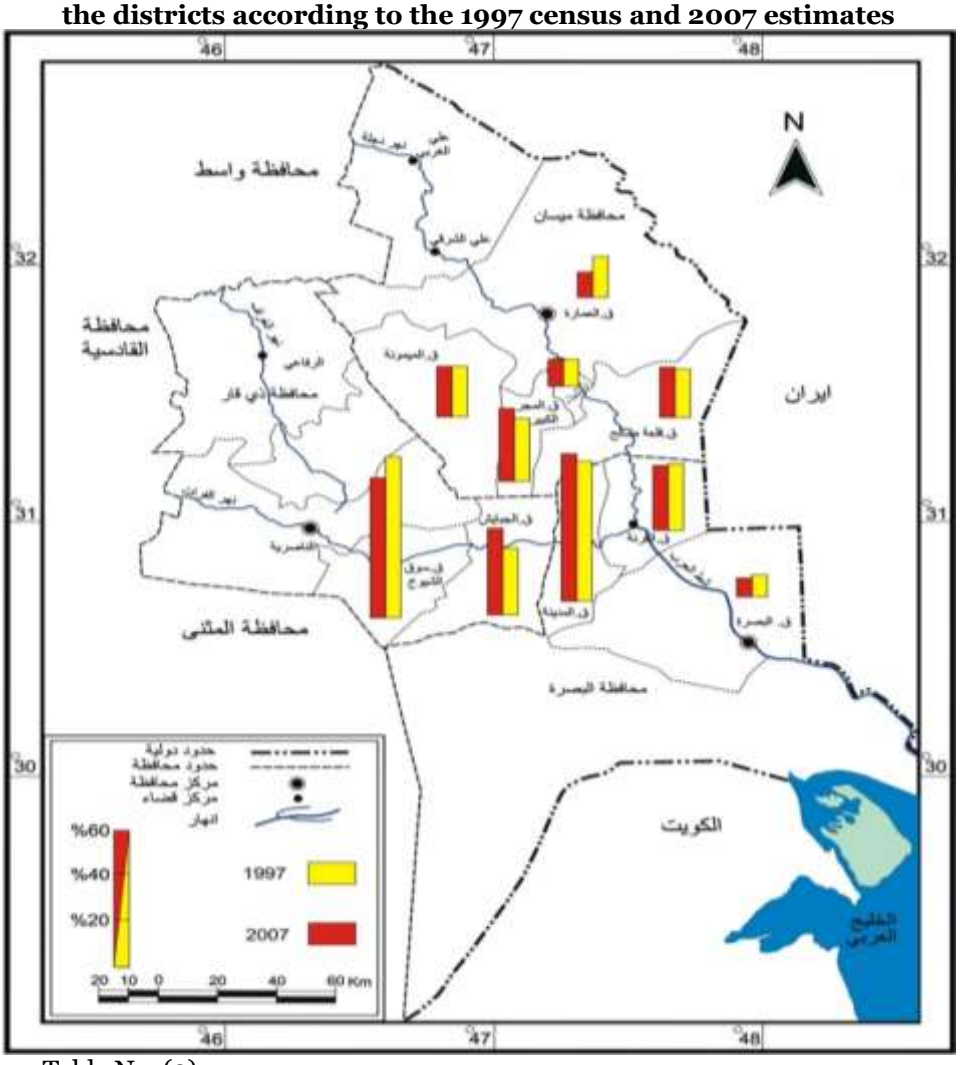
The post-flooding phase witnessed the return of a number of displaced families to their original areas of residence, as their number reached (27369) families distributed among the marshes of the governorates of (Basra, Dhi Qar and Maysan) with (8538, 12983, 5848) respectively. Table (4).

Table (4) Geographical distribution of families returning to the marshes of the study area for the year 2007

Number of families	Village distribution	Number of villages	Governorates
2012	in the depths of the marsh	20	30	Basra
6526	adjacent to the lake	10	
8538	the total		
2216	in the depths of the marsh	36	126	Dhi Qar
10767	adjacent to the marsh	90	
12983	the total		
6338	in the depths of the marsh	44	111	Maysan
2210	adjacent to the marsh	67	
8548	the total		

Source: Ministry of Water Resources, Marshlands Revitalization Center, Study and Evaluation of the Social and Economic Status of the Iraqi Marshes, p. 156.

Map (3) Relative distribution of the population of the marshes of southern Iraq according to the districts according to the 1997 census and 2007 estimates



Source: Based on Table No. (2).

The other part preferred to remain in the city centers and districts, as the inhabitants of the marshes practice work far from their environment to obtain a source of livelihood, such as working in the army or police or as construction workers and others (1), which makes it difficult for them to return to the marshes again after they lost their livestock and some of their agricultural lands, which forced them to remain in the cities so that the other family members could return to the marshes.
From Table (5) it is clear that the population of the governorates of the study area has increased, with it The population size of the marshes, and this statistic was relied upon and issued by an official body (2) To clarify the changes that occurred in their numbers during that period.

Table (5) Geographical distribution of the population of the marshes of the study area according to the 2007 census

The percentage of the population of the marshes of the district or sub-district to the population of the marshes of the governorate	Population of districts (Naseema)		Percentage of the population of the governorate's marshes to the population of the governorate's marshes %	Percentage of the population of the marshes in the governorate %	Population of marshes in the governorate (Naseema)	Population of the province (Naseema)	السكان / المحافظة
%11	50542	Architecture	44	54	454830	848872	Maysan
%22	99379	The auspicious one					
%22	100035	Saleh Castle					
%33	150972	Great Hungary					
%12	53902	The dark-skinned					
	454830	the total					
%62	140017	Sheikhs Market	22	14	226698	1629747	Dhi Qar
%38	86681	The Chebayish					
	226698	the total					
%28	99886	The horn	34	17	356775	2175999	Basra
%65	232779	The city			1038303		the total
%7	24110	Shatt al-Arab					
	356775	the total					

Source: Ministry of Planning, Central Statistical Organization, Information Technology, Iraq Population Estimates, 2007, pp. 47-49

Biodiversity in the study area

The marsh environment contains various microscopic and microscopic organisms, vertebrates and crustaceans. It is a food resource that attracts a number of fish and migratory birds from different parts of the world, as it represents the food chain (☐) that works to achieve what is called the natural balance . (1)
The food chain of the microscopic organisms begins with phytoplankton and zooplankton, which are the basis for the production of primary energy for the marsh ecosystem. They are called plankton because their movement is not controlled, but rather the water takes them wherever they go, so that their life is constant on the surface of the water (2) . As for the swimming organisms, they are diverse, some of which swim in the middle areas to feed fish species, some crustacean species, and invertebrates. As for the bottom, specialized organisms live, sticking to the mud, as in algae, and others live on the coast, affected by the daily tidal processes (3).

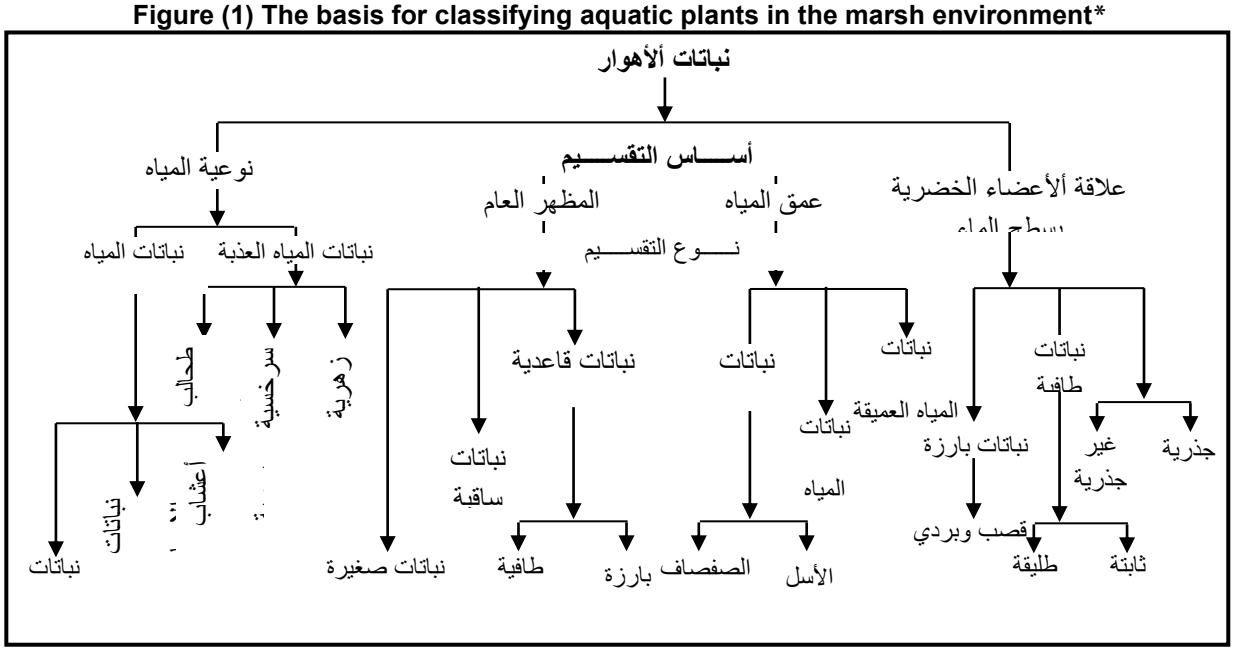
The marshes in the pre-draining stage are characterized as areas suitable for the emergence of biodiversity resulting from shallow water, slow flow of water currents, high nutrient concentrations and moderate temperatures, which was reflected in the environmental reality of the marshes. As for the drying stage, it was accompanied by rapid environmental changes that occurred in the region, such that the ecosystem that was formed during a long history of development and adaptation was damaged, so that the post-submersion stage witnessed a change in the environmental reality as a result of the return of some water areas, which was reflected in the emergence of an ecosystem that differs from what it was before drying, although it was diverse in plant and animal life, but this part of the diversity came to adapt to the new situation of the marshes, and this biodiversity includes: -

Macrophytes

The study area was rich in water resources, as it constitutes a suitable environment for certain types of plants that cannot be found in other environments. Therefore, reed and papyrus plants are distributed in various places in the study area , covering large areas of it. They are usually evergreen and renewable, in addition to their nutritional and industrial benefits, as they contribute to the beauty of the area and give it a tourist dimension (4).

Aquatic plants vary in the way they grow, each according to its environment. Some float on the surface of the water and their roots are attached to the bottom of the marsh, while others rise more than a meter above the surface of the water. Some of them grow around the edges of water on the soil moisture and are called (Swamp Plants.) And they have aerial stems and leaves. Figure (1)

Figure (1) The basis for classifying aquatic plants in the marsh environment*



Source: ARA Alwan, Past and present status of aquatic plants of the marshlands of Iraq, Marsh Bullentin, Vol. 2, Marine Science Center, University of Baghdad, 2006, p. 169.

Geographical distribution of vegetation cover in the study area

The distribution of vegetation cover took various forms during the three stages:

A- The pre-drying stage: It was characterised by a kind of integration and harmony between the various elements of the environment, as the vegetation cover appears as one of the elements of the ecosystem in the marshlands area in a harmonious and regular manner in terms of its type and places of spread through its relationship with the rest of the other elements such as soil and water (1) .

Table (6) shows that the central marshes recorded the highest diversity of aquatic plants with the presence of (44) species, while Al-Hammar Marsh includes about (40) species, then Al-Hawizeh Marsh with (37) species. Figure (2)

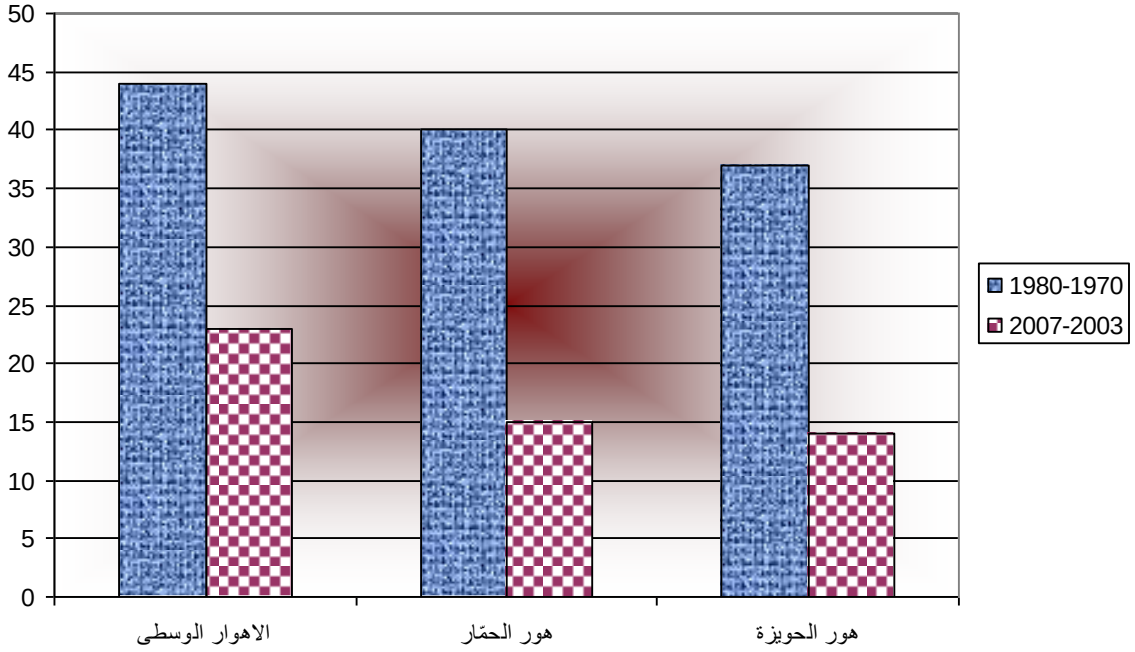
Abdul-Ridha Al-Mayah, Aquatic Plants in the Marshes of Southern Iraq, Journal of the Marshes of Iraq (5) .Environmental Studies, Center for Marine Sciences, University of Basra, Issue 12, 1994, p. 130

Table (6) Comparison of the distribution of the dominant aquatic plant species in the marshes of the study area before and after drying For the period from (1970 - 2007)

Number of registered items	the site	Years
44	Central Marshes	1980 – 1970
40	Al Hammar marsh	
37	Al-Hawizeh Marsh	
23	Al-Hawizeh Marsh	2007 – 2003
15	Central Marshes	
14	Al Hammar marsh	

Source: United Nation Environment program Iraqmarshlands, Monitoring program vegetation, 2007, p. 13.

Figure (2) The dominant plant species in the marshes of the study area before and after drying For the period from (1970 - 2007).



Source: Based on Table (3)

Reeds and papyrus form a familiar plant cover in the marshes, but not everywhere, as there must be suitable conditions for its growth. In the Hawizeh Marsh, the density of papyrus appears at the mouth of the branches of the Tayeb River in the Sanaf Marsh, which caused turbidity at the confluence area. This contributes to the growth of papyrus, which disappears in the central parts of the marsh due to its increased depth (1).

Reeds are spread in the deep areas of the marsh, except for the parts devoid of vegetation that are occupied by clear water, which represents the deepest parts of the marsh. The relationship between the growth of reeds and papyrus plants depends mainly on the depth and turbidity of the water, but this relationship is not clear in the Hammar Marsh when compared to the marshes of Al-Hawizeh and Al-Wusta due to the topography. The bottom of the marsh tends to be flat, while it tends to be relatively concave in the marshes of Al-Hawizeh and Al-Wusta, which results in a difference in the depths of the water between the middle of the marsh and its banks, and this results in a difference in the vegetation cover.

The Hawizeh Marsh recorded the highest diversity of aquatic plant species, as they were concentrated in the marshes of Al-Azim and Umm Al-Naaj because they are places of deep water. As for the central marshes , their plant cover has revived in the marshes of Abu Zarq and Awda due to the return of part of their water after 2003. As for the Hammar Marsh, plant life has revived in parts of it, represented by the marshes of the Hammar, Al-Shafi and Abu Al-Narsi districts, and it decreases in areas not submerged in water.

In general, the healthiest stations appeared in the marshes of (Al-Hawizeh, Al-Hammar and Al-Wusta) respectively during the cold season compared to the hot season of the year 2007 (2).

As for the rest of the types of aquatic plants, they are distributed among the marsh areas, as plants grow... Golan, Akoul, Castor, and the weeds of the log and the wounded are found at the edges of the marshes. As for the shallow areas, when the water level in the marsh decreases, the waterways become crowded with the plants of Ghaziza, Shamblan, and Shabika, which hinders navigation in the marsh paths (3).

B- The drying stage: This stage represents the collapse of the ecosystem and the disappearance of water, the main element in it, to a large extent. In late 2002, the water receded from large areas of the marshes of the study area, with the exception of the northeastern part of the Al-Hawizeh Marsh, because its feeding is

located outside the borders of Iraq. As for the rest of the marsh, the shallow parts were cut off due to the drying method that was followed in it, so that the papyrus plant, which usually grows in shallow areas, disappeared from it, while its presence spread on the banks that were not reached by drying (1) , and most of the plant and animal life almost disappeared.

C - Post-submergence stage: This is the stage of the return of part of the ecosystem after the return of the previously receded waters to return to the region its plant and animal life, as the Hawizeh Marsh recorded the highest plant diversity with the recovery of (23) species and the central marshes with (15) species, while the Hammar Marsh had the lowest plant diversity with (14) species. See Table (6).

The return of more than 50% of the aquatic plants present in the drying stage indicates that the current ecosystem is no longer as it was in the past. This is indicated by the fact that there are some distinctive types of plants that were not found after the submersion, including the insect hunter plant (Utricalaria australis) and the arrowhead plant (Sagittaria Sagitifalia). New types have also appeared, including the ketal plant (☐Hydrilla verticillata) (2) .

The disappearance of plants that were present and the appearance of others that were not present indicates that a change has occurred in the new ecosystem after it lost part of its existing elements, and new elements were formed that were a reason for the emergence of new types of plants in it due to the marsh lands being exposed to drying for a long period, which changed many of the characteristics of the soil as it received more salty water after being submerged, and that was a reason for this environmental change to occur.

Physical properties of the marsh waters of the study area

The physical and chemical properties of water are among the properties that should be relied upon to know the suitability of water for human, agricultural and industrial uses and how to benefit from it. This wealth. Periodically assessing the water qualities gives a clear impression of the extent of improvement or deterioration of these resources. This axis includes studying the characteristics related to the quality of water in some marshes affiliated with Hori Al-Hammar and Al-Hawizeh after the flooding stage and the extent of its impact on the ecosystem of the region through human influences that affected its water levels.

First Physical Properties

Table (6) shows the results of the physical tests of the marsh waters selected in the current study and their comparison with the national and international determinants of the quality of water suitable for the aquatic environment. Eight models were selected, with (4) models for each of the Al-Hammar and Al-Huwaizeh marshes.

1- Temperature(oC)

depend on temperature (3) , and water temperature also plays an important role in the life of living organisms to carry out Biochemical reactions (such as metabolism) at the appropriate temperature.

Temperature has an effect on the density of water, which is directly related to salinity, and then its effect on the distribution of living organisms in the water body (1) .

Table (6) shows the presence of seasonal changes in temperatures resulting from the intensity of the sun's brightness and the difference in day length during the two seasons of the year .

Table (6) Physical characteristics of selected sites in the marshes of the study area for the year 2007

Turbidity (NTU (	Dissolved) oxygenDO ((mg/L)	) SolidsTDS (Total solute (mg/L)	Electrical) conductivity (milli) EC	The Ace Hydrogen	Water temperature(° C)	The name of the marsh		Site code
Al-Hawizeh Marsh								
4.30	8.70	5200	10.40	8.50	31.60	summer	Mother of sheep	1
1.99	8.40	788	1.45	7.49	15.21	winter		
1.33	8.10	1910	3.82	8.52	31.90	summer	Great marsh	2
0.33	10.21	1031	3.04	7.64	15.40	winter		
1.07	7.90	1800	3.60	8.70	31.80	summer	Al-Sawda marsh	3
3.87	10.13	1059	2.10	7.83	17.60	winter		
1.29	7.90	5400	10.80	9.01	32.00	summer	Sanaf Hor Al	4

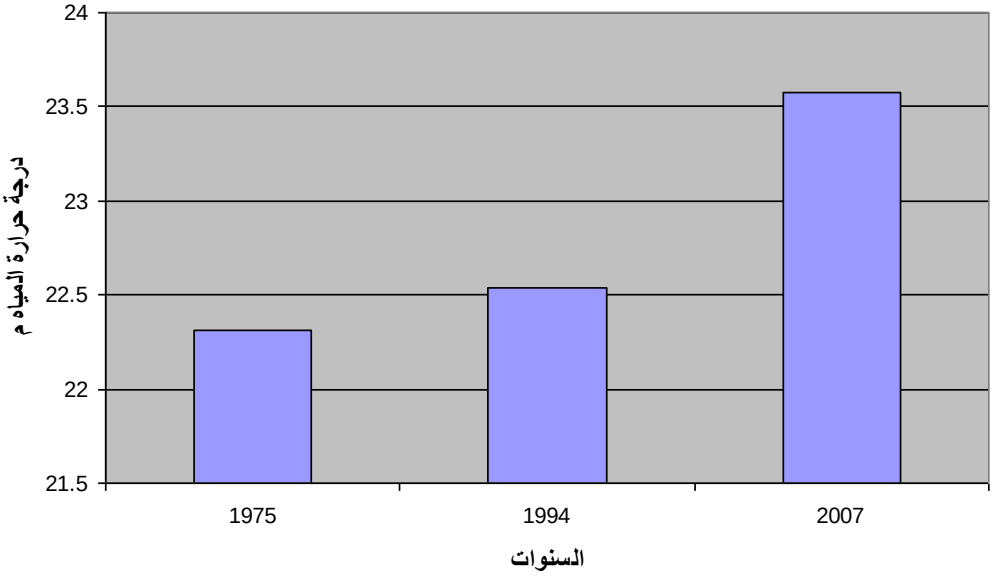
1.58	9.80	1010	1.88	7.45	19.40	winter		
Donkey's swamp								
8.37	0.77	4565	6.34	8.35	32.00	summer	Al-Amiyah marsh	5
1.72	4.10	1239	2.84	7.55	15.60	winter		
2.00	5.90	5000	3.02	8.15	31.90	summer	Al-Mashab marsh	6
2.19	10.88	1064	2.31	8.04	14.50	winter		
9.46	6.20	5744	10.40	4.80	30.40	summer	Al Shafi's marsh	7
1.77	10.87	1487	3.05	8.12	15.00	winter		
2.50	6.20	4966	3.17	8.28	31.20	summer	Hor Awda	8
5.24	7.88	657	1.61	7.51	20.20	winter		
less than 10	5	1500	0.4	8.5-6.5	Acceptable	(*) National determinants		
5	5	1000		9.5-6.5	Acceptable	(**) Global determinants		

Source: Based on the results of laboratory analyses conducted at the Hazardous Materials Department/Ministry of Science and Technology(*)

Ministry of Water Resources, Marshlands Revitalization Center, Water Specifications and Soil Classification, Unpublished Study, 1998, p. 4.

(**) OT, Lind, Hand book of common methods in limndogy, The CV Mosby CO., ST.Louis,1979.p.80.
Temperature is one of the important environmental factors that determine the presence of organisms through its direct and indirect effect on the various chemical, physical and biological properties of water..
When comparing the current results with the results of the analysis of previous years (Table 7), we find that they are close during the hot and cold seasons, Figure (3).

Figure (3) Comparison of temperature results in the marsh waters of the study area For the period from (1970 - 2007)



Source: Based on Table (7).

Table (7) Comparison of analysis results for the marsh waters of the study area for the period from (1970–2007)

) Turbidity NTU (	Dissolved oxygen (mg/L)	Dissolved solids (mg/L)	Connectivity Electrical milli) (Siemens/cm	pH	Water) temperature° C (	Years
-----	7.5	-----	-----	7.6	22.31	(1) 1975
	7.7	3500	0.98	7.9	22.54	(2) 1994
3.48	7.83	2706.69	4.34	8.11	23.85	2007
less than 10	5	1500	0.4	-6.5 8.5	Acceptable	National determinants
5	5	1000	-----	-6.5 9.5	Acceptable	Global determinants

(--)Some physical properties could not be obtained during and before drying.

Source: Based on:

(1) BK Maulood & G. C.F.Hinton, An Ecological survey of some Aquatic Ecosystems in southern Iraq, Tropical Ecology, University of Sulaimaniyah, Vol. 29, No.1, 1979, p. 29.
(2) Najah Aboud Hussein, Abdullah Hamad Abdullah Al-Moussawi, Physical and Chemical Properties of the Waters of the Southern Marshes in Iraq, Journal of the Marshes of Iraq Environmental Studies, Center for Marine Sciences, University of Basra, Issue 11, 1994, p. 100.

2- Turbidity

The degree of turbidity is related to the percentage of suspended solids in the water, and consists of silt particles and a mixture of organic and mineral solids, microorganisms, and others. The turbidity of the water is removed by sedimenting the suspended materials in it ( ) .

Al-Huwaizah Marsh recorded the lowest turbidity values (☐) , reaching (0.33) NTU (☐☐) at Al-Azim Marsh station in the cold season, as in Table (6), while the highest turbidity value was in Al-Hammar Marsh (19.46) NTU at Al-Shafi Marsh station in the hot season, while the general average of turbidity during the hot and cold seasons in the water samples of the study area was (5.04) and (33 , 2) NTU, respectively.

When comparing the turbidity rates in the waters of the study area with the global and national determinants, we find that they did not exceed them except for the stations of Hori Al-Amiyah and Al-Shafi , as the reason for the low turbidity in the waters of Al-Hawizeh Marsh is due to the stability of the marsh waters in most areas due to its not being affected by the drying processes except in a limited range, which led to the sedimentation of suspended materials in the deep areas of the marsh, unlike the waters of Al-Hammar Marsh, which were suddenly flooded after being exposed to total drying, which made the water in contact with previously cultivated land and other abandoned land, which led to a change in the properties of the water until the flooding state stabilized, which increased the concentrations of suspended materials, and turbidity also has an effect on the growth of algae and aquatic plants, especially submerged ones that contribute to reducing light through the water column, and suspended materials (turbidity) also affect the respiration of fish, especially when their values exceed (200) NTU ( ) and turbidity is low in relatively stagnant waters as in marsh waters and increases in running water, and it has been determined according to the Iraqi specifications for water Drinking turbidity values should be less than (10) NTU ( ) .

3- Electrical Conductivity (EC*)

Electrical conductivity depends on the temperature of the water; an increase of one degree Celsius causes an increase in electrical conductivity by 2%. It is also an indicator of the concentration of dissolved salts and the amount of total dissolved solids ( ) .

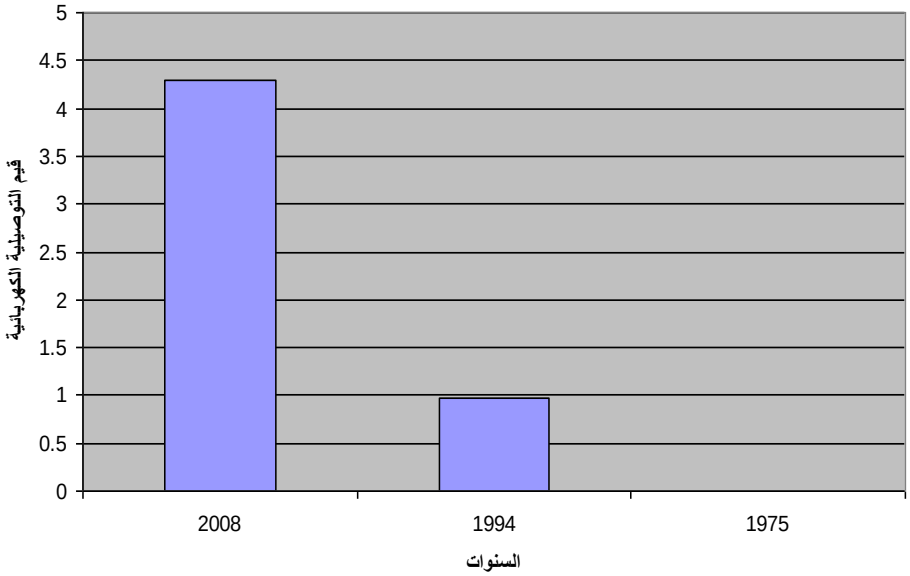
From Table (6), we note the results of electrical conductivity measurements in the water samples of the study area, as the highest value was recorded in the stations of Umm Al-Naaj, Al-Shafi and Al-Sanaf marshes , reaching (10.4 , 10.4, 8 , 10) milli-Siemens/cm respectively in the hot season, while the lowest value of electrical conductivity was recorded in the Umm Al-Naaj marsh station , reaching (4 , 1) milli-Siemens / cm in the cold season, and this indicates the existence of a variation in the values of electrical conductivity in the water samples of the study area.

When comparing the (EC) values with the national and international standards shown in Table (6), we find that most of the values exceeded the permissible limits, which are (0.4) milli-Siemens/cm.

From Figure (4), we note that the values of (EC) in this study are high when compared with the results of the analysis of previous years.

The reason for the high electrical conductivity values in the hot season is due to the low rates of drainage of marsh water, which leads to an increase in the concentrations of dissolved ions and their concentration in the water. Agricultural activities also play an important role in increasing the electrical conductivity values and what is required in terms of the use of fertilizers, in addition to throwing waste directly into the marsh waters ( ) .
From this we conclude that electrical conductivity is directly proportional to the concentrations of dissolved ions and that the concentration of dissolved salts is in turn inversely proportional to the discharge rates.

Figure (4) Comparison of the results of electrical conductivity values in the marsh waters of the study area For the period from (1970-2007)



Source: Based on Table (7)

4- Hydrogen (pH)*

pH is an important variable that must be measured and is of great importance in quantitative calculations of saturation states ( ) . It is also the controlling factor for most reactions of gas-water-rock systems such as: hydration, polymerization, adsorption, complexation, and oxidation-reduction reactions ( ) . Measuring pH in the field is also important for assessing water quality due to its relationship to the problems of both corrosion and taste change ( ) .

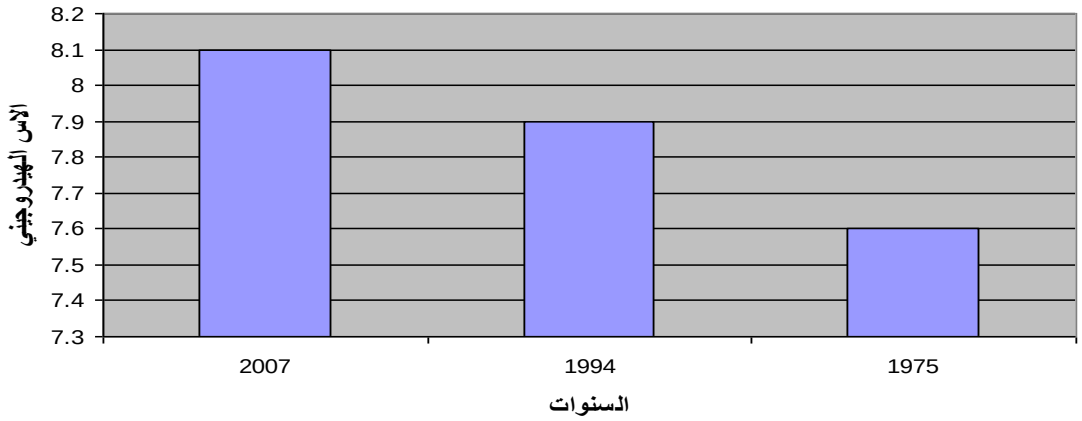
The factors that affect the pH value are (temperature, the presence of bicarbonates, calcium, and plants), as the process of photosynthesis reduces the amount of CO2 and then works to increase the pH ( ) .

The results of the water test showed a difference in the pH values in most of the study stations. By observing Table (6), we find that there is an increase in the pH values to range between (15 , 8 - 01 , 9) in the Al-Mashab and Al-Sanaf stations , respectively, in the hot season, while most of the pH values during the cold season were within the standard limits (7.45 - 8.12) in the Hori Al-Sanaf and Al-Shafi stations , respectively, as the marsh waters were predominantly alkaline, and this was evident from the pH values . In the Al- Hammar and Al -Hawizeh marshes , which is a characteristic of Iraqi local waters ( ) due to the calcareous nature of the sediments of the Tigris and Euphrates rivers.

The pH values are linked to several factors, the most important of which are the difference in temperature and the presence of algae and aquatic plants. The rise in temperature in the hot season leads to an increase in the photosynthesis process and the deposition of organic matter, which in turn increases the consumption of carbon dioxide. The massive growth of aquatic plants also leads to a reduction in the amount of CO2 , especially in the cold season, where we notice an increase in pH values ( ) . In general, the reason for the slight changes in this factor indicates that the marsh waters have a high buffer capacity due to the high concentrations of carbonates and bicarbonates.

When comparing the pH rates in the current study with the results of the analysis of previous studies shown in Figure (5), we find that the pH value of marsh water is subject to a clear variation between high and low values as a result of the difference in carbonate and bicarbonate concentrations within the study station sites.

Figure (5) Comparison of pH results in the marsh waters of the study area For the period from (1970 - (2007)



Source: Based on Table (7)

Conclusions

The research reached a number of conclusions, which are:

1- The marshes are located within the unstable platform of the Earth's surface, as they were affected by tectonic activities that the region's basin was exposed to, causing the marsh area to be in a state of continuous subsidence.
2- Groundwater with varying salinity characteristics was able to vary the distribution of agricultural production areas in the study area.
3- The soil of the Basra marshes is unique in that it is clayey with low porosity, and two-thirds of the soil of the Maysan marshes is a silty clay mixture, which makes it more porous, while the soil of the Dhi Qar marshes tends to be silty clayey, making it more porous than the soil of Basra and less than the soil of Maysan.
4- Due to the lack of organic matter in the soils of the marshes of the study area and the very low porosity, it has become a stagnant soil that retains water.
5- When the marsh soils were exposed to drying, they lost many of their properties due to their long exposure to drought and solar radiation, which affected their structure, creating an imbalance in the ecosystem, although they regained some of their natural properties.
6- The decline in water levels and the rise in temperatures in the marshlands have greatly reduced animal and plant life due to the changes occurring in the physical and chemical properties of the water.
7- The main marshes that were drained, whether within the Hawizeh Marsh or the Hammar Marsh, have not fully recovered their water. This reflects the clear shortage of water in the Tigris and Euphrates rivers as a result of the dams built on them, whether in Turkey or Syria. The need for fresh water has now become part of the political and economic thinking of countries, and this requires open policies based on mutual interests.
8- The phenomenon of global warming and the scarcity of fresh water have been accompanied by an increase in the world population. The countries in which rivers originate have built irrigation projects and dams on them in order to compensate for the great demand for them. This applies to Turkey, which is the source country for the Tigris and Euphrates rivers, which requires the establishment of good neighborly relations and the exchange of benefits between the source country and the downstream country.
9- is linked to the political situation, especially between countries that do not have energy and have water, and countries that represent the mouths of these rivers and have energy, such as Turkey and Iraq, which led to the trend towards water as a means of adopting the principle of energy for water.
10- Despite their environmental importance, the marshes may now be a difficult reality in the face of the challenges facing the world's population, from the need for fresh water, which has been decreasing significantly, to the point that drinking fresh water for free has become a thing of the past. This has been reflected on the inhabitants of the marshes, especially after the submergence, which brought nothing but salt water to the marshes, which forced those inhabitants to leave their places again and return to the places where they settled when they dried up.
11- The political situation that Iraq has been going through since the beginning of the nineties has pushed the ruling authority to think about blocking water and preventing it from reaching the marshlands, which has had a complete impact on its environmental situation, leading to its collapse through many of its previous features, whether in the quality of water or soil or the amount of birds and fish that reach it, and the plants in it and the plankton that live in it, which are food for living organisms within this environment.

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