# Study of fish deaths circumstances phenomenon in Diwaniyah River, South of Iraq

Hazim A. Walli

University of Al-Qadisiyah, College of Science, Department of Environment Science, Diwaniya 58002, Iraq

(Received 13 July, 2019; accepted 17 August, 2019)

# ABSTRACT

The current study focus on fish death phenomenon in 2018 in Diwaniya River south of Iraq. This phenomenon cross over all Iraqi river from north to south especially in fish farming, the chemical and physical parameters show bad number according to WQI in water, also EDX examine of SEM (scanning electron microscopy) show a high concentration of Arsenic in plants of the river. Fish from farming and river appear arsenic in muscle, brain and gills of fish that live in river.

Key word : Fish death Phenomenon, Al-Diwaniya River, Arsenic, EDX, Fish farming

# Introduction

Recently, Iraq witnessed suddenly the phenomenon of fish deaths in the Euphrates River and without previous warning and this constitutes a surprise disaster. The incident may be a dramatic sign of worsening pollution and water issues in Iraq, that is progressively troubled to supply a sufficient supply of unpolluted water, particularly within the south of the country (Retures, 2019).

It remained an intractable mystery, especially, there were no traces to use explosives or toxic substances for hunting, as the case previously observed, where contaminated Bacteria and Fungi were isolated and identified and chemical and physiological tests were also done for water samples. The samples subjected to Electron microscopy Energy dispersive x rays (EDX) to determine the concentrations of elements in water. Different parts of fishes took from AL-Diwaniyah River A, as well as AL-Hilla River where the largest percentage of fish's mortality was in the Musayyib area. The results were compared to get the causes of losses in fish.

#### **Study Location**

The study included the Euphrates River in AL-Diwaniyah city and the samples were collected from dead fish, river water, and water plants. The sixth sample of AL-Hilla River was compared with the results and brought to the laboratories of the Environmental Research Unit.

# Materials and Method

(1) Physiological and chemical parameters included: (pH, E.C., TDS, DO, BOD, TH, Alkalinity, Cl-, SO4-2, Mg, Ca) and other parameters (2) 2 - Examination of heavy elements in water, fish and plants. 3. Fungi and Bacteria examinations (Assad and Hussain, 1986). 4. EDX electronic microscopy in Kufa University. College of Science.

# **Results and Discussion**

The culture media such as Mannitol solt agar, TCBS, and EMB were used to isolate bacteria from water

Corresponding author's email: hazimwale@gmail.com

#### WALLI

and fish samples and PDA to isolate contaminated fungi. Bacteria *streptococcus*, *klebsiella pneumoniae*, and *vibrio* were isolated and identified. The death of fishes may be caused by Fish vibriosis disease usually occurs in fish and marine habitats and has been reported worldwide, as the disease has been detected in freshwater fish and can cause deaths by 50% in farmed fish. Infection is spread very quickly when fish are grown intensively in Fish farming systems (fish ponds). The mortality rate was 100% in the infected ponds. Fungi such as *Aspergillus niger*, *Rhizopus stolanife*, *Candida albicans* were also isolated and subjected to identification. As for physical and chemical tests as shown in Table 1.

# According to the WQI Water Quality Index equation in the Water Research Center WQI = 41

The water quality in AL- Diwaniyah city ranged from poor to moderate

# EDX Analysis with scanning electron microscope (SEM)

The results of water, plants and fish samples analysis in AL- Diwaniyah city revealed that Arsenic is predominant in all samples studied (Fig. 1). This element exists in nature, in products manufactured by man and used in industry as a component of the work of alloys, Glass, dyes, textiles, paper, metal and preservatives for wood and ammunition (Al-Atar, 1998). Arsenic is also used in tanning process, and to some extent, in insecticides (arsenic lead)(Qunsah *et al.*, 2015). Arsenic takes two forms, one organic and the other inorganic. Inorganic arsenic compounds (such as those found in water) are highly toxic (Fig. 6).

Chronic arsenic poisoning may end up from long-run exposure to inorganic arsenic, in the main through drinking contaminated water, uptake foods ready from that water, and uptake foods made in arsenic-rich water (Flanagan *et al.*, 2012). The most common symptoms of poisoning are skin lesions and skin cancer (Argos *et al.*, 2010). The immediate symptoms of arsenic poisoning are emesis, abdominal pain and diarrhea, followed by symptom, tingling within the limbs, cramp and death, in extreme cases (Al-Hasnawi et al., 2016).

In 2010, FAO and WHO Experts Committee (Joint Commission) re-evaluated the consequences of arsenic on human health, taking into consideration new information. (Awadh, 2013). The Joint Commission concluded that there was some evidence that the concentrations of inorganic arsenic in drinking water, which exceeded 50 to 100 µg per liter in some regions of the world, had adverse effects. In different regions wherever arsenic concentrations in water also are high (10 to 50 micrograms per liter), the Commission concluded that, although potentially harmful, the incidence rates are low and difficult to detect using epidemiological studies (WHO, 2010). The current recommended level of arsenic in drinking water is 10 micrograms per liter (Hakanson, 1980). Although this indicative value is defined as a temporary value because of the encountered difficulties in measuring arsenic levels in drinking water and the practical difficulties of removing them from the water (Khalaf, 1961).

The above figure illustrates that the highest value was 770  $\mu$ g/g dry weigh in plants, whereas amounted to 257, 185, and 131  $\mu$ g/g dry weight for internal intestines, muscles and gills of fish respectively. The water sample recorded a concentration of 62. 37  $\mu$ g/L. All the results exceed the permissible limits of their presence in the environment so this value is toxic to humans and other organisms.

Analysis of the electronic microscope of the samples, where the images were as in the following



Fig. 1. Shows the concentration of arsenic in the studied samples

Table 1. Chemical and physical parameters of water of AL-Diwaniyah River

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pН	EC	T.D.C	DO	BOD	Tur	Mg	Ca	T.H	Cl-	$\mathrm{SO}_4$	ALK
7.6	1180 μS/cm²	595 Mg/L	7.1 Mg/L	1.6 mg/L	64.5 NTU	49.7 mg/L	89.7 mg/L	446 mg/L	157.9 mg/L	272 mg/L	130 mg/L



#### Fig. 3. Brain

Eco. Env. & Cons. 25 (November Suppl. Issue) : 2019

BRUKER

Page 1/2

BRUKER

Page 1 / 2

Fig. 5. Plant



Fig. 6. AL-Diwanyiah River

arrangement: 1. Muscle 2. Brain 3. Intestine 4. Plants 5. AL-Diwaniyah River Water 6. AL- Hilla River Water.

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