Scholars LITERATURE

La Prensa Medica Argentina

Research Article

DOI: https://doi.org/10.47275/0032-745X-189
Volume 106 Issue 2

The Hydro Climatic Effects of Thermal Pollution on Surface waters in Iraq and its Biological Effects

Muthanna F Ali[1], Alyaa H Salman[2], Muthik A Guda[3], Ali Abid Abojassim[3] and B Almayahi[3]

[1]University of Kufa, Faculty of Arts, Najaf, Iraq
[2]University of Kufa, Faculty of Education for Girls, Najaf, Iraq
[3]University of Kufa, Faculty of Science, Najaf, Iraq

Abstract

The water affects many variables, which are achieved by the lack of compatibility in the proportions of water components according to international standards due to human and industrial waste, health and massacres and other places, which lead to raise the temperature of water from the permissible limit in a manner that affects the vitality of living organisms, especially fish, which is the main source of food for the population, As the fish wealth of various types were decreasing and decline in their numbers and types due to the nature of human uses of throwing dirt, sewage or wastewater from residential, industrial and commercial, which affect the changing temperature of water, except temperature that prompted the researcher to the need for a water quality analysis with respect to temperature and the extent of its impact on the changing nature of the preparation of living organisms.The research focuses on three main axes that highlight the scientific and correct objective of knowing the problem of thermal pollution of surface water in Iraq and the most appropriate standards for water quality. The first guarantees the thermal pollution of the surface water of the Tigris and Euphrates rivers in Iraq and its causes. The second axis focused on qualitative hydrological analysis of water quality. The study aimed at the third axis, which included the most important measures to be taken by the countries and concerned parties to mitigate the risk of contaminated water and its effects on the economic life of the population of the study area.

Keywords: Thermal environmental; Pollution; Water; Living organisms; Iraq

Correspondence to: Basim A Almayahi, Department of Environment, Faculty of Science, University of Kufa, Najaf, Iraq,E-mail: basimalmayahi@googlemail.com

Citation: Muthanna F Ali, Alyaa H Salman, Guda M, et al. (2020) The Hydro Climatic Effects of Thermal Pollution on Surface waters in Iraq and its Biological Effects. Prensa Med Argent, Volume 106:2. 189. DOI: https://doi.org/10.47275/0032-745X-189.

Received: January 19, 2020; **Accepted:** February 03, 2020; **Published:** February 10, 2020

Introduction

The water affects many variables, which are achieved by the lack of compatibility in the proportions of water components according to international standards due to human and industrial waste, health and massacres and other places, which lead to raise the temperature of water from the permissible limit in a manner that affects the vitality of living organisms, especially fish, which is the main source of food for the population, As the fish wealth of different types to decline and decline in their numbers and types because of the nature of human uses of throwing dirt, sewage or various waste water, which affected the change in water temperature, which prompted the researcher to Analysis of the factors affecting the temperature of the water and its effect on changing the nature of the preparation of living organisms [1]. The research focuses on three axes, which emerged during the scientific and correct objective to know the problem of thermal pollution of the surface water in Iraq and the most appropriate criteria for it. The first one included the thermal pollution of surface water in Iraq and its causes. The second axis focused on the graphical and statistical analysis of surface water temperature in the study area to the third axis, which included the most important actions to be taken by States and stakeholders to mitigate the risk of contaminated water and its impact on the economic life of the population of the study.Thermal pollution is a reduction in water quality due to ambient temperature changes. The reason for this pollution is the use of water as a coolant for power plants and industries [2]. When water retreats to nature at a higher temperature, oxygen support is reduced, depending on the temperature difference, which will completely affect the environmental structure. Especially the fish. This is known as the "thermal shock" [1]. The concept of thermal pollution is one of the most important problems facing water in the world, which is caused by leaking excess heat from factories, electrical installations, nuclear power plants, volcanoes, and other water bodies that contain rivers and seas. And the oceans, which leads to increase the temperature of water and thus affect the organisms of all kinds by these practices, as it is known that the rise of water temperature when up to (45 m) Impacton the vital activities of many organisms [2].

Materials and Method

Surface water in Iraq is supplied from multiple sources in a manner that has led to the variation and storage of water releases according to the nature of the population needs and each of the areas in which these water flows (Figure 1).

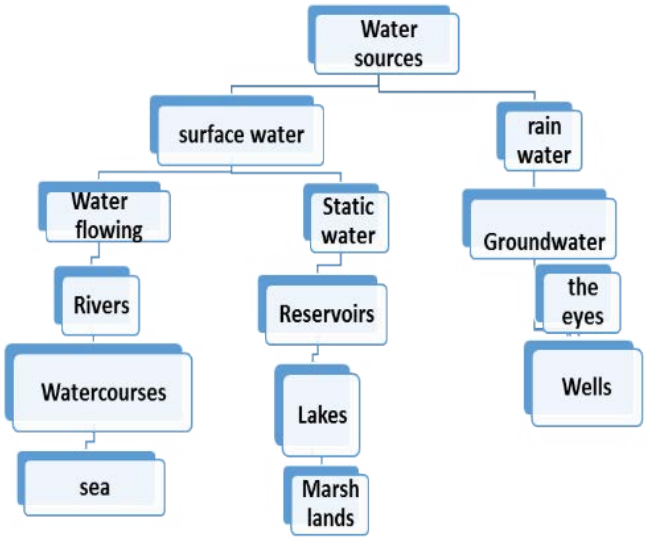

Figure 1: Water Resources in Iraq.

The correct scientific research is based on a scientific methodology that includes the selection of the research problem and its logical formulation that defines the general framework of the phenomenon under study. The research problem came as follows:

- Is the water of the rivers in Iraq exposed to the problem of thermal pollution?
- What are the factors affecting the change in the characteristics of water and its reflection on the environmental reality in water?
- What are the negative effects on the nature of water systems in Iraq?

The hypothesis of the research to refer to the ideas and evidence to explain solutions to solve the problem of scientific research, which includes the following:

- The problem of thermal pollution is evident in the study area, which results from the human factors represented by the wastewater of industrial wastewater and water due to the process of cooling the power plants.
- The seriousness of this phenomenon is determined by the effects that reflect the nature of the environmental reality, especially fish and aquatic plants.

The researcher also sought to adopt methodological methods that include descriptive and quantitative methods in the analysis by adopting factors influencing the river system in Iraq, which is located between the two circles (29°5´20) from the south and between (37° 22´ 50) north of it. And between longitudes (45 km east) from its west, and 45 (48 east) from east (Figure 2).

The research focuses on three main axes that highlight the scientific and correct objective of knowing the problem of thermal pollution of surface water in Iraq and the most appropriate standards for water quality. The first guarantees the thermal pollution of the surface water of the Tigris and Euphrates rivers in Iraq and its causes. The second axis focused on qualitative hydrological analysis of water quality. The study aimed at the third axis, which included the most important measures to be taken by the countries and concerned parties to mitigate the

Figure 2: The main rivers and basins in Iraq.

risk of contaminated water and its effects on the economic life of the population of the study area.

Results and Discussion

The First Axis: The Thermal pollution of the surface water of the rivers in Iraq and its causes

Iraq is concentrated in several water systems that play a role in determining the nature of economic activity in the study area, which include the following:

- Environmental systems of fresh water, such as the Tigris and Euphrates rivers and their tributaries and Shatt al - Arab.
- Estuaries such as the mouth of the Shatt al - Arab in the Arabian Gulf and the Strait of Basra in Khor al - Zubayr.
- The marine ecosystem is Khor Abdullah and Zubair and the Arabian Gulf.
- Environmental systems of stagnant water represented by lakes such as Dokan, Darbandikhan, Al-Tharthar, Habbaniyah, Razazah and the Iraqi marshes.

These environmental systems are subjected to qualitative hydrological changes due to human factors, the most important of which is the pollution of industrial wastes. Iron, steel, paper and power plants work on the use of water in the cooling processes and then discharge the hot water to the water of the ponds, rivers and lakes, which causes their temperature to rise. 81% of the total thermal water for the consumption of large quantities of water in the cooling of engines. It is estimated that a plant with a production of about (1000 MW) uses about (2 million liters) of cooling water every minute [3]. And then exposed neighborhoods.Most aquatic organisms are red-hot, and the rise in water temperature leads to increased activity, accompanied by increased need for dissolved oxygen in water, which is reduced by high water temperatures. The heat pollution causes hatching of some fish before the seasons of the availability of appropriate food and increase the growth of unwanted and non-edible algae as food for aquatic life. When these algae die and decompose, they consume large amounts of

dissolved oxygen in water as well as the result of foul gases and toxins accumulate year after year To eliminate life in the water and thermal pollution may also oxidize some of the metal pollutants that are given by factories in the water and may produce some types of toxic oxides,as well as sewage and health detergents [4]. The waste that is carried by water and caused by pollution consists of decomposed and non-decomposed materials. The dissolved waste includes organic materials and thermal charges. The source of these organic materials is the waste that comes with the water discharged from the residential areas. Usually these materials can be disposed of with multiple materials. The water may be highly charged with these substances, causing some odors such as hydrogen sulphate and methane gas. Non-decomposed materials include salts, dissolved gases in water or small parts of water. Waste may include several oxidants such as mercury, And cadmium. In fact, the effect of these substances on water is not known to the full extent and the allowed level is also unknown, but there are some evidence, such as mercury-contaminated fish eaten by humans, may cause death and suspended substances in the water are dangerous and not become the nucleus of bacterial growth.The source of thermal pollution from river transport units and acid waste, it affects the nature of surface water, and the multiplicity of elements contaminated with water, which includes elements of organic origin, such as organic salts and Anacin pesticides and fatty acids and amino, which is the last most prevalent, and the elements of the origin of inorganic, Is a dissolved salts in ionic state represented by chlorine, sodium, calcium, potassium, manganese, phosphates, sulfates, nitrates and bicarbonates.The change in water color and its tendency to gray, due to the low sunlight that reaches the water layer, contributes to the weak process of photosynthesis, which in turn causes the death of plant elements of dual interest as a food source for aquatic organisms and as a component of the oxygen element. Contrary to the vital area in the rivers water in a material and helps the transmission of many diseases to humans, especially epidemics, and this appears more sharply in agricultural banks and irrigation water excess containing ingredients pesticides and some components of organic fertilizers to the side Nitrates, whose high concentrations in water, are highly concentrated on the growth of aquatic plants and algae because they form an important nitrogen image as a plant nutrient [5]. The temperature of the water is of great importance in judging the quality of water sources. The degree of oxygen solubility depends on water temperature. If dissolved oxygen concentration in a surface water source is equivalent to 8 mg oxygen per liter of water, (actual oxygen concentration) is equal to 9.25 m. This means that the water contains a high concentration of dissolved oxygen [6]. The most water that is exposed to thermal pollution is the disposal of industrial wastewater, which must be within the specified specifications so that the water does not undergo a change in the degree Heat (Table 1).

The surface water is also affected by oil, which is rapidly spreading as it reaches 700 km from the area from which it leaked. The oil industry, refining and extracting several incidents leading to oil pollution, especially in the province of Basra (Figure 3). As the statistics of the Ministry of Oil indicate that the number of accidents in 2011 (about 116 incidents) led mostly to the spread of oil stains in the Shatt al-Arab, which suffers mostly from the increasing percentage of salinity and pollution, which caused the population a number of diseases as a result of this pollution as well as fish And the death of a large number of them [8].

The second axis: Qualitative hydrological analysis of surface water temperature in Iraq

Thermal pollution is divided into two types, either sudden rise or severe decrease in temperature of water, both of which lead to the same result, but the causes are different, the most important reasons include:

High temperature: This is usually near industrial cities, water plants, nuclear plants and any other activity that requires huge quantities of water for cooling. These stations draw huge amounts of water to be used to cool the generators and then put them back in the water surface without treating the temperature, Severe in the temperature of water and thus change properties and decrease the rate of oxygen in a way that leads to the death of organisms immediately, and in Iraq there are a number of electrical stations that discharge the used water in the cooling to the river, especially in the Shut- Kufa in Najaf, as well as for a number of other stations in the study area [9] (Table 2).

Low temperature

This is near dams and cold-water tanks when they are opened and redirected to rivers whose water is warm. Living organisms are suddenly shocked by their adaptation to living at a certain temperature. The most affected organisms are fish eggs, larvae and microorganisms that do not grow except in warm water, thus directly affecting the Figure of fisheries and photosynthesis processes that dispose of carbon dioxide and provide the oxygen needed to sustain underwater life. Iraq has many water dams that store water for purposes for population use. However, when water is released, the coldness of water affects the nature of living organisms, especially fish. Iraq is concentrated in several dams and water reservoirs that are supplied with water from the

Figure 3: Oil spill around pipelines carrying oil products near Khor al-Zubayr in the province of Basra.

Table 1: The most important industries leading to the phenomenon of thermal pollution in Iraq [7].

Notes	Water Specifications	Uses
Spraying technique for cooling systems or rotary pumps causes clogging of mold and algae	-Must not help the growth of mold and algae - It should contain the least amount of dissolved gas	Cooling systems
Must conform to drinking water standards Alkaline is equivalent to fruit acid and taste change	- It should be high purity free from pathogenic bacteria	Distilleries Alcoholic
	- Must be non-alkaline	
Hard water Deposits basal pigments and reduces the dissolving of acid dyes.	Free of acid-free substances of iron and manganese salts	Textile Industries
Salts found in water can interact with chemicals forming undesirable compounds	High purity free from bacteria and any small organisms free of dissolved salts and any organic components (such as the Bruges)	Pharmaceutical Industries

Table 2: Number of power plants and quantity produced by type of stations in Iraq except Kurdistan Region [10].

Name of stations	Actual Participation in Production%	Production Quantity (MW)	Number of stations
Steam stations	20.8	13258360	7
Gas stations	35.7	22790570	25
Mobile stations	0.2	101405	6
Diesel stations	2.5	1623125	8
Hydroelectric Stations	6.9	4392150	6
Total stations	66	42165610	52
Hyundai diesel	1.6	1031094	9
Stz	3.9	2517487	-
Salad dizzels	0.4	259142	-
Ministry of Oil	0.1	44241	-
Total	6	3851964	9
total	72	46017574	61
Kurdistan Region	-	-	-
Gas stations	24.3	15551887	4
Hydroelectric Stations	1.5	983808	2
Desels	2.1	1338645	-
Total	28	17874340	6
Total production of electricity	100	63891914	67
Imported energy + barges		10170234	-
Total gross electric energy		74062148	67

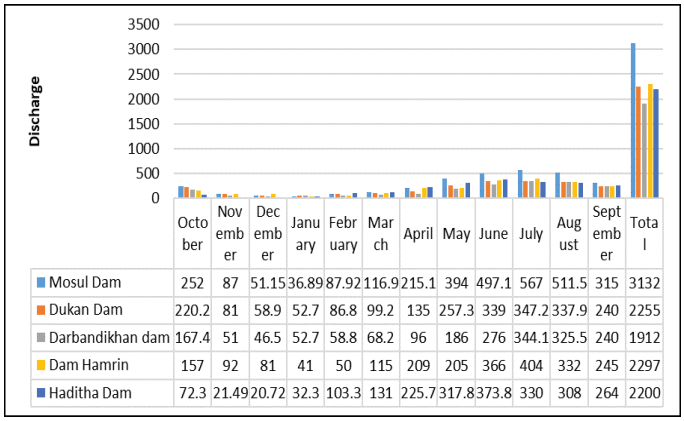

Figure 4: Water dams in Iraq and their discharge rates (m^3/s) [11].

Tigris and Euphrates, which are also supplied with melting snow from outside Iraq and rain fed and groundwater from inside Iraq. The most important dams are Mosul Dam, Dokan dam, Darbandakhan Dam and Dam Hamrin, as well as reservoirs such as Tharthar Reservoir, Razza and other reservoirs. The rate of discharge in the Mosul dam reached (566,99 m^3/s) in July and the lowest in November (87 m^3/s). In Dokan Dam it reached (347.2 m^3/s) and in November (51 m^3/s) , While the severity of the discharge between Derbendkhan and Dam Hamrin dams in July was(344.1 m^3/s) and (404 m^3/s), the lowest in November (51 and 92 m^3/s) respectively. A modern dam in the Euphrates River reached its highest discharge in December at (20 m^3/s) and the lowest discharge in December was (20.72 m^3/s) (Figure 4). This is due to the nature of water releases and population consumption of water.

In general, the water and irrigation projects in Iraq have a major role in meeting the requirements of basic life, but the misuse by the concerned authorities and the population leads to pollution, especially thermal pollution (Figure 5).

Waste from industrial activities is one of the most dangerous sources of water pollution because water is a major factor in the establishment of many industries that consume large amounts of water, especially food industries (such as dairy, beverage, canning). Or peeling their products.Water may be helpful in establishing some of them by using it for the purpose of cooling steam boilers, filtration or distillation. Therefore, the water produced after all these processes is called industrial wastewater. They affect the overall nature of water and increase its temperature in a way that affects the nature of water consumed by the population (Table 3).

The most important change in water that leads to pollution is the bio-chemical requirement, which is commonly used in measuring water pollution. It measures the biological demand of oxygen within a period not exceeding five days. It calculates the amount of oxygen required to analyze organic matter in water such as bacteria, (20°C) and measured in the dark with (Mg/L). As for water quality levels, they are as follows [13]:

- Very good: If the value of an individual equivalent value is smaller than (3 Mg/L).
- Good: This level is granted if the output value of an individual equivalent is between (3-5 Mg/L).
- Medium Quality: Water is of medium quality if we obtain an individual equivalent of between (5-10 Mg/L).
- Poor: Water is classified as poor if the value of an individual equivalent is between (10-25 Mg/L).

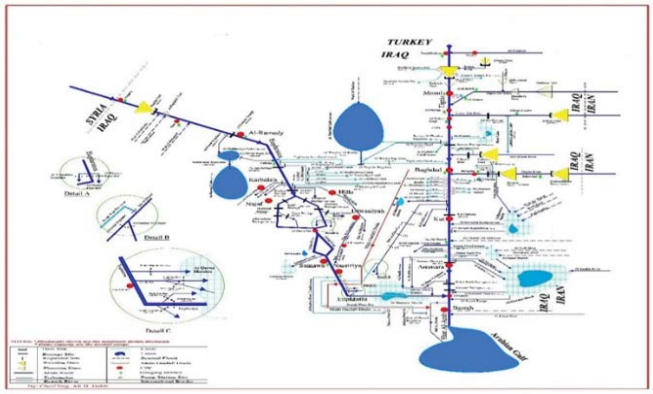

Figure 5: Water and irrigation projects in Iraq [11].

Table 3: Pollutants from industrial processes and their industrial origin [12].

Type of industrial activity	Quantity of water discharge m3/s	Type of industrial activity	Quantity of water discharge m3/s
Chemical industries	5266000	Miscellaneous mines (other than coal)	229000
Iron and steel industry	2781000	Electrical Industries	16000
Paper, fiber and wood	2165000	Rubber and asbestos	151000
Coal and stone mines	1425000	Glass and porcelain industry	91000
Food and drinks	1219000	Leather Industries	84000
Oils	876000	Aircraft and ships	69000
Textiles and clothing	704000	Oil industries	7000
Equipment and cars	624000	Metal Products	296000
Quarries	364000	Stores	256000
16767000			Total

- Very poor: Water is at this level if the value of the individual equivalent is smaller than (Mg/L).

According to the above, the amount of water discharged as a result of the industries that depend on the production of water has varied to affect the quality of water according to statistical data, which is very clear during the years 2011 and 2012, the amount of water discharged to the river by (79765 and 93570 m^3/day), which is large enough to cause thermal change in the water and pollution (Table 4) [14].

Therefore, bacteriological data were collected on the river water in Iraq and for each governorate where the degree of pollution was very high and the reason is the qualitative change due to the consumption of human population and found that the number of bacteriological models that were examined by the concerned authorities in the departments and directorates of the environment (72%) of the total samples examined (697 samples) of the network of sub-channels of the Euphrates River in Babel governorate due to the discharge of water from the plants which raise the temperature of water in the study area, Contaminated models (1.6%) of total (1.3%) of the channels from the Euphrates River. In Diyala, Ninewa and Basrah governorates, the percentage of polluted water was 0.6 (0.2 and 0.7%) of the total studied models (1335, 2415 and 3285) respectively. The number of contaminated models was about 0.6, 0.2 and 0.7 model respectively (Table 5).

In Al-Qadisiyah Governorate, samples of water were withdrawn (874 samples). It was found that there is no pollution in the water, except for high salinity due to the drainage water. The percentage of polluted water from the Tigris and Euphrates rivers in Kirkuk and Muthanna governorates was 1.3 and 2.6% respectively. The percentage of pollution in Najaf governorate increased by 19.3% and 9.9% In the province of Dhi- Qar (Figure 6).

It is clear from the table that the laboratory analysis of the water presented by the General Establishment of Electrical Industries in Iraq increased the change in the water component ratios of the natural characteristics of the acidity and the biological need of oxygen, sulfates and nitrates and about (6.2,46,461 and 220 mg/L) It was found that the laboratory analysis of the acetate, total dissolved solids, suspended solids and total insoluble gases (54,1680,110 and 780 respectively) exceeded the allowable limits. This is due to the change in the amount of water produced by different industries (Table 6).

The third axis: The environmental effects of water pollution in Iraq and the possibilities of reducing them

The phenomenon of thermal pollution leads to several changes in water as reflected inliving organisms.

First:A significant decline in dissolved oxygen in water leads to immediate disruption of the function and death of living organisms due to non-adaptation of these organisms to changes.

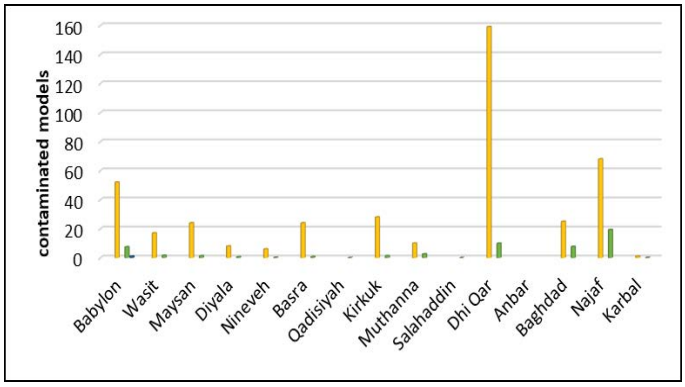

Figure 6: Models examined for surface water samples in Iraq.

Table 4: Summary of the quantities of water discharged from laboratories and factories in Iraq.

Sector	Total water used				Total discharged water			
	Quantity M3 / day		Percentage		Quantity M3 / day		Percentage	
	2011	2012	2011	2012	2011	2012	2011	2012
Chemical	83794.6	120940	59.5	65.4	47030.5	57928.5	59	61.9
Engineering	13487.5	13991	9.6	7.6	7931.8	8249	9.9	8.8
Food	4856	6690	3.4	3.6	2358	2994	3	3.2
Histological	12849.4	16284	9.1	8.8	8515.2	11097	10.7	11.9
Construction	25792	27012	18.3	14.6	13929.5	13302	17.5	14.2
total	140779.5	184917	100	100	79765	93570	100	100

Table 5: Modeling from samples from The Tigris and Euphrates rivers in Iraq [15].

Areas	Number of bacteriological Models studied	Number Contaminated models	%
Babylon	697	52	7.5
Wasit	1052	17	1.6
Maysan	1792	24	1.3
Diyala	1335	8	0.6
Nineveh	2415	6	0.2
Basra	3285	24	0.7
Qadisiyah	874	-	-
Kirkuk	2127	28	1.3
Muthanna	382	10	2.6
Salahaddin	-	-	-
DhiQar	1608	159	9.9
Anbar	-	-	-
Baghdad	326	25	7.7
Najaf	353	68	19.3
Karbal	1729	1	0.1

Table 6: Laboratory analyzes of water from the General Establishment for Electrical Industries in Iraq [16].

Laboratory analyze	Concentrate mg / l	Permissible limits	Laboratory analyze	Concentrate mg / l	Permissible limits
Acid function	6.2	June-9	The turbidity	54	less than10
Biological need for oxygen	46	less than 5	Total Dissolved Materials	1680	1500
Sulfates	461	400	Suspended materials	110	60
Nitrates	220	50	Total hardness	780	500

Second: The severe confusion fish life as a result of sudden changes in temperature, resulting in a lack of sense of fluctuations in the seasons and climate changes around them and this also helps in the extinction of these species. This phenomenon leads to large numbers of fish being sent to the source of heat as a result of their fungal nature, as well as the death of the microorganisms on which most fish depend on food, and consequently the proliferation of other harmful and deadly species, so that if they are relied upon as food, And mortality of micro-organisms and fish [17].

Third: The phenomenon of thermal pollution affects the nature of the water itself, as the density of water and surface tension and the melting of gases in water and viscosity and others.

Fourth: Chemical reactions occur in the temperature rate as the reaction speed multiplies every 10 degrees Celsius.

Fifth: The introduction of hot water affects biological systems in the water source by destroying the protein structure of living organisms and increasing the metabolism of aquatic animals, which can lead to a shortage of food sources, thus reducing the number of living organisms. As well as the increasing activity of enzymes, leading to consumption of objects of larger quantities of food in a shorter time than if the environment has not changed [18].

Sixth: Thermal discharge in river water leads to the growth of blue-green algae with environmental damage and is a poor and suitable source of food for the growth of bacteria.

Seventh: The sudden rise in water temperatures leads to a thermal shock leading to the death of organisms in water, especially fish. The highest water density is 1.00000 g/cm^3 in 4℃ and then decreases at higher temperatures. The higher the temperature, the stronger the viscosity of the water, the greater the pressure of the water vapor and then the average evaporation sharply, which will of course affect the solubility of gases in water, including dissolved oxygen (Table 7). Because fish requireat least (5 mg/L) to stay in good condition.

Water pollution can be mitigated by the following stakeholders:

- Attempt to impose sanctions on factories and factories that are working on the discharge of wastewater from the industry illegally to rivers and water bodies.
- Construction of industrial wastewater treatment plants before discharge to the river.
- Supporting laboratories and quality controls with modern equipment to perform their chemical and physical analysis of water in rivers, streams and sub-channels to conserve and protect the aquatic environment from pollution.
- Conducting an industrial survey that works on measuring pollutants in water before and after analysis to ensure the quality of water.
- Establish a database of chemical and physical elements in the wastewater electronically for periodic and spatial monitoring and control to ensure protection of water from pollution.

Table 7: Several water properties as a function of the water temperature, in the degree of dissolved oxygen concentration [19].

Temperature	Density (g/cm^3)	Viscosity	Steam pressure (cm/g)	Dissolved oxygen (mg/l)
0	0.99987	1.7921	4.58	14.6
5	0.99999	1.5188	6.54	12.8
10	0.99973	1.3077	9.21	11.3
15	0.99913	1.1404	12.8	10.2
20	0.99823	1.005	17.5	9.2
25	0.99707	0.8937	23.8	8.4
30	0.99567	0.8007	31.8	7.6
35	0.99406	0.7225	42.2	7.1
40	0.99224	0.656	55.3	6.6

- Monitoring the population consumption of water in areas, villages and cities.
- The necessity of activating the method (activated sludge) in the study area, which requires three stages: a. Where one or more pollutants are disposed of at each stage, respectively (primary or physical treatment), as solid and non-aquatic substances such as oil are disposed of at this stage and are carried out on a number of the first stages (sifting) (50%) of solids and 40-60% of heavy particles are disposed of by sedimentation B. Biodegradation, which consists of biodegradable organic matter by adding Microorganism. T. The method of treatment of lakes, which adopts the principle of flow and slow water runoff in large basins. After the process of physical treatment, water is exposed to ventilation, which plays the role of microorganisms and algae to break down pollutants and organic matter.
- One method used to treat wastewater is the so-called garden system, a system consisting of a set of elements. The advantage of this method is that it does not require mechanical ventilation and is considered energy-saving. This method is the collection basin where the initial treatment of water takes place. The water stays there for 4-5 days and is decomposed by organisms that grow in the roots, leaves and stems of the plant as a suitable environment for their growth [20].
- There are several considerations when deciding on the cooling systems that can be adopted by the station and these considerations related to the economic factor and the location of the station and the strictness of environmental legislation, and these common systems [14]:

Open system: The water drawn from the water source is used once for cooling and then returned to the source the water may be cooled slightly by a pond before returning it to the water source.

Wet towers: This type of tower exploits the principle of heat disposal by evaporation, in which the hot water is emptied at the bottom of the tower, where the height of the tower is (90-120 meters), the sides of the tower are sloping, the water falls at the bottom of the tower and is exposed to a stream of air that helps evaporate or spray hot water like spray in the tower So that it can be evaporated and cooled quickly. In either case, it loses its fill to the air, collects most of it in the tower basin, returns to the water stream, or turns back to the condenser. The

heat loss results from evaporation of water. The main drawback of the evaporation system is the amount of vapor The atmosphere is used in h (1000mW) is able to evaporate about 80-100 thousand cubic meters of evaporated water per minute, which is equivalent to one day of rainfall on an area of about (5 square kilometers). On cold days, this amount of steam condenses in the form of thick fog above the area near the station. The wet cooling method is not suitable for cold days. If the source of water is salty, the salt spoils agriculture on an area of 160 square meters around the station (Figure 7).

Dry Systems: The cost of this tower exceeds the cost of the wet tower, nearly two and a half times and remains the most efficient and cheaper alternatives, based on the cost and appropriate calculations between them and the service of the consumer, which ultimately pays the price of production. The dry systems depend on the current of an air current that meets hot water pipes. This system is successful in power plants for economic reasons but it may be effective in very cold climates (Figure 8).

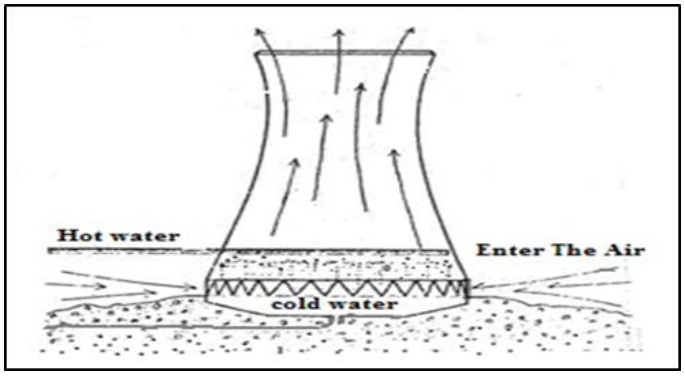

Figure 7: Wet towers [18].

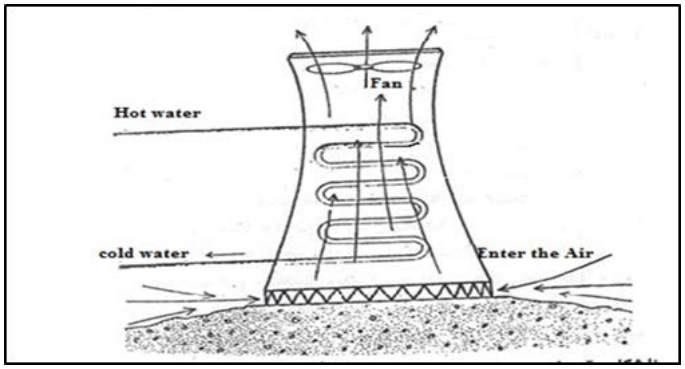

Figure 8: Dry Systems [18].

Conclusion

It is clear through scientific research that the surface water in Iraq suffers from a large pollution due to a number of natural and human causes, especially the number of plants, factories and factories that have a major role in causing the qualitative change, and this requires that there are areas dedicated to storage of water from factories and factories that lead to Raising the temperature in a way that affects the living ecosystems in water, especially rivers, i.e. Tigris and Euphrates, which leads to the decline in numbers, especially fish, as well as the negative impact on the lives of the population, and this requires caution and care to preserve the water environment, as requires N stakeholders develop the necessary measures and directing the population through advertisements about not leaving waste and dumped in surface water, as should a particular rule enables laboratories and factories to regulate their industries and the discharge of wastewater without surface water damage to the order to maintain the environmental safety of the population situation.

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