The Variability Levels of Elements in the Waste Water of Capakcur River: An Analytical Study

[1]Parez Najat Agha, [2]Balan Tariq Omer
[1]Catholic University in Erbil, Erbil, Kurdistan
[2]Erbil, Kurdistan

Abstract.

The analyzing and its effect of Capakcur wastewater parameters in Bingul province in Turkey can be variant in different climate conditions, we can say concentration of wastewater parameters are directly affected by cold climate and hot climate Thus, according to the water pollution requirements, the concentrations of heavy metals in water samples were low in this report. Potentiometric process, titrimetric method, flame photometric method, gravimetric method, walkley-black method, spectrophotometric, calcimeter method, walkley-black wet digestion method, olsen method, and CEM digestion system were used to analyze parameters. Which resulted in pH, EC, HCO3 and CO3, Cl, hardness (Ca + Mg), K, Na, sediment, organic matter, and heavy metal ions (Mn+2, Zn+2, Fe+2, Cu+2, Ni+2, Cd+2, and Pb+2) in wastewater samples were 8.19, 292.99, 3.56, 0.402, 2.73, 2.19, 7.203, 0.0495, 21.159, 0.148, 0.033, 0.219, 0.035.

Keywords: Wastewater, Capakcur River, parameters, analyzing.

1.Introduction.

Environmental contamination is one of the most serious issues confronting the world today. The world involves both living and non-living things, such as humans, trees, and animals, as well as food, water, houses, seas, and wetlands. Air, water, dirt, noise, and light emissions are the five types of environmental pollution. To stop exceeding the expected costs, each emission problem requires expert care. Metal contamination in aquatic environments may occur as a result of direct atmospheric deposition, geologic weathering, or the release of agricultural, residential, or industrial waste yield. Some metals important in water are required for the metabolism process in all living organisms but toxic when present in high concentrations, whereas others are non-essential but toxic even at low concentrations. Any of these metals accumulate in marine environments and have a significant impact on humans and the ecosystem. Metals such as Zn and Cu are required for metabolic activity in organisms [1][2]. Water is required for essential activities such as feeding, respiration, excretion, and reproduction at all stages of the human life cycle. Water, on the other hand, is both a basic ingredient in the creation of the living world and a living environment in and of itself. Water, which includes both surface and ground water, is one of the most essential necessities for life. As a result of the country's rapid population growth, water quality is highly significant. The most important parameter that determines the behavior of elements in water is Ph. The composition of certain metals is dictated by the pH of water, which changes their availability and toxicity in the aquatic environment. Metals such as Al, Cu, Cd, and Zn are more likely to increase adverse environmental impacts as pH decreases. [3]. Water contamination is caused by the spread of fertilizer and opioid use in agriculture, as well as the rise of industrialization. Point and non-point sources are the most common causes of water contamination. Pollutants released by a single source, such as factory pollution into water, are referred to as point sources. Non-point pollutants, on the other hand, are emitted from several sources, such as contaminated water during rains that has passed through many areas, such as wastewater. The solids material, color, odor, and temperature of wastewater are the most important physical characteristics. Complete solids in wastewater are made up of insoluble or suspended solids as well as soluble compounds dissolved in water. Proteins, sugars, and fats make up the bulk of biological matter. A typical wastewater contains between 40 and 65 percent suspended solids. Usually, nearly 60% of the dissolved solids of urban wastewater are settleable. Solids can also be categorized in another way: those that are volatilized at high temperatures (600 °C) and those that are not. The former is known as volatile solids, while the latter are known as set solids. Volatile solids are mostly organic. Color is a qualitative property that can be used to measure the overall condition of wastewater. A light brown color indicates that the wastewater is less than 6 hours old, while a light-to-medium grey color indicates that the wastewater has experienced some degree of decomposition or has been in the compilation system for some time. Finally, whether the color is dark grey or black, it indicates that the wastewater is contaminated. The wastewater is typical of a septic system, having undergone general bacterial decomposition under anaerobic conditions. The formation of various sulfides, especially ferrous sulfide, is a common cause of wastewater blackening. However, as the general population has grown more concerned about the proper functioning of wastewater treatment facilities, odor determination has become increasingly necessary. Fresh wastewater odor is normally not unpleasant, but as wastewater decomposes biologically under anaerobic conditions, a plethora of odorous compounds are published. The primary odorant is hydrogen sulfide (rotten eggs smell). Wastewater is graded as solid or weak based on the amount of oxygen available to oxidize and stabilize it. The chemical properties of wastewater are also divided into two categories: inorganic and organic. Volatile organic compounds (VOCs) and priority contaminants are usually treated separately due to their relevance [4].The biological properties of wastewater include viruses, bacteria, and parasites. Wastewater includes a large number of bacteria and other species that cause problems when sewage is discharged. Untreated wastewater can eventually make its way into a community water supply, spreading water-borne diseases. The composition of wastewater varies from hour to hour, from day to day, and from season to season. , but the average composition can be indestructible over time. In total, wastewater contains 99.9% water by weight. Mineral and organic matter account for the remaining 0.1 percent (1,000 ppm) (organic, dissolved, suspended, and inorganic solids). Mineral matter is mainly made up of salts from the water source, foods, urine, food extracts, and allowable acids and alkalies from factories. Organic matter, mainly of human or food nature, is decomposed and oxidized by biological or chemical agents to create more solid compounds. The overall mineral and organic matter content of waste water is approximately 0.1 percent by weight. This matter is further subdivided into filterable and nonfilterable excess [5].

2. Material and methodology.

The content of water around it were calculated by measuring parameters in this analysis. As seen in Figure 1, the Capakcur River was split into six points to gather six samples in two separate seasons: winter and spring. The first water sample was taken from the beginning of the river when it entered the province, the second from the middle of the river, and the third from the point where the Capakcur and Gayt rivers met. The fourth water sample was collected after mixing all of the aforementioned rivers, the fifth water sample was collected before mixing the Goynuk and Capakcur rivers, and the final sixth sample was collected after mixing all three rivers (Capakcur, Goynuk, and Gayt), and the samples were then transported to the laboratory for analysis.

Figure 1: Work station map Source: [19]

2.1. Definition of the research field.

The region that has been worked on has been called Capakcur Dam, which is narrower than the river and is situated in the center of Bingol province; it also blends with two other rivers, the Goynuk and Gayt River. Bingol got its name from Bingol Mountain, which is situated in the Varto governorate on the Erzurum-Muş frontier. Capakcur was legally used as a name. Since Capakcur Castle is located in a mountainous location, the city center has been relocated to evlig or olig in the creek bed at some point in its existence. Bingol is situated in the Upper Euphrates zone of East Anatolia, between 41°20' and 39°54' North latitudes and 38°27' and 40°27' Eastern meridians, with Mus to the east, Elazig to the west, Erzurum to the north, and Diyarbakir to the south. Bingol has an average annual temperature of 12.1 degrees, an annual rainfall of 873.7 millimeters, 24.5 snowy days, and 94.1 frosty days.

2.2. Metrology of the area.

The climatic characteristics of the Bingol province vary significantly depending on the topographic composition and location of the provinces. On the eastern boundary, there is a terrestrial with dry and hot summers and cold winters. Rainfall occurs in the form of rain in the spring and summer, as well as snow in the winter. The peak temperature in the research region is in July and August (34.5oC), with annual precipitation of 936.9 mm and gross annual evaporation of 1202.5 mm. Summer temperatures allow evaporation to rise, reaching a height of 262.7 mm in July. When evaluating climate data, the temperature structure is Xeric (Table 1) since the normal temperature in Bingol is 12oC and the temperature differential between summer and winter is 5oC Winters are dry, while summers are humid and wet.

Table 1. The average climate data for long years of Bingöl province (1965-2015). Source [18]

Months	Temperature ºC			Cover. Precipitation (mm)	Relative humidity (%)	Wind Speed (m/s)	Evaporation (mm)	Soil Temperature ºC		
	Max.	Min.	Ort.					5 cm	20 cm	50 cm
1	2.1	-6.1	-2.4	133.5	72.4	1.2	0	-0.6	0.6	2.8
2	3.4	-5.3	-1.5	132.9	72.1	1.2	0	0.2	0.6	2.1
3	9.1	-0.5	3.8	126.7	66.8	1.6	0	5.6	5	4.7
4	16.3	5.6	10.7	121	62.6	1.8	55.4	12.5	11.2	10.1
5	22.7	10.1	16.3	75.1	55.8	1.9	132.4	19.4	17.7	15.7
6	29.3	14.6	22.1	20.6	43.5	2.1	208.1	27.1	24.6	22
7	34.5	18.9	26.7	5.7	35.9	2.2	262.7	32.4	29.4	26.8
8	34.5	18.5	26.4	3.3	35.1	2.1	255.0	31.9	29.5	27.9
9	29.6	13.5	21.1	10.4	41	1.9	183.1	25.4	24.8	24.8

10	21.5	8.1	14	63.3	57	1.6	91.4	15.8	16.7	18.4
11	12.4	2.2	6.6	109.9	68.2	1.4	13.7	7.2	8.5	11
12	4.9	-3	0.5	134.5	74	1.2	0.7	1.7	3.1	5.7
Yearly	18.4	6.4	12.0	936.9	57.0	1.7	1202.5	14.9	14.33	14.29

2.3. Methodology.

The methods were used for the water quality analysis are [6]:

- pH: pH analysis was done using standard potansiometric method described.
- Electrical Conductivity (EC): EC analysis was done using standard potansiometric method.
- Bicarbonate and Carbonate: Bicarbonate (HCO_3^-) and carbonate (CO_3^{2-}) were analyzed by titrimetric method using 0.01N H_2SO_4 solution.
- Chlorine: Chlorine (Cl-) was measured by titration with 0.05N $AgNO_3$ solution.
- Calcium and Magnesium: Calcium and magnesium were prepared by titrimetric method.
- Potassium: Potassium analysis was done using flamephotometric method.
- Sodium: Sodium analysis was done using flamephotometric method.
- Sediment: Sediment concentration were determined using grawimetric methods.
- Organic matter: Organic matter were prepared by walkley-black method.
- Micro and heavy metal elements: (Mn, Zn, Fe, Cu, Ni, Cd, and Pb): Micro and heavy metal elements concentrations were analyzed spectrophotometric.

3. Data results.

Water samples and water analysis findings were obtained in order to determine the physical and chemical properties of the Capakcur River in Bingol province over four months (December, January, April, and May).

3.1 pH.

The pH values of water samples collected from the observation site as seen in Table 2.; the pH values ranged from 7.7 to 8.9 in the November sample, 7.76 to 9.24 in the December sample, 7.83 to 8.1 in the April sample, and 8.06 to 8.33 in the final May sample. pH influences many biological and chemical processes in water, showing the strength of the solution's potential to be acidic or basic, and is characterized as the expression of H+ ion concentration in the solution. The sum of dissolved CO2, HCO3–, and free CO2 in the water determines the pH. Factors that induce pH changes in water include agricultural waste, sewage waters, and phytoplankton. The significance of chemical reactions in water and pH for biological life cannot be overstated [7].

Table 2. pH values of water sample

Water parameters		21.11.2016	28.12.2016	24.4.2017	9.5.2017	Mean
pH	Min.	7.7	7.76	7.83	8.06	
	Max.	8.9	9.24	8.1	8.33	
	Average	8.31	8.24	8.01	8.21	8.19

3.1.1. Electrical Conductivity (EC).

Table 3 displays the EC values of water samples obtained at the observation site. EC values of water varied from 244-438 S/cm in November sampling, 328-543 S/cm in December sampling, 92-217.8 S/cm in April sampling, and 100-231.2 to 223 S/cm in May sampling. Water's electrical conductivity is characterized as its ability to conduct electricity. Temperature has an impact on the EC. If the temperature rises, so does the EC value. The overall number of ions dissolved in the well and in the EC normally has a linear relationship. Inorganic dissolved solids such as chloride, nitrate, sulfate, phosphate anions, and sodium, magnesium, calcium, potassium, iron, and aluminum cations affect water conductivity [8]. The conductivity of a substance varies according to its geological composition and precipitation. It has been documented that surface waters in high rainfall areas are usually less saline due to the constant washing of the soil [9].

Table 3. EC values of water samples

Water parameters		21.11.2016	28.12.2016	24.4.2017	9.5.2017	Mean
EC μS/cm	Min.	244	328	97	100	
	Max.	438	543	217.8	231.2	
	Average	347.44	464.28	178.56	181.7	292.99

3.1.2. Bicarbonate Analysis.

Table 4 shows the descriptive figures for the bicarbonate levels of the water samples taken at the observation site. The amounts of bicarbonate in the water ranged from 1.9 to 4.4 mg/L in November, 8.2 to 13 mg/L in December, 0.2 to 0.4 in April, and 0.1 to 0.4 mg/L in May. The atmospheric and CO2 absorption of carbonate rocks is largely responsible for bicarbonate alkalinity of groundwater [10]. [11] notes that it is capable of measuring bicarbonate and carbonate alkalinity in natural waters.

Table 4. Bicarbonate values of the water sample

Water parameters		21.11.2016	28.12.2016	24.4.2017	9.5.2017	Mean
Bicarbonat mg/L	Min.	1.9	8.2	0.2	0.1	
	Max.	4.4	13	0.4	0.4	
	Average	3.28	10.44	0.26	0.27	3.56

3.1.3 Chloride Analysis.

Descriptive figures of chlorine levels of water samples collected at an observation site 5 Table, The chlorine concentrations in the November sample were 0.2-0.5 mg/L, 0.4-0.8 mg/L in the December sample, 0.2-0.8 mg/L in the April sample, and 0.2-1 in the May sample, according to the findings of the study. Chloride is a chemical compound that can be present in natural waterways, municipal wastewater, and surface runoff. Chlorine is extracted from dirt, chemical fertilizers, factory manure, animal waste, sewage, and some food production. Industry wastes have an effect on the Cl level of water. The rise in CaCl2 in water makes it more susceptible to pollution from waste waters. Waters containing elevated chlorine levels are unfit for use in the home or in industry [7].

Table 5. Chlorine values from observation site

Water parameters		21.11.2016	28.12.2016	24.4.2017	9.5.2017	Mean
Chloriede mg/L	Min.	0.2	0.4	0.2	0.2	
	Max.	0.5	0.8	0.8	1	
	Average	0.34	0.53	0.34	0.39	0.40

3.1.4. Hardness.

Descriptive statistics for the hardness values of water samples obtained at the observation site 6 Table, Water hardness levels in the November study ranged from 3.4 to 5.8 mg/L, 1 to 6 mg/L in the December sample, 1.2-1.8 mg/L in the April sample, and 1-3 mg/L in the May sample. The Ca+ 2 and Mg + 2 ions are responsible for the bulk of the hardness of natural waters. This hardness is referred to as absolute hardness. This hardness is thought to be absolute hardness with a few defects. The degree of hardness of the water is usually related to the geographical system that it straddles along the path that it tracks in the rainwater. Harder waters can be found in the dense regions of the earth layer and on calcareous ground. Ground waters are usually softer than underwater waters.

Table 6. Hardness values taken from the observation site

Water parameters		21.11.2016	28.12.2016	24.4.2017	9.5.2017	Mean
Ca+Mg mg/L	Min.	3.4	1	1.2	1	
	Max.	5.8	6	1.8	3	
	Average	4.47	3.39	1.47	1.63	2.73

3.1.5 Calcium analysis (Ca).

The calcium concentrations in the water ranged from 1.2 to 3.8 mg/L in the November study, 1 to 2 mg/L in the December sample, 0.6 to 1.6 mg/L in the April sample, and 0.6 to 1.4 mg/L in the May sample, according to descriptive statistics of water sample calcium values taken from the observation site Table 7. Rain, underground, and surface waters are the sources of calcium in water. Calcium in water is derived from rain, underground and surface waters that are dissolved in limestone, and water that is drained away from the earth. Ca-containing waters in greater quantities are not appropriate for consumption or commercial use [7]. Hard water is water with a high mineral content (in contrast with "soft water"). When water percolates through dept, hard water is created. Hard water is created as water percolates into limestone and chalk layers, which are mostly composed of calcium and magnesium carbonates. Hard water is classified as having a Ca ++ content of less than 10 mg L-1 in soft water, soft water having a Ca ++ content of 20 to 25 mg L-1, and medium hard water having a Ca ++ content of 25 mg L-1 [12].

Table 7. Calcium values taken from the observationsite

Water parameters		21.11.2016	28.12.2016	24.4.2017	9.5.2017	Mean
Ca mg/L	Min.	1.2	1	0.6	0.6	
	Max.	3.8	2	1.6	1.4	
	Average	2.43	1.54	1.12	0.89	1.49

3.1.6 Sodium analysis.

Water survey descriptive data from the observation site Table 8 indicates that the sodium concentrations of water vary from 6.78 and 21.25 mg/L in the December study, 5.37 and 14.55 mg/L in the January sample, 1.96 and 6.42 mg/L in the April samples, and 2.47 to 5.17 mg/L in the May samples. In December and January, the number of samples seems to have risen. This is believed to be because of an increase in concentration caused by prolonged evaporation. Any points sampled during the winter were later discovered to be dry as a result of temperature (creeks, wells, etc.). The most popular alkali metal present in nature is sodium. In water, all sodium compounds are easily soluble. Both natural waters contain some sodium. The occurrence of sodium underground is determined by factors such as mineral form and quantity, pH, decay time, groundwater flow rate, and calcium ion exchange in the atmosphere, as well as artificial and natural contamination. [13]

Table 8. **S**odium values taken from the observation site

Water parameters		1.12.2016	10.1.2017	24.4.2017	9.5.2017	Mean
Na mg/L	Min.	6.781	5.375	1.965	2.476	
	Max.	21.25	14.55	6.423	5.179	
	Average	10.47	10.20	4.26	3.89	7.20

3.1.7. Potassium analysis.

Explanatory statistics of the potassium values in a water sample obtained at the observation site Table 9 shows that the potassium concentrations of water varied from 2.24-5.93 mg/L in the December study, 3.006-5.26 mg/L in the January sample, 10.69-1.57 mg/L in the April sample, and 0.63 to 1.46 mg/L in the May sample. Potassium is present mostly in feldspars (orthoclase, microcline), mica, feldspathoids, and clay minerals, accounting for 2.5 percent of the earth's crust. It is the domain of plants [13]. The amount of potassium in groundwater is calculated by the dissolution of potassium minerals (such as potassium feldspars). While it is fairly widespread in nature, it is normally found at a few milligrams per liter in natural waters. The moderate potassium content in the water has no detrimental effects on water use. There is no clear connection between low and high concentrations of drinking water and human health. Potassium is an important nutrient for both plant and animal life. The sum of K in the major rocks that form the soil base is greater than the amount of Na. Na ions, on the other hand, outnumber K ions in water. [13]

Table 9. Potassium values of the water sample taken from the observation site

Water parameters		1.12.2016	10.1.2017	24.4.2017	9.5.2017	Mean
K mg/L	Min.	2.24	3.006	0.692	0.639	
	Max.	5.931	5.26	1.572	1.461	
	Average	3.11	3.57	1.02	1.06	2.19

3.2. Heavy content of water samples.

The present analysis finds that (Mn^{++}, Zn^{++}, Fe^{++}, Cu^{++}, Ni^{++}, Cd^{++}, and Pb^{++}):

3.2.1. Manganese (Mn).

Illustrative statistics for the Manganese values in the water sample obtained at the observation site Table 10 indicates that the Mn concentrations of water ranged from 0.203 to 0.277 mg/L in the November study, 0.203 to 0.299 mg/L in the January sample, 0.011-0.058 mg/L in the April sample, and 0.016 to 0.074 mg/L in the May sample. Manganese is one of the most abundant metals on the planet's surface. About 0.1 percent of the earth's crust. Manganese does not occur in its natural (elemental) form, but it is found in over 100 mineral compounds [14].

Table 10. Manganese values of the water sample taken from the observation site

Water parameters		24.11.2016	12.1.2017	24.4.2017	9.5.2017	Mean
Mn mg/L	Min.	0.203	0.205	0.011	0.016	
	Max.	0.277	0.299	0.058	0.074	

	Average	0.24	0.26	0.03	0.06	0.148

3.2.2. Zinc (Zn).

Descriptive statistics of Zn values of water samples collected at the observation site Table 11 indicates that the Zn concentrations of water ranged from 0.021 to 0.043 mg/L in the November study, 0.02-0.061 mg/L in the January sample, 0.02-0.036 mg/L in the April sample, and 0.025 to 0.07 mg/L in the May sample**.** Zinc is a chemical element (Zn) It is an important and beneficial component of both the human body and plants. Zn cannot be completely eliminated due to its dual nature as an integral microelement on the one hand and a poisonous environmental component on the other [15]. Zinc, on the other hand, can cause non-fatal smoke fever, pneumonia, and pose a risk as an environmental pollutant [16].

Table 11. Zinc values of the water sample taken from the observation site

Water Parameters		24.11.2016	12.1.2017	24.4.2017	9.5.2017	Mean
Zn mg/L	Min.	0.021	0.02	0.02	0.025	
	Max.	0.043	0.061	0.036	0.07	
	Average	0.03	0.04	0.03	0.04	0.03

3.2.3. Iron (Fe).

Observational results of Fe values of water samples obtained at the observation site Table 12 shows that the Fe concentrations of water ranged from 0.187 to 0.409 mg/L in the November study, 0-0.152 mg/L in the January sample, 0.089-0.548 mg/L in the April sample, and 0.007 to 0.638 mg/L in the May sample. Iron in well water is listed as a secondary contaminant by the Environmental Protection Agency, which ensures it has no significant effects on health. The EPA has established an overall dose of secondary contaminants of 0.3 milligrams per liter as a recommendation rather than a federal requirement.

Table 12**.** Iron values of the water sample taken from the observation site

Water parameters		24.11.2016	12.1.2017	24.4.2017	9.5.2017	Mean
Fe mg/L	Min.	0.187	0	0.089	0.007	
	Max.	0.409	0.152	0.548	0.638	
	Average	0.28	0.05	0.28	0.26	0.22

3.2.4. Copper (Cu).

Copper (Cu) values in a water sample obtained from the observation site: Table 13 indicates that the Cu concentrations of water ranged from 0.01 to 0.058 mg/L in the November study, 0.002-0.061 mg/L in the January sample, 0-0.044 mg/L in the April sample, and 0.026 to 0.098 mg/L in the May sample. Copper is a reddish metal present in dirt, water, sediment, and air. It is an important ingredient for living beings, required in limited doses to ensure proper health, but too much copper causes health effects such as vomiting and diarrhea, as well as liver and kidney disease [17].

Table 13**.** Copper values of the water sample taken from the observation site

Water parameters		24.11.2016	12.1.2017	24.4.2017	9.5.2017	Mean
Cu mg/L	Min.	0.01	0.002	0	0.026	
	Max.	0.058	0.061	0.044	0.098	
	Average	0.03	0.02	0.02	0.07	0.04

3.2.5. Cadmium (Cd).

Descriptive statistics of cadmium (Cd) levels in a water sample collected at the observation site Table 14 shows that the Cd concentrations of water ranged from 0.008 to 0.021 mg/L in the November study, 0.007 to 0.1 mg/L in the January sample, 0.013 to 0.045 mg/L in the April sample, and 0.041 to 0.06 mg/L in the May sample. A low level of cadmium is naturally present in surface and groundwater; however, higher levels of cadmium in water can result from the use and disposal of cadmium-containing elements. Cadmium is a common element that is occasionally present in drinking water that is poisonous to fish and other marine organisms. Cadmium levels in public water supplies are being regulated.

Table 14**.** Cadmium values of the water sample taken from the observation site

Water parameters		24.11.2016	12.1.2017	24.4.2017	9.5.2017	Mean
Cd mg/L	Min.	0.008	0.007	0.013	0.041	
	Max.	0.021	0.1	0.045	0.06	
	Average	0.01	0.02	0.03	0.05	0.029

3.2.6. Nickle (Ni).

Descriptive statistics of nickel (Ni) values in a water sample collected at the observation site Table 15 indicates that the Ni concentrations of water ranged from 0.037 to 0.186 mg/L in the November study, 0.101-0.269 mg/L in the January sample, 0.068-0.142 mg/L in the April sample, and 0.12 to 0.19 mg/L in the May sample. Ni is an element that accumulates in sediments and is a portion of many biological cycles. Ni is emitted directly from a variety of factories through discharge to surface water. The most prominent source of nickel in drinking water is leaching pipes, which can be harmful in high concentrations.

Table 15**.** Nickel values of the water sample taken from the observation site

Water parameters		24.11.2016	12.1.2017	24.4.2017	9.5.2017	Mean
Ni mg/L	Min.	0.037	0.101	0.068	0.12	
	Max.	0.186	0.269	0.142	0.19	
	Average	0.11	0.16	0.10	0.15	0.13

3.2.7. Lead (Pb).

Lead (Pb) levels in a water sample collected at the observation site Table 16 shows that the Pb concentrations of water are negative in the November and May tests, 0-6.426 mg/L in the January study, and 0.259-0.503 mg/L in the April sample. Lead is typically harmful, because it is present in drainage that comes from streets and roofs. The average person's body contains around 120 mg of lead. Organic lead causes neuron necrosis, while inorganic lead causes axonal degeneration and myelin removal. Both forms of lead have the potential to cause edema and congestion.

Table 16**.** Lead values of the water sample taken from the observation site

Water parameters		24.11.2016	12.1.2017	24.4.2017	9.5.2017	Mean
Pb mg/L	Min.		0	0.259		
	Max.		6.426	0.503		
	Average		0.87	0.42		0.65

3.3. Water organic matter.

The sample of water Table 17 displays the organic matter values from the observation area. Organic matter concentrations in the December study ranged from 22.01 to 29.17 mg/L, 18.37 to 22.62 mg/L in the January sample, 18.23-20.56 mg/L in the April sample, and 18.33-21.37 mg/L in the May sample. Organic matter is described as anything containing carbon compounds produced by living organisms, which contains a wide array of products such as plants, roots, and algae, as well as animal parts, waste, sediment, and sewage sludge.

Table 17**.** Water organic matter values taken from the observation site

Water parameters		2.12.2016	3.1.2017	24.4.2017	9.5.2017	Mean
Organic matter mg/L	Min.	22.01	18.37	18.23	18.33	
	Max.	29.17	22.62	20.56	21.37	
	Average	24.78	20.50	19.62	19.74	21.16

3.4. Water sediment.

On November 29, 2016, the thickest sediment was determined at the point P5 (0.2 gr/L) in the results of water sediment. P6 (0.07 gr/L) was found to have the lowest sediment concentration. On 02.01.2017, the densest sediment (0.04 gr/L) was determined at point P3. P2 (0 gr/L) was found to have the lowest sediment concentration. On April 24, 2017, the thickest sediment (0.04 gr/L) was measured at points P1, 2, 4, and 5. P6 (0.02 gr/L) has the lowest sediment concentration. On May 9, 2017, the thickest sediment was estimated at P3 (0.06 gr/L). P6 (0.01 gr/L) was determined to have the lowest sediment concentration. Table 18 shows this. The sum of mud, sand, silt, and other soil particles that accumulate at the bottom of a body of water is referred to as sediment. Sediment may be caused by soil erosion or by the rotting of plants and animals. Wind, water, and ice also move these pollutants to rivers, lakes, and streams [17].

Table 18**.** Water sediment from the observation side

Sample	Sediment (gr/L)			
	29.11.2016	02.01.2017	24.04.2017	09.05.2017
p1	0.14	0.02	0.04	0.02
p2	0.09	0	0.04	0.05
p3	0.10	0.04	0.03	0.06
p4	0.08	0.02	0.04	0.02
p5	0.20	0.02	0.04	0.02
p6	0.07	0.02	0.02	0.01

3.5. Statistical water analysis.

Table 19 provides a rundown of the mean, standard deviation, and variance values of fifteen calculated parameters for four months of results for the Capakcur river sampled.

Table 19. Descriptive

		N	Mean	Std. Deviation	Std. Error
pH	1.0	12	8.2242	.13426	.03876
	2.0	12	8.3517	.28749	.08299
	3.0	12	8.2050	.23888	.06896
	4.0	12	8.5025	.53095	.15327
	5.0	12	7.9358	.19797	.05715
	6.0	12	7.9208	.13548	.03911
	Total	72	8.1900	.34836	.04105
EC	1.0	12	317.708	117.7936	34.0041
	2.0	12	316.642	116.5094	33.6334
	3.0	12	315.475	109.0149	31.4699
	4.0	12	204.750	112.2045	32.3906
	5.0	12	285.708	141.8107	40.9372
	6.0	12	317.692	171.1773	49.4146
	Total	72	292.996	131.9517	15.5507
Bicarbonate	1.0	12	3.475	4.3687	1.2611
	2.0	12	3.683	4.4210	1.2762
	3.0	12	3.317	3.8312	1.1060
	4.0	12	3.167	3.6001	1.0393
	5.0	12	3.683	4.7899	1.3827
	6.0	12	4.058	5.2321	1.5104
	Total	72	3.564	4.2600	.5020
Chlorine	1.0	12	.467	.2741	.0791
	2.0	12	.333	.1303	.0376
	3.0	12	.375	.1215	.0351
	4.0	12	.442	.1782	.0514
	5.0	12	.350	.1168	.0337
	6.0	12	.450	.2067	.0597
	Total	72	.403	.1815	.0214
Ca+Mg	1.0	12	2.467	1.0765	.3108
	2.0	12	2.433	1.0165	.2934
	3.0	12	3.108	1.2206	.3524
	4.0	12	2.033	1.3694	.3953
	5.0	12	3.000	1.7352	.5009
	6.0	12	3.392	2.0891	.6031
	Total	72	2.739	1.4909	.1757
Ca	1.0	12	1.383	.6576	.1898
	2.0	12	1.500	.6060	.1749
	3.0	12	1.367	.6651	.1920
	4.0	12	1.367	.5314	.1534
	5.0	12	1.617	.6686	.1930
	6.0	12	1.750	1.0553	.3046
	Total	72	1.497	.7065	.0833
Mn	1.0	12	.13592	.112286	.032414

	2.0	12	.14292	.111036	.032053
	3.0	12	.14792	.110525	.031906
	4.0	12	.14733	.102442	.029573
	5.0	12	.15692	.103890	.029991
	6.0	12	.15733	.106940	.030871
	Total	72	.14806	.104323	.012295
Zn	1.0	12	.02883	.006250	.001804
	2.0	12	.02858	.008544	.002466
	3.0	12	.03392	.005282	.001525
	4.0	12	.03650	.014988	.004327
	5.0	12	.03250	.008533	.002463
	6.0	12	.04367	.015210	.004391
	Total	72	.03400	.011415	.001345
Fe	1.0	12	.117083	.0709692	.0204870
	2.0	12	.110250	.1098049	.0316979
	3.0	12	.154167	.0938479	.0270915
	4.0	12	.368917	.2382300	.0687711
	5.0	12	.342000	.1853684	.0535113
	6.0	12	.220250	.1069410	.0308712
	Total	72	.218778	.1752762	.0206565
Cu	1.0	12	.025250	.0158924	.0045877
	2.0	12	.041750	.0195221	.0056356
	3.0	12	.035250	.0317522	.0091661
	4.0	12	.034667	.0235925	.0068106
	5.0	12	.040583	.0257133	.0074228
	6.0	12	.036833	.0253586	.0073204
	Total	72	.035722	.0239119	.0028180
Ni	1.0	12	.14358	.046740	.013493
	2.0	12	.12025	.017274	.004987
	3.0	12	.12967	.027665	.007986
	4.0	12	.14392	.039383	.011369
	5.0	12	.11200	.036534	.010546
	6.0	12	.13508	.074004	.021363
	Total	72	.13075	.044016	.005187
Cd	1.0	12	.020167	.0158506	.0045757
	2.0	12	.029083	.0194677	.0056198
	3.0	12	.027583	.0174848	.0050474
	4.0	12	.029583	.0175834	.0050759
	5.0	12	.032417	.0168548	.0048656
	6.0	12	.032250	.0203431	.0058725
	Total	72	.028514	.0178365	.0021021
Na	1.0	12	7.65692	3.103940	.896030
	2.0	12	7.75908	2.602233	.751200
	3.0	12	7.56217	2.747827	.793229
	4.0	12	4.76975	2.659181	.767639
	5.0	12	4.95267	1.942262	.560683
	6.0	12	10.51325	7.660214	2.211313
	Total	72	7.20231	4.277868	.504152
K	1.0	12	1.90267	1.023259	.295389
	2.0	12	1.91408	.827966	.239013

	3.0	12	1.80258	1.012765	.292360
	4.0	12	2.05858	1.058297	.305504
	5.0	12	2.10800	1.219364	.352000
	6.0	12	3.35717	2.336204	.674404
	Total	72	2.19051	1.401173	.165130
Organic matter	1.0	12	21.7833	1.95169	.56340
	2.0	12	21.5933	2.73236	.78876
	3.0	12	21.2233	3.00901	.86863
	4.0	12	21.0758	3.11962	.90056
	5.0	12	20.3583	3.18306	.91887
	6.0	12	20.9217	1.47210	.42496
	Total	72	21.1593	2.60390	.30687

3.6. ANOVA Tests for Comparison of the Measurement Parameters at Different Stations.

The ANOVA one-way (sites) result is given in table 20, the objective of data (bold color) is the significance of discriminate feature and to decide significance variable that result in water quality variance in four months, pH and Fe parameters were significantly affected according to Capakcur river station. There was no substantial variation between the different stations' EC, Bicarbonate, Chloride, Ca+Mg, Ca, Mn, Zn, Cu, Ni, Cd, Na, K, and Organic matter.

Table 20. The results of the one-way ANOVA (Sites), mean ± standard error and probability (p) of the physicochemical variables.

Water Variables	S1	S2	S3	S4	S5	S6	F-value ANOVA	P-value
pH	8.22±.039	8.35±.083	8.21±.069	8.50±.153	7.94±.057	7.9±.039	7.60	**.001**
EC (µs/cm)	317.7±34	316.6±33.6	315.4±31.47	204.75±32.39	285.71±40.94	317.69±49.41	1.44	.222
Bicarbonat	3.48±1.26	3.68±1.28	3.32±1.11	3.17±1.04	3.69±1.38	4.06±1.51	.062	.997
Chlor	.47±.080	.33±.038	.38±.035	.44±.051	.35±.034	.45±.060	1.20	.321
Ca+Mg	2.47±.31	2.43±.29	3.11±.35	2.03±.39	3.00±.501	3.39±.60	1.44	.221
Ca	1.38±.19	1.50±.17	1.37±.19	1.37±.15	1.61±.19	1.75±.30	.59	.712
Mn	.14±.032	.14±.032	.15±.032	.15±.030	.16±.30	.16±.03	.070	.996
Zn	.029±.02	.03±.002	.03±.002	.04±.004	.032±.002	.043±.004	3.40	.009
Fe	.12±.02	.11±.032	.15±.03	.37±.07	.34±.05	.22±.031	7.18	**.001**
Cu	.03±.005	.04±.01	.04±.01	.034±.01	.041±.01	.037±.007	.71	.620
Ni	.14±.013	.12±.004	.13±.008	.14±.01	.11±.010	.14±.02	1.02	.415
Cd	.02±.004	.03±.01	.03±.01	.03±.01	.03±.005	.032±.006	.75	.589
Na	7.65±.89	7.76±.75	7.56±.79	4.77±.76	4.10±.56	10.5±2.2	3.47	.007
K	1.9±.30	1.9±.23	1.8±.29	2.06±.31	2.1±.35	3.3±.67	2.25	.059

Organic matter	21.9±.56	21.6±.79	21.22±.87	21.07±.90	20.3±.92	20.9±.43	.44	.821

Different superscript letters in a row show significant differences (P < 0.05) indicated by Tukey Honest significant difference tests.
* indicates significantly calculated F-value.
*p values if it is red color it is significant (P < 0.05, and P < 0.01).

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Conclusion.

According to the report, water pH levels ranged from 7.7 to 9.24 and rose during the winter season. The EC values of water samples ranged from 97 to 543 S/cm, with the highest values occurring during the winter season. The bicarbonate levels in water samples ranged from 0.1 to 13 mg/L, with the peak levels found during the winter months. The sodium and potassium content of water ranged from 1,96 to 21,25 mg/L and 0,64 to 5,93 mg/L, with highest values in the winter seasons, respectively. Total hardness levels in water samples ranged from 1 to 6 mg/L, with highest levels in the winter season, similar to EC, pH, bicarbonate, Na, and K levels. The increase in pH, EC, bicarbonate, and Na levels in water samples occurs since Ca, Mg, Na, and K elements, among others, join the water from the soil surface. Because of the lack of a heavy metal source in this region, the Mn, Zn, Fe, Cu, Ni, Cd, and Pb contents of water samples in the study area were found in low concentrations. And the mean amount of sediment in the winter season was 0.2, while the lowest value in the spring season was 0.01. According to the findings of this study, the water from this river can be used for irrigation in plant development. To protect the safety of the water, identified contaminants in the river's vicinity should be regulated or banned from entering the river.

References.

1. Skidmore JF (1964) Toxicity of zinc compounds to aquatic animals, with special reference to fish. The quarterly review of Biology 39(3): 227-248
2. Spear FS (1981) An experimental study of hornblende stability and compositional variability in amphibolite. American Journal of Science 281(6): 697-734
3. Munter R (2003) Industrial wastewater characteristics. The Baltic University Programme (BUP), Sweden
4. West DX, Padhye SB, Sonawane PB (1993) Struct Bonding, (1991); DX West, AE Liberta,, RC Chikate,, AS Kumbhar and RG Yerande. Coord Chem Rev 123: 49
5. Richards LA (1954) Diagnosis and improvement of saline and alkali soils Washington: United States Department of Agriculture. Agriculture handbook p: 60
6. Alemdar S, Kahraman T, Ağaoğlu S, Alişarlı M (2009) Bitlis ili içme sularının bazı mikrobiyolojik ve fizikokimyasal özellikleri. Ekoloji 19(73): 29-38
7. Demiralay İ, Analizleri TF (1993) Atatürk Üniversitesi Ziraat fakültesi Yayınları No: 143
8. Akyurt İ (1993) Balık Yetiştiriciliğinde Su Kalitesi Yönetimi Atatürk Üniv Yayınları p: 144
9. Varol S, Davraz A, Varol E (2008) Yeraltı suyu Kimyası ve Sağlığa Etkisinin Tıbbi Jeoloji Açısından Değerlendirilmesi. TAF Preventive Medicine Bulletin 7(4): 351-356

10. Tanyolaç J (2000) Limnoloji (3 Baskı) Hatipoğlu Yayınevi, Ankara, 237s
11. Tanyolaç J (2004) Limnoloji: tatlısu bilimi Hatiboğlu Yayınevi
12. Koçak İ (2017) Şeyhler Yöresi Borat Yatağının Jeokimyasal Özellikleri, Emet, Türkiye
13. Windham GC, Zhang L, Gunier R, Croen LA, Grether JK (2006) Autism spectrum disorders in relation to distribution of hazardous air pollutants in the San Francisco Bay area. Environmental health perspectives 114(9): 1438
14. Brune A, Urbach W, Dietz KJ (1994) Compartmentation and transport of zinc in barley primary leaves as basic mechanisms involved in zinc tolerance. Plant, Cell & Environment 17(2): 153-162
15. Hampp R., Beulich K, Ziegler, H (1976) Effects of zinc and cadmium on photosynthetic CO2-fixation and Hill activity of isolated spinach chloroplasts. Zeitschrift für Pflanzenphysiologie 77(4): 336-344
16. Salavati-Niasari M, Davar F, Mir N (2008) Synthesis and characterization of metallic copper nanoparticles via thermal decomposition. Polyhedron 27(17): 3514-3518
17. Wauchope RD, Buttlez TM, Hornsby AG, Augustijn-Beckers PWM, Burt JP (1992) The SCS/ARS/CES pesticide properties database for environmental decision-making. In Reviews of environmental contamination and toxicology, Springer New York pp. 1-155
18. https://www.mgm.gov.tr/eng/forecast-cities.aspx.
19. https://www.google.com/maps