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Environmental Impacts of Salt Tide in Shatt Al-Arab-Basra/Iraq

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Abstract : *The estuarine environment areas where the fresh river water meets the salty sea water resulting in particular features of the environment. It includes the estuarine environment in Iraq, all from the mouth of Shatt al-Arab in the Arabian Gulf and Khor Al-Zubair and the mouth of Shatt al-Basra and Khor Abdullah and even some southern marshes that high tide and low tide arrive. The problem for research that changed the hydrological characteristics of the Shatt al-Arab has exacerbated the problem of tidal salt to the upper river in the province of Basra and increasing concentrations of total salts TDS. Thus, the study aims to determine the factors affecting the change amounting to water discharge levels and the impact of water on increasing concentrations of salt in the watershed. The research results show that the extent of the salt tongue in the Shatt al-Arab was due to natural factors, including climate change, drought and lack of human water drainage and other related to water resources management and policy aquatic neighboring countries. The salt water advance has an adverse impact on other vital agricultural, environmental, and economic activities in the province of Basra.*

I. Introduction

The estuarine environment areas where the river with fresh water meets sea salt water resulting, in particular, features of the environment. The organisms that live in this environment are characterized by its ability to withstand changes in water temperature and salinity rate and the concentration of suspended sediment, where the water is dynamic and unstable [1]. The most important characteristic of estuaries is its high levels of nutrients, as a result of washing organic materials and agricultural chemicals from neighboring land to the estuary. The nutrients predispose turn compromise suitable for plant growth, with the help of other factors. Thus, is of high productivity and is appropriate for the life of different types of aquaculture [2]. There are fish tend marine life for their entire lives, but they reproduce and multiply in estuaries or freshwater as it is in the patient fish in the lower part of the river Shatt al-Arab. It is an important species in commercial terms and in raising the income levels of rural households in the province of Basra, especially in the judicial Fao and Abu Alkhaseeb. As well as, the other types of fish are intervened to the mouth of the river on a seasonal basis to get food [3].

The salt tidal is well known as (Salinity Intrusion), which is a phenomenon of salty seawater progress toward upstream. It is a natural phenomenon subject to many factors such as the flow of the river (River Inflow) which is the key to controlling the incursion of salt. The main reason for the lack of flow is the global climate change, the tidal Rang, the difference in density between sea water and fresh water, and the topography of the river (Bathymetry and Topography), temperature and sediment (sediment transport)[4]. Moreover, the human activities, all are important factors that increase the incursion of salt. The coming tide energy rates from the Arabian Gulf accompanied with the high salinity of the Shatt al-Arab have increased due to declining revenue stream Shatt al-Arab River and the rise of the Arabian Gulf water level due to natural causes and human activities. The most important factors caused this phenomenon are:

Climate Change and Drought

The climate changes and drought are the main challenges facing Iraq in general and the studied area in particular, and the extent of its ability to adapt and deal with them as well. These changes are causing the erratic water supplies and the inability to storage rainwater efficiently. Also, the decline of agricultural land and the deterioration of soil fertility and aggravation of diminishing rates water drainage in the rivers Tigris and the Euphrates and the Shatt Al-Arab. Besides, the risk of decline in the marsh area has lost an area of 379 km2 in 2008, and increased concentrations of irrigation water salinity, especially in southern Iraq and the potential decline in groundwater [5].

The decreasing of the amount of rainfall in other parts of Iraq, Turkey, and Iran affected the water security in the Shatt al-Arab and impeded economic and social development in this geographical territory. Iraq suffered from a drought the years 2007 and 2008, which caused a burden on the living environment in the province of Basra and the degradation of the surface quality of irrigation water and the deterioration of the productivity of agricultural land, as the recent study will confirm [6].

The increase in the amount of change in temperature rates as shown in Table (1) and the accompanying drought and low humidity rates and amounts of precipitation (Tables 2 and 3) had a direct impact on changing the components and characteristics of environmental regulations. These effects are including the mouth of the Shatt al-Arab water in the province of Basra. These environmental parameters caused a negative impact of on various economic activities, as the high temperatures rates represent a thermal energy added to the ecosystem in turn to affect the rest of the other climatic elements that reflected negatively on the ecosystem components in the region [7].

Table 1: the amount of minimum and maximum temperature changes (ºC) in the province of Basra for the period of 1946-2011 [6].

Temp / Month	Sep.	Oct.	Nov	Dec.	Jan.	Feb.	March	April	May	June	July	August
Min.	+2.8	+2.6	+1.2	+1.0	+0.7	+1.1	+1.1	+1.1	+2.3	+1.9	+1.5	+2.5
Max.	+3.0	+1.1	+0.1	+0.4	-0.4	0.0	+0.7	+1.8	+3.3	+5.1	+5.1	+4.5

Table 2: the amount of changes in the relative humidity (%) in Basra province for the period 1949-2011 [6]

Months	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	August
Relative humidity	-20.0	-14.4	-11.7	-12.9	-9.4	-12.2	-15.0	-18.8	-22.5	-25.6	-24.0	-21.8

Table 3: The amount of rain quantity (mm) in Basra province for the period 1990-2011[6]

Months	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	August
Relative humidity	0.0	-8.5	-4.7	-6.1	-10.7	-6.2	-26.2	-2.5	-2.5	0.0	0.0	0.0

2. The salt water of Arabian Gulf impacts the Shatt al-Arab during the periods of tide and periods of South East winds that reaches the district of Abu Alkhaseeb. The high discharge of the Shatt al-Arab during the flood season in previous years had lead to the receding tide water-bearing salt prompt to the lower part of the river, while dissolved salts rates rise during the summer season, as the fit of dissolved salts in the Shatt al-Arab is inversely proportional to the drain quarterly and annually. However, in recent years, the saline tide exceeded the district of Abu Alkhaseeb down to the Al-Aashar, and it extends in the dry years up to Al-Hartha north of Basra city [8].

3. The establishment of irrigation projects and dams:

The irrigation institutions at the top of the Tigris and Euphrates projects affected by decreasing the amount of water revenue, which had an adverse impact on meeting the water needs and the deterioration in water quality. The establishment of dams and reservoirs as the dam built on the Swaib River and the dam on the Euphrates River in Basra province led to change the nature of the hydrodynamic system of Shatt al-Arab continually. The Shatt al-Arab River becomes highly depends on the Tigris River for the fed water while the Rest Rivers and streams (Swaib, Euphrates, KarmatAli and Karuna) are closed [9].

The Shatt al-Arab depends on the amount of water rate provided to the province of Basra from the Tigris River. As can be seen from the Table (4), this provided water volume fell in 2014 to 60 m3/s compared to the seventies of the twentieth century, which was 207 m^3/s. The amount of drainage water in the Shatt al-Arab rates also dropped for the time being compared to the sixties and seventies of the twentieth century. It was in Al-Maqal about 730 m^3/s in duration (1948-1960) and 919 m3/s for the period (1977-1978) and decreased to 758 m3/s in duration (1986-1987) and to 709 m3/s in duration (1995-1996) to 246 m^3/s in duration (2007-2008) and to 196 m^3/s of water for the year 2011-2012 [10].

This paper aims to demonstrate the impact of the salty tide on the environment of the province of Basra after decades of drought and bad use and worse treatment process for its effects on the environment. The study included the environmental impacts of the Shatt Al-Arab, which consists of the confluence of the Tigris and the Euphrates rivers who meet in the town of Qurna, 70 kilometers north of the city of Basra (Map 1) to form Shat Al-Arab with a length of 200 km until the estuary in the Arabian Gulf. The Karun River war poured in Shat Al-Arab at 40 km south of the city of Basra [11].

Table 4: the conduct of the Tigris River (m^3/s) in the province of Basra for various interval of years [8]

Years / months	1977-1978	2011-2012	2013-2014
Sep	362	41	44.17
Oct	315	52	45.2
Nov	190	51	45.2
Dec	126	69	43.3
Jan	71	24	51.17
Feb	75	33	65.54
March	106	32	80.37
April	158	43	63.4
May	200	41	73.5
June	241	46	69.6
July	297	54	72.2
August	342	67	66.6
Average	207	44	60.0

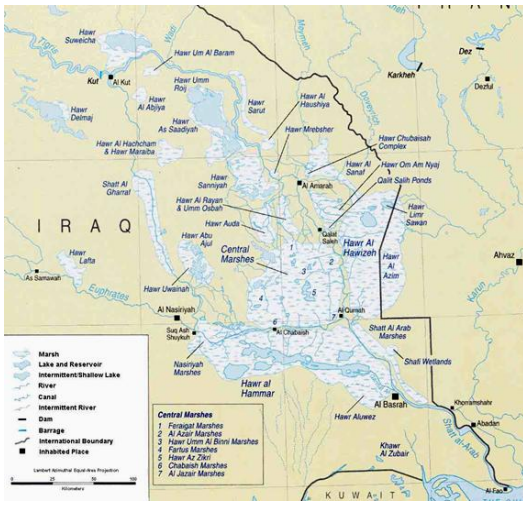

Fig. 1: the course of the Shatt Al- Arab River in the province of Basra

II. Methodology

The study followed the analytical method for the subject based on data on the studied salty tide phenomenon. The data obtained from:

1. The office sources related to the topic.
2. The field study that included:

a. Visiting the Environment Directorate in the province of Basra to obtain data on the concentrations of dissolved salts rates in the Shatt al-Arab water samples taken from the sites (Qurna, Al-Maqal, Ceyhan in Seebah area, and Fao) for the year 2013-2014. The study relied on two readings per month that were analyzed in the Directorate Environment labs in Basra.

b. The access to agricultural data of Basra Directorate of Agriculture for the period of 2001-2012. The data represented the cultivated area with various crops.

c. Obtained data for water drainage and concentrations of different salts review of the Directorate of Water Resources in Basra for variable years.

III. Results and Discussions

From a review of the available data, one can refer explicitly to environmental hazards in the province of Basra. The persistence of low water levels and lack of water drainage have overlapping effects on various economic activities, as follows:

1. The Deterioration of the Water Quality of the Shatt Al-Arab:

The data listed in the Table (5) reveals high salinity rates in the Shatt al-Arab water for the years from 2008 to 2009, in Qurna sites and Al-Maqal and Saybah and Fao. We find that the Shatt al-Arab water salinity

increases with the decline south towards the downstream due to the lack of water revenue in the basins of the Euphrates and Tigris. Also, the alteration of the Karun River watercourse, which was the most significant freshwater tributary of the Shatt Al-Arab, caused an increase in the salt of its water. The salt concentration rate was 4333 mg/l in Qurna and increased in Seebah to 12303.91 mg/l and in Fao reached 14735.33 mg/l.

Table 5: the dissolved salts concentration (mg/l) in the Shatt Al-Arab water for the year 2008/2009 [7]

Location / Month	Al-Qurna	Al-Maqal	Alseebah	Fao
Sep	5920	5975	12300	15400
Oct	6120	6900	18220	19920
Nov	6130	7120	34040	35200
Dec	7120	13120	38200	44500
Jan	2800	2820	4618	4900
Feb	2350	3300	3900	4950
March	2810	3120	3950	5110
April	3021	3250	3368	5550
May	3021	3400	3370	8150
June	3106	4221	8235	9200
July	4388	4428	8276	11444
August	5210	5421	9170	12500
Average	4333	5257	12303.91	14735.33

The laboratories analyzations show high salts concentrations in the irrigation and drainage network branching from the Shatt al-Arab. The percentage of total dissolved salts in irrigation water in the henna farms and palm groves in the Fao in August 2009 according to the results of the analysis in the laboratories of the Directorate of Basra Environment was as the following:

feeder 1. Near the main pump for the henna farm, the concentrations were 20172 ppm.

2. At the beginning of the feeder channel for the henna farm, the concentrations were 19554 ppm.

3. The center of the feeder channel for the henna farm, the salt concentrations were 19554 ppm.

4. The channel for palm plantation in Fao the salt concentrations were 20392 ppm.

The listed data in Table (6) indicates low concentrations of total salinity. However, it is still above the permissible limits for agricultural uses.

Table 6: the dissolved salts concentration (mg/l) in the Shatt Al-Arab water for the year 2013/2014 [13]

Location / Month	Al-Qurna	Al-Maqal	Syhan/Alsybah	Fao
Sep	1275	1564	5426	25070
Oct	1450	1819	12559	35200
Nov	1334	2343	10945	35663
Dec	1203	3029	3302	22077
Jan	1039	1273	2343	11960
Feb	1420	1995	2023	6645
March	1253	1504	1889	10544
April	1420	2650	2269	3254
May	1658	6131	3226	3489
June	1650	4335	2856	34886
July	1185	2751	2234	4823
August	1020	1677	1685	20843
Average	1325.5	2589.2	4229.7	17871.1

The deterioration of soil properties and reduced the actual cultivation area under its averages of the last century. As the irrigation of agricultural land with poor contaminated quality and high salinity leads to increase the soil salinity. Then, the use of irrigation water contains a concentration of salt of about 1000 mg/l at a rate of adding an annual amount of 100 cm of water per hectare (4 acres) leads to the accumulation amount of salts in the soil up to 10 metric tons (10,000 kg) per 4 acres.

The climatic and hydrological characteristics change leads to the consequent change in the poor productivity of the soil resulting in a negative shift of area planted various vegetable crops in the province of Basra. Table (7) shows the deterioration in the cultivated area indicators. This area shrunk from 313078 acres in the year to 2001 to 118423 acres for the year 2012.

Table 7: the rate of the cultivated area (acres) for the period 2001-2012 in the province of Basra [8]

Years	Area	Changing percentage %
2002-2001	313078	-
2003-2002	268571	-14
2004-2003	228466	-15
2005-2004	236516	4
2006-2005	225272	-5
2007-2006	211962	-6
2008-2007	196467	-7
2009-2008	180167	-8
2010-2009	59545	-67
2011-2010	125364	111
2012-2011	118423	-6

2. The Impact on Crops:

As irrigation water salinity affects plant growth by reducing the moisture available to the cultivated plants as a result of the osmosis pressure of the soil solution and the nutritional imbalance of the plants added to the toxic effect of some ions when their concentrations are high. The salinity causes the stunting of plants. Besides, it causes the fall of flowers and fruits of some crops resulting ina poor quality depending on the sensitivity of cultivated plants and its resistance to salinity. Table (8) represents the proportion of the damage to the area of crops grown in the Fao resulting from high concentrations of salt in the Shatt al-Arab during the summer season of 2009.About 65% of the planted area with palm trees, though it is from the trees resistant to salinity, was affected. In addition to 90.95% of the sensitive vegetable crops to salinity were affected.

Table 8: the planted crops area (acres) and the percentage of damages in Fao for the summer season of 2009 [14]

The crop	Cultivated area	Damage proportion %	Agricultural province
Palm trees	1000	65	All areas in Fao
Paper vegetables	150	85	Al-Maamer, Aldoura
Bean	16	90	Al-Fadakia, Aldoura
Henna trees	420	95	South Fao
Pepper	5	95	Al-Fadakia, Aldoura, Almaamer
Aborigine	5	95	Al-Fadakia, Aldoura, Almaamer
Pamia	25	90	Al-Fadakia, Aldoura, Almaamer

The affected planted vegetable area varied, rising from 43 acres in the Seebah area to 519 acres in the district of Abu-AlKaseeb center. While the affected area in the region of the Shatt al- Arab was 1250 acres bringing the total affected area cultivated with vegetables to 1987 acres for the Summer season of 2009 in the areas (Fao, Abu Alkaseeb, and Shatt Al-Arab).

Table (9) clarifies the total affected palm trees were 77694 trees, and the number of deceased ones 16073 Palm, while the perishable seedlings were 38455 seedlings for the year 2009, and were mostly within orchards of Faoarea. Also,the high concentrations of irrigation water salinity resulted in the poor quality of the fruits of the palm at the summer season, where the percentage of damage the produced date reached 75% in Fao, and the farmers forced to used it mostly for animal feed.

Table 9: the number of the deceased or injured palm trees in Basra province for the year 2009 [14]

Management unit	Injured palm trees	Deceased palm trees	Deceased palm shoot
Fao	67580	16000	18371
Al-Seeba	7614	73	5342
Abu-Alkhaseeb center	2500	-	12352
Shat Al-Arab area	—	—	2390
total	77694	16073	38455

The total numbers of the affected fruit trees and other (grapes, pomegranates, figs, fig, olive, apricot, Sidr, Apples) were about 57753 trees for the year 2009. These trees distributed in Fao 34916 trees and 14707, 8130 trees in each of the district of Abu Alkaseeb center and the Seebah area, respectively. The above environment changes contributed to changing the natural properties suitable for the cultivation of various fruit trees that were planted in the fifties of the last century in the province of Basra (Table 10), where some of it extinct and the others cultivated ones are not producible or have too low productivity.

Table 10: the number of planted fruit trees (tree) by type for the years 1957/1958 and 2011/2012 in the province of Basra [12]

Tree type	1957-1958	2011-2012
Pears	100	-
Peaches	3854	-
Anjas	173	-
Apricots	6493	-
Grapes	29967	800
Oranges	11163	-
Pomegranate	12968	1208
Apples	3153	-
Figs	3386	580
Olive	17	889
Limes	1721	-
Sweet lemon	1006	-
Other types	2105	-
Buckthorn	-	74950
Berries	-	500

3. The Impact on Livestock and Natural Pasture:

The increase the proportion of Shatt Al-Arabs salinity affects negatively the growth of aquatic plants and the growth of the banks of rivers, plants and the lack of diversity of natural plants and other extinction and the degradation of others, and thus degradation of natural grasslands and low productivity in the Shatt Al-Arab region. Then, it will turn the productive areas to an area of land and soils of non-productive and non-suitable areas for agriculture. Also, it will reduce green spaces, which helps to desertification creep with it various manifestations to the Shatt Al-Arab region.

The total number of affected cows was 3671 head. It reached in Fao, the district of Abu Alkaseeb center, Seebah about (3243, 159, and 269) head, respectively for the year 2009. The total buffalo affected were 46 head, and the entire affected sheep was 672 head, distributed by (468,145, and 59) head in each of the Fao, the district of Abu Alkhaseeb, and Seebah, respectively for the year 2009.The damage to cultivated crops forage area reached about 426 acres of which 251 acres in the district of Abu Alkaseeb center and 23 acres in the Seebah and 152 acres in Fao, for the year 2009.

5. The Impact on Fisheries and the other Vital Environment and Components in the Shatt Al-Arab:

The water salinity increase leads to the loss of biodiversity and damage to fisheries fluvial and marine fish in the north-west of the Arabian Gulf. As well as, lower amounts of sediment to build the Delta and increase the loss of agricultural land and the growing problem of food shortages, food insecurity and high malnutrition diseases and other diseases caused by the use of contaminated water rates. The river water salinity rising rates lead to events of varying degrees of toxicity and create unfavorable conditions of the aquatic environment, causing the loss messaging with excessive salinity sensitive marine organisms, and affects public health to aquatic organisms and their ability to reproduce and grow how they influence the safety of bio-diversity and effectiveness of operations. The diversity of fish has declined in the Shatt al-Arab environment from (68) type to (26) form. The high salinity has led to the death of fish in fish farms in Seebah area. About 30 fish farms were affected in the province of Maheala.

The mouth of the Shatt al-Arab area is an important environment for breeding and incubators for fish and crustaceans as it is an ecosystem that require some aspect of their life cycle. Increasing salinity in the Shatt al-Arab leads to the destruction of some strains of fish that breed in low salinity waters before migrating towards more salinity of the Arabian Gulf. As the high salinity leads to the destruction of the proliferation of shrimp and several species of marine organisms regions and, therefore, a significant reduction in the fisheries production, which form a pattern of living of the population in the Shatt al-Arab region in particular, and the province of Basra, in general.

Many of the fish left the Shatt al-Arab because of the high rate of salinity and the entry of other exotic fish for the fresh water. In addition to the presence of marine sunk boats and ships that tear fishing nets. There are much valuable fish in the Shatt al-Arab disappeared and migrated towards the north of Basra toward the marshes (such as carp and Buni and Alktan).It is now very rare in the Shatt al-Arab and replaced by some marine fish, and this led to rising river fish prices in the local markets compared to prices of farmed fish in artificial lakes.

6- The Impact on Beekeeping

The effect of high salts concentrations in the water on beekeeping indirectly because of affected the primary feeding sources, where this led to the deaths of hives in the area or migrate to other places. The number

of apiaries affected has reached 1176 unfastened distributed as follows: 26, 1087, and 63 unfastened in each of the Fao center, the district of Abu Alkaseeb, and the Seebah area, respectively for the year 2009.

7. The Economic and Social Impact on People's Lives

The high concentrations of salts college in the Shatt al-Arab impacts negatively on the lives of the general population in the region and led to increased monthly spending visual citizen. The costs of the purchase of drinking water and water required to wash rose in Seebah and Fao where the price of one ton of water reached 20,000 Iraqi dinars in 2009.

Table 11: daily rates within months of the year temperatures (°C) for the year 2009 and general rates in the Al-Hussein station [15]

Rates / Months	Daily rate		Maximum		Minimum	
	2009	General rate	2009	General rate	2009	General rate
Sep	33.8	33.0	43.2	42.0	25.5	24.6
Oct	29.0	27.1	37.1	35.7	21.7	19.8
Nov	19.8	19.5	26.6	26.8	14.8	13.6
Dec	15.9	14.0	21.3	20.0	11.4	9.0
Jan	11.4	12.2	18.8	17.9	5.3	7.4
Feb	16.9	14.7	23.2	20.8	11.8	9.2
March	19.9	19.1	27.5	25.3	13.7	13.4
April	25.4	25.8	32.2	32.5	19.3	19.4
May	33.8	31.3	41.3	38.8	26.6	24.7
June	37.8	35.2	45.6	42.8	29.4	27.2
July	37.8	36.7	45.4	44.5	29.8	28.8
August	37.7	36.1	46.4	44.5	29.2	27.9

The fresh water quantity processed to the affected areas by mobile basins was 700 tons /day/ months in the summer of 2009.The purchase price of 20 liters of water is 750 Iraqi dinars in some areas and remote villages. The high concentrations of salts caused filters and nutrients erosion in the liquefaction plants that take water directly from the river course of the Shatt Al-Arab. High drinking water prices and the worsening liquefaction due to water pollution resulted in higher portable water and snow mold costs. Also, many ice plants stopped working that coincided with rising temperatures rates for the summer months compared to the general rates and the increase in cutting power supply hours. Table 11 and Table (12) indicate the average monthly temperature and humidity for the year 2009.

Table 12: the annual rate of relative humidity and temperatures in the province of Basra, for the period from 2005 to 2013 [16]

Years	Relative humidity (%)	Min. temperature	Max. temperature
2005	42	20.4	35.0
2006	43	19.1	34.1
2007	35	22.6	37.4
2008	41	19.2	33.9
2009	40	19.9	34.1
2010	37	21.4	35.5
2011	38	19.9	33.0
2012	39	20.7	34.0

The high salinity and low water levels rates contributed to the life paralysis economic in general in the province of Basra. The number of hours continuous power cuts has increased, a result of low water levels in the Shatt Al-Arab, which contributed to the withdrawal of small fish the river and aquatic plants and impurities and other pollutants to the filter of Al-Najibiyah and Al-Hartha stations, and thus clogged and need to be cleaned and ongoing maintenance. Therefore, power plants stop most of the day, which reflected negatively on the increase monthly expenditure of citizens in the region to buy a home or maintenance of generators and fuel purchase necessary for its operation and its backup tools.

The higher salinity concentrations impact negatively on the incomes of the farmers and peasants due to preparing them for the land and the failure of cultivated in the summer season of 2009. The failure of the productivity of crops grown, for example, that the henna tree produces annually amounts of henna that is sold in the domestic market at a price of powder 500 Iraqi dinars/ kg for the year 2009.No doubt, that the planted area in these trees damaged and will leave a negative impact on farmers' income in Fao.

The salty tidal wave led to the displacement of some buffalo breeders and some residents of Fao and Seebah to Basra city center and thus increased the pressure on services, which already suffer from significant

problems. So, this and thus salty tidal wave had a negative impact on the city of Basra, in addition to the deterioration of the surrounding agricultural territory.

It can be told through the proceeding that the Shatt Al-Arab water pollution in the dissolved salts and its effects on the environment is beyond the reasonable limit (the infection can be considered as a hazardous in the district of Abu Alkhaseeb center while it is a disaster in the Seebah and Fao) for the year 2009. The Pollution danger is in its quality and quantity of pollutants that exceed the environmental safety critical line or the permitted pollution concept. It began its negative impact on the natural environment and human in various forms. The devastating pollution is the most dangerous types of pollution where the pollutants exceed the danger limit contact to the killer or destroyed limit. When the environment reaches this limit, the ecological system collapses and becomes unable to give due the disruption of the ecological balance.

IV. Conclusions

The region affected by the climate change and drought, which reflected negatively on the decline in revenue and provided water. Also, the area impacted with the salted tongue coming from the Arabian Gulf to the Shatt Al- Arab, the recent study found the following:

1. The salt concentrations increase is considered as one of the problems of the estuarine environment that require appropriate solutions to preserve the ecosystem and the optimal use of those waters.
2. The concentrations of total dissolved salts in the waters of the Shatt Al-Arab for the years (2009-2014) rose compared to previous years and exceeded the permissible limits for irrigation and drinking animals.
3. The low water levels of the Tigris and the Euphrates that fed Shatt Al-Arab caused small water discharges reaching the Shatt Al- Arab was one of the reasons that contributed to the increasing of salt concentrations.
4. The close of Karun River water coming from the Iranian territory about Bhmsheer canal which was feeding the Shatt Al-Arab freshwater in previous years can be considered as one of the leading causes of increasing the salt concentrations in Shatt Al-Arab water.
5. The pollution of the Shatt al- Arab water by drainage from agricultural lands (Iraqi and Iranian). Moreover, 70% of the sewage and drainage channels contaminated water flowing into the main course of the Shatt Al-Arab.
6. The deeperof saltwater wave (extending the salt waters tongue from the Arabian Gulf) in the Shatt Al-Arab and the arrival of its impact on the province of Basra center for the year 2009; also, can be considered as one of the primary sources of increasing salt concentrations.
7. The deterioration of the surrounding ecosystem of the Shatt Al-Arab River with its various components (soil, water, vegetation), with irrational or agricultural, or the animal, river, land and wealth.
8. Te social and economic deteriorating situation of the inhabitants of judicial Fao and Abu Alkhaseeb and the migration of some of their farmers toward Basra province center, even the province of Basra announced the environmentally -stricken areas by the official authorities in Iraq.
9. The deterioration of services in the center of the city of Basra because of the increased emigration of the rural population to its direction.

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