The Peerian Journal
Open Access | Peer Reviewed
Volume 25, December, 2023.
ISSN (E): 2788-0303
Website: www.peerianjournal.com
Email: editor@peerianjournal.com

The impact of environmental pollution on biodiversity in the Shatt al-Arab/southern Iraq: A review Article

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Abstract: Stalinization and the deterioration of the quality of the Shatt al-Arab water cause a state of severe water scarcity due to the water being unfit for drinking, whether for humans or animals, in addition to agriculture, which prompted many to migrate to these areas for fear for themselves and their livestock. Therefore, Iraqi experts and officials warned of an environmental catastrophe in Shatt al-Arab due to the significant increase in salinity, which has now exceeded uses for agricultural purposes, which led to the destruction of marine life. The environment of the Shatt al-Arab was good and suitable for many types of aquatic life, but it has become, like seawater coming from the Gulf, unsuitable for many types of marine life and fish which caused a severe shortage. Pollution in the Shatt al-Arab River comes as a result of the lack of fresh water supplies from the main sources of the rivers Tigris and Euphrates rivers, where the Shatt al-Arab represents the meeting point of these two rivers, in addition to cutting off the Karun River, which comes from Iran and feeds the southern part.
Keywords: Environmental Pollution, Biodiversity, Aquatic system, Shatt al-Arab

A review Article Problem: The level of pollution, in terms of its effects on agriculture and life, reaches 100% in Iraq, and the water of the Shatt al-Arab cannot be used for life currently, as it is currently used only as a canal for navigation purposes, and not as fresh water for drinking, agriculture, or even washing.
A review Article Objective: This article attempts to describe many factors that led to this pollution. Technically, in recent years there has been a phenomenon of global warming and a decrease in rain and river tributaries, as a result of a decrease in the amount of water passing through the Tigris and Euphrates rivers.
The method of the article: Discuss the importance of follow-up management appropriat of the aquatic environment in the Shatt al-Arab to reduce aquatic environmental pollution and protect it from the release of domestic and industrial waste because of its impact on aquatic biodiversity, as well as its impact on human health by conducting laboratory tests on water quality while requiring oil companies operating in Basra Governorate: It is necessary to filter environmental pollutants before releasing them into the environment.

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1-INTRODUCTION

Biodiversity faces great pressures that affect its distribution in the Iraqi environment, which depends on the interaction between the demands of the organism and the conditions surrounding its habitat. The change in environmental conditions during recent decades due to a number of factors, the most prominent of which is environmental pollution, has led to the disappearance of some environmental manifestations, which has resulted in the disappearance and appearance of some types of organisms snake [1]. The change in the nature of the Shatt al-Arab waters led to an imbalance in the fish biostructure, which resulted in the introduction of some exotic species that did not exist previously, as the quality of the water became suitable for their growth and reproduction, and thus had negative effects on the quality of local fish, which rushed to search for other places that were more suitable for its growth and reproduction[2].

1-1 Invasive fish

Have become widespread, which have entered an environment and spread in an excessive, epidemic or unwanted manner, this species also establishes itself in natural or semi-natural environments or systems and threatens the original biodiversity[3]. Therefore, invasive species are one of the most important factors influencing the change in biodiversity, it is at the global level or at the level of one country, because it leads to the elimination of the original local species and replaces them through competition, expulsion, occupation of nests, or hybridization with the original species that are genetically close to them, which reflects its economic and environmental effects, in addition to the fact that this invasion will lead to serious changes in the composition, quality and distribution of species in invaded areas, leading to the unification of animals and plants in the invaded area and thus the loss of biodiversity[4]. Invasive species also lead to genetic pollution of the original species, threatening them with the risk of extinction, as this type of pollution occurs as a result of hybridization that it leads to the creation of more uniformity and the replacement of local genetic structures as a result of the increase in the numbers of the invasive species. One of the most prominent and important characteristics of the invasive species is its rapid growth and reproduction, its high ability to spread, its flexibility in changing appearance, its high ability to compete, as well as its tolerance to a wide range of environmental conditions. It can be defined as a species, some species, or a lower taxonomic unit outside its natural range that can survive and be able to reproduce later[5].

Invasive species are one of a whole group of factors that affect ecosystems, so it is not easy to determine the percentage of the impact that can be attributed to invasive species. Since the seventeenth century, invasive species have caused about 50% of the total number of extinctions, and the impact is still continuing as they are exposed to Most endangered species are at risk due to alien species, so the impact of invasive species can appear in several aspects, including according [6]:

1 – Environmental impacts: Invasive species are biological pollution and have a great ability to persist and spread into new environments. Their impact on the local natural ecosystem is irreversible and often requires many years to be repaired and the impact of invasive species removed. According to (IUNC) (International Union for Conservation of Nature) Invasive species are the second most prominent threat to biodiversity, as they have caused the extinction of about 112 species of chordates around the world, in addition to becoming predatory, parasitic,

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hybridizing, competing, or causing diseases to indigenous or endemic species, as is the case with the Nile flower, which has significant damage to Local aquatic environment.

2 - Economic impacts: It is one of the biggest problems facing the economy, as it causes severe damage that affects the economy at the global level, and most of these losses are the result of invasive pests, in addition to the increase in poverty and the threat to sustainable development through its impact on the agricultural sector, fisheries, human health, and living organisms. Wilderness is often the basis of livelihood for people in developing countries. Freshwater fish that are exposed and threatened face a number of problems resulting mainly from habitat modification or change due to human activities and the resulting increase in environmental pollution, which plays a role in reducing fish diversity to the point that all species are destroyed due to the disturbances occurring. In changing the natural properties of water, as one study indicated that the change occurring in the natural properties of water is a clear and strong indicator of the change in biodiversity, so the spread of invasive species that the Shatt al-Arab waters are witnessing is indicator of the nature of the changes affecting the environment.

1-2 Invasive fish species

There are more than 15 species of invasive fish spread in the waters of the Shatt al-Arab including according [7] (Prussian carp, Common carp, Similar to Alhamri
Quail with sharp abdomen, Silver carp, Grass carp
Bighead carp and Planned running) , they are the result of factors of change in aquatic biodiversity, as they could lead to an adverse change in the ecosystem, resulting in the extinction of some local fish species, such as brown, catfish, carp, and others. Therefore, the introduction of these species It may be due to human activities, such as the construction of dams and reservoirs and the increase in environmental pollution, as well as some natural causes represented by high temperatures, lack of precipitation, and changing forms resulting from climate change[8]. One study indicated that invasive exotic fish threaten the nature of the fish population by about 21%. Water pollution resulting from sewage eliminates fish wealth by about 47%. Therefore, it is possible for invasive fish to enter fresh water after their habitats are exposed to danger, which prompts them to search for other alternative habitats, their presence raises concern in terms of threatening local resident species, which is reflected in the nature of fishing, as the amount of catch in the waters of southern Iraq decreased from (90.2%) for the period 1965 - 1973 to (18.97) during the year 2011, and in Kuwait the amount of catch decreased from (1100 tons) In 1994 to (120 tons) in 2000, and in Iran from (1142 tons) in 1996 to (114 tons) in 2000, according to what was mentioned in[9] .

There are species of freshwater fish that are in danger of extinction, the most prominent of which is salinity, as it is usually an indicator of water pollution, as any concentration outside the tolerance range of some fish can lead to their death due to the change in osmosis regulation resulting from the increase or decrease of ions present in the water, which affects basically, it has a negative impact on the metabolic capabilities of living organisms, especially the ratio of potassium ions to the ratio of sodium ions, as life processes cannot deal with other ions inside the cell, and it can also be affected by reducing the solubility of oxygen the solubility of oxygen decreases in water[10]. It is 20% saline than it is in fresh water at the same temperature), in addition to its impact on the productivity of zooplankton, which is directly linked to the productivity of phytoplankton. The major role in the performance of aquatic ecosystems, as they are the basis for

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the nutritional levels of crustaceans and different types of fish, as well as the entry and dominance of invasive fish, which have a great ability to withstand the changes that may occur in the water and which can feed on some local fish species that have weak resistance to invasive fish [11]. In addition, some local fish, such as browns, for example, lay eggs near the river's edges, which has recently become a place where liquid human waste is received directly and without significant treatment, which has directly affected the growth and reproduction of these species. Moreover, these species require a period of time ranging between 4-6 years to reach sexual maturity. The process of reproduction is unlike invasive or marine species that reproduce twice a year, as is the case with tilapia, perch, and other fish. Therefore, local species are at risk of extinction if they are not preserved by controlling invasive species. Therefore, fresh water has begun to lose some of the species that It has been prevalent for several decades in the past , which shows the fish that are in danger of extinction and belong to the family of cichlids, as they are characterized by their high nutritional value to humans, in addition to the very high economic returns they achieved whether for the state or for local fishermen[12].

1-2Salinity causing the collapse of biodiversity in the waters of the Shatt al-Arab

Salinity is considered the main cause of the collapse of biodiversity in the waters of the Shatt al-Arab due to a tongue of salty marine water entering the waters of the Shatt al-Arab River with a length of 160 kilometers, and environmental change whose worst manifestations are represented by the invasion of marine organisms into the river's course, as fishing, agriculture, and drinking water are no longer as they used to be in the region. The salinity of the Shatt al-Arab waters has increased, leading to the emergence of invasive marine organisms coming from the waters of the Arabian Gulf and the death of millions of fish, which threatens the lives of fishermen, fish wealth, and the agricultural sector, and even threatens the cessation of the city's water treatment plants[13,14].

There are several factors that have combined to cause the water of the river, which is formed at the confluence of the Tigris and Euphrates in southern Iraq, to become stalinized among them is the decline in the levels of the two rivers, and the Iranian authorities opening a project to drain salty water into the Shatt al-Arab from its eastern border with the Iraqi city of Basra, in addition to the rise in temperatures in Iraq[7]. In general, and in the Basra Governorate overlooking the river in southern Iraq in particular; It exceeds fifty degrees Celsius in the summer, as the Iraqi Ministry of Water Resources indicated that Basra Governorate is witnessing a tragic situation due to the high salinity of the Shatt al-Arab, as it has reached such high levels that it is not possible to continue the usual uses of water, as salt concentrations have reached the Sayhan area, the historical site of the mouth of the Karun River. Shatt al-Arab, to 25 thousand parts per million compared to two thousand parts per million in the Katiban area in the upper Shatt al-Arab, and this is due to two reasons, the first of which is the dumping of highly salty water during this period of the year from the Iranian side, as happened in previous years, as well as the high tide that pushes that water toward Basra city center[7].

Salt concentrations reached their highest levels in the center of Basra, which led to the departure of river fish that live on the waters of the Shatt al-Arab to the upper reaches of the river towards the Tigris and Euphrates, that is, towards the areas of Qurna and al-Amara, which led to the complete cessation of fishing movement in the Shatt al-Arab, in addition to the destruction of the herbs. Riverine that lives in the coastal environment, on the other hand, its waters were invaded by

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strange marine creatures. Jellyfish spread in large numbers and sizes, and introduced marine organism's alien to the Iraqi aquatic environment, including snails, plankton, and other types of fish. The sea water entering it reached more than 160 kilometers, while fresh water is in the surface layer only, indicating that the matter It also threatens the agricultural sector, and vegetable crops irrigated with Shatt al-Arab water are gradually disappearing, especially in the areas of Abu al-Khasib and the Shatt al-Arab District[7].

1-3 Problems that caused pollution of the water system of the Arab state:

The first of which is the treatment plants, which suffer from scarcity, and the plants available now are unable to cope with crises, and the people depend on drinking water transported by cars, as tanks are filled on a daily and weekly basis for the purpose of the usual daily uses of water. There are multiple problems related to the topic of the activity and its impact on the environment of the Shatt al-Arab[15,16].

In addition to other factors that can be summarized as follows according [7,15]:

1. Dredging and drilling work for the Shatt al-Arab Canal has stopped since 1980 until now due to the events and the wars the country is going through.
2. As a result of the large number of subsidiary rivers of the Shatt al-Arab, the percentage of different liquid discharges the river is estimated at about 70% of the wastewater of the Basra Governorate center and some district the areas through which the river passes.
3. There are also industrial, service, and agricultural water expenditures, such as a power generation station Al-Najibiya, Al-Haritha, the paper industries factory, hospitals, and service activities as well agricultural land expenses such as pesticides and fertilizers.
4. Violations resulting from marine industries and mooring sites and transgressions resulting from side trading of petroleum derivatives, smuggling and cleaning marine and river vessels.
5. The large number of sunken boats and military targets from ships and ships that have not been recovered yet.
7. The waters of the Shatt al-Arab become salinized as a result of the lack of precipitation (rain and snow) and the decrease in water sources from outside Iraq (the countries bordering Iraq in the Tigris and Euphrates basins and cutting off river water the main source of fresh water for the Shatt al-Arab and diverting its course into Iranian lands by the Iranian side[17,18].

The impact of the ongoing wars on the region and the subsequent use of prohibited weapons and operations

Military forces led to major destruction of orchards, canals, and small rivers in the area, in addition to population migration and the impact on the economic activity of this region, in view of the continuous pollution in the water system of the Shatt al-Arab waters, this article discusses the importance of this system, focusing on the most important causes and consequences caused by the deterioration of biodiversity in the waters of the Shatt al-Arab waters in southern Iraq.

2- Conclusions and Recommendations

Salinity causes the collapse of biodiversity in the waters of the Shatt al-Arab due to a tongue of salty marine water entering the waters of the Shatt al-Arab River with a length of 160 kilometers, and environmental change whose worst manifestations are represented by the invasion of marine organisms into the river's course, as fishing, agriculture, and drinking water are no longer as they used to be in the region by diversion of sewage water from Iran to the Shatt al-Arab, as well as the waste of the

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Abadan refineries, leads to major pollution in the environment of the Shatt. He adds that 70% of the areas of Basra have become unfit for drinking, and that cutting off the waters of the Karun River and reducing the waters of the Shatt al-Arab causes the waters of the Gulf to rise to it. Its water became salty and unsuitable for drinking or agriculture, which greatly affected agricultural activity and animal husbandry. Areas of Al-Faw, Siba and Abu Al-Khasib became afflicted, and large numbers of families were displaced as a result. The environmental conditions of the city of Basra are completely in a state of disaster in every sense of the word. With all definitions of the environment according to international standards, urgent measures are required to put an end to the dangerous environmental deterioration that threatens human life, agricultural life, and aquatic life in the Shatt al-Arab and all areas of southern Iraq.

Author contributions

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Acknowledgment: The authors would like to thank Mustansiriyah University (www.uomustansiriyah.edu.iq) Baghdad – Iraq for it support in the present work and extremely grateful to all the people help us to get our data.

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