The Caspian Sea Journal
ISSN: 1578-7899

Volume 10, Issue 1, Supplement 2 (2016) 24-32

Study of Biological and Physico-Chemical Quality of Babolrood River in Mazandaran province, Iran

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ABSTRACT ─ Babolrood River in the southern Caspian Sea is an important and valuable habitat for migrating species and birth collect valuable fisheries. In the present study, to assess the quality of river water Babolrood river in the year 1389-1390 based on physic-chemical in River studies at some stations within so many sampling intervals with van veen grap and another system. Water quality monitoring is an important role in the sustainable management of river ecosystems. Changes influenced by human activities and land when and where the river is the border river. Overall assessment of water quality which, given the different standards for different usages of water is used, it is not easy. Water Quality Index (WQI) is simple and understandable as a tool for determining water quality and potential application is for managers and decision makers. Babolrood River in northern Iran, one of the major rivers of the aquaculture and agriculture due to urban and industrial development in recent years has suffered a loss of quality. In this study, sampling and analysis of quantitative and qualitative indicators Babolrood river water quality, water quality was investigated. Sampled during the year was performed and the parameters of temperature, pH, NO--, NH3, Ca++, Mg++, SO4--, CL-, NO3-, PO4-, HCO3-, K+, CO3-- and Na+ monthly and heavy metals, suspended water were measured on a seasonal basis. The results showed that the average values of dissolved oxygen, BOD5 and COD are significant differences between months and between different stations (T<0.05). Parameters in the cold season with a better quality have increased river flow. PH, turbidity, TSS and TDS showed no significant differences among the different stations and between the months of the year have been significant (T<0.05). In the study of water quality using different indices used by most stations in poor condition and have been averaged. NSSWQI index and topical index, because the number of parameters and impact parameters weight factor swelling surgical results are presented. Is merit in maintaining the survival of aquatic ecosystems, rivers and uses the laws governing the operation of their water, while complying with international standards, should be taken into consideration and properly implemented to also benefit from a variety of applications, the life of ecosystems to be maintained.
KEY WORDS: water river ecosystems, water quality index (WQI), Babolrood River, water quality standards.

Introduction

When contaminated water is called the combined effects of human activities or its properties can be changed directly or indirectly, to the extent of these changes, all uses of water that normally went to work are undesirable[2]. Sources of water pollution can be depending on whether the focal point or a point spread is non-classified. And the focal points are limited. For example, industrial or municipal wastewaters are discharged into rivers [11]. General point pollutants are controlled through filtration in place. Non-focal point, such as diffuse and intermittent runoff is influenced by factors such as land use, climate, hydrology, topography, vegetation and geology is [6].The focus of the source of pollution comes from. Definitive source of pollution is important, because generally it is reasonable that the source of contamination in the range. After contaminants were released from their source can not affect the self-acceptor. Acceptor is what is affected by pollutants [19&5]. Necessary for the formulation of standards and indicators of water quality and subsequent water quality zoning, planning to protect water resources and prevent further degradation of these gifts are[4]. The country's water resources constantly being monitored and negative changes as soon as i fell solution. It provides the necessary guidelines and specific standards are developed [12]. First, it is necessary to develop standards of quality standards and indicators used in other free countries have been studied and compared with the implementation of regional conditions, climate and water resources applications to develop standards in the country [8].

The study of objectives:

- Measurement and determination of some physicochemical Azparamtrhay Babolrood river at several stations during the months of the year.
- Set the time and place changes the parameters passed
- The water quality of river water quality based on indicators
- Measurement of some physico chemical factors in the soil around the river
- Measurement of metals in four species of crop and horticultural crops is the main water supply is needed through Babolrood River.
- Determination of water quality in the health of the crops

Materials and Methods

Babolrood River Caspian Sea is one of the main river and its watershed to the north Caspian Sea, the East River to the northern slopes of Alborz Mountains to the Forum and the South and West to the Haraz River catchment is limited. This river originates from Alborz heights of 3700 meters and after passing through deep canyons and twisting and bending and joining different branches Lafoor region is inserted. The main branch of the river linking the Persian month Azar is Rivers, Asklym, Bablk and KrsngWest side of the main branches, the river Klarvd methanol and interconnected and connected to the river near the bridge Khran MH Khan (south of Babylon) to join Babolrood and after passing through the city of Babol, the Caspian Sea and Babolsar Amirkola falls 80 to 150 meters wide medium rivers of Babylon and its average depth is 3 m. The maximum distance along the river (from the branches to the Caspian Sea) is about 120 km. It's Rainy River - is snow and rain, and the function is less affected by melting snow. Probe repeatedly during a long and severe in areas with frequent rainfall and discharge in the autumn and spring are usually the bulk. Babolrood river discharge with increasing catchment area, from upstream to downstream is high. The annual discharge rate varies from 250 to 600 million cubic meters and its average discharge 9 cubic meters per second have been measured. The correlation between physical and chemical parameters of water, indicating the influence of parameters on each other or INFLUENCE is a common factor is shown in Table 4-1. Dissolved oxygen and BOD, COD is an inverse relationship at the 5% level of significance. Biological oxygen demand and chemical oxygen demand due to the oxygen consumed by microorganisms to decompose organic material undermines the dissolved oxygen.

Dissolved oxygen, pH and temperature with an increase in the rate of biodegradation is an inverse relationship (significant at 1% level). Shvhymy Avtaman (2006) in lake water quality study of Chinese in West Malaysia Pahng variables such as seasonal (dry or wet) and dissolved oxygen affect the rate of decomposition of organic material for maximum effect. It seems that in the dry season due to the closure of rubber dam for storage of agricultural water reduced river flows and temporary conditions similar to those prevailing conditions in the lake.

Results

This river has a direct relationship with turbidity and TDS, which shows increased flow in the winter due to strong currents and sediments associated with the turbidity and TDS increases. As mentioned earlier, TDS and TSS with the 1% level of significance was the picture that shows the interaction of these two factors together.

The diagram indicates that losses of dissolved oxygen water quality in recent years have been.

Changes in DO levels from 1368 to 1386 with 95% confidence intervals

Biochemical oxygen demand

There was no significant difference between the values of the stations (672/0 = P) but the differences were between the years (5% P <) and Duncan test of the difference in the three categories is shown in Fig.

The hash of K can be due to increased urban population (due to the fact that none of the cities and industries along the lower quality could be increased due to lack of attention to environmental laws, regulations, and construction of wastewater treatment systems, construction sand and workshops high in fish in the river margins and increased use of pesticides and fertilizers in agriculture is uncontrolled.

BOD values change from 1368 to 1386 with 95% confidence intervals

4-4) measured parameters, total coliforms, BOD, DO few other parameters

The following parameters of the measurement results of total coliform, BOD, DO, EC, COD, TSS, TDS, TURBIDIT Babolrood 12 months in 7 stations in the river bed is shown. First results in different stations and then in different months is given as follows:

Station

Coliform standard deviation of the General Quran lowest stations (2/8 ±) and the highest station Anarstan and Paul Habibi 7/7 ± he said. In all measurements at all stations during the 12 months of 2400 the number of total coliform coliform and solved in 100 ml measured even sewage effluent limit is also higher due to exposure to human waste to villages and towns and guidance is due to high water levels in rivers and water wells are also cause this type of contamination. Lowest standard deviation of turbidity in Babolsar station (7/81 ±) and Paul Habibi highest station (0/240 ±) has. Turbidity of river water from the first station to station 7 which can be reduced due to water loss is greatly increased width of the river and the river happened to be flat, but the experience of analysis of variance showed no significant differences between the stations. Lowest standard deviation of COD in Aystgahqran Forum (0/5 ±) and the highest Khrdn station (1/12 ±) shows the same trend as COD and BOD from Station 1 to Station No. 7 is a significant increase between stations 1 and 2, 3, 4 and 5 with 6 and 7, there are stations (P <0/05) COD 114 mg is the highest river in the neighborhood due Amirkola, transporting it to landfill leachate Amirkola the river Hryan COD and BOD is the amount of surface water quality classification based on increases in the Europe Union countries [55] only the amount of COD 4 stations in class 4 (bad) and three stations in the next row (very bad) is placed. The diagram shows that there is no significant difference between stations in the amount of deviation (P <0/05) increased BOD from the Quran Hall station to sea. BOD measures the lowest Anarstan Station 8/0 ± and Habibi highest bridge in Station 7/6 ± is the BOD values decreased and warming in winter and use increases the BOD of the river promenade on the river water quality standards in Japan None of the stations is not suitable for fishing and water-water stations 3, 4 and 5 are suitable for agriculture. Standard deviation of the lowest TSS Khrdn station (1/272 ±) and the General Quran highest station (0/323 ±) has. There is no significant difference between the stations of the second factor, TDS and TSS TS is obtained and the index of this parameter is used NSFWQI.

TDS standard deviation of the lowest station Quran Hall (5/184 ±) and the highest Anarstan stations (2/206 ±) has. And observed no significant differences between stations. DO standard deviation of the station and entirely Amir Babolsar minimum 6/0 ± and the highest station Quran Hall 5/2 ± had. Variance test for significant differences in experience between the first station with other stations shown (P <0/05) stations upstream of the status of dissolved oxygen are of better quality. DO measured in winter and highest in summer and spring were the lowest. Concentration of oxygen (6/5) to milligram per liter (7/2) mg L varied. There is sloped bed, turbulence and water pollution may be lower due to higher amount of dissolved oxygen in the upstream than downstream .Coliform standard deviation of the months January, February-April lowest (1 ±) and highest in March (3 ±) has. It was highest in the Persian month marc due to increased pollution of groundwater and wells in the wastewater can be released.
Standard deviation of the EC in May Asfndkmtryn value (3 ±) and highest in June (669 ±) has.
DO standard deviation of the lowest in January (2/0 ±) and highest in the month of May (19/2 ±) has. Oxygen concentration was directly related to water-soluble substance and is a significant difference between the stations. (P <0/05)
BOD in March the lowest standard deviation of 0/1 ± and in June the highest 2/8 ± had.
COD standard deviation of the lowest in March (0/1 ±) and highest in December (7/17 ±) has. Significant difference in months not years and river discharge and temperature have an important role in the COD and BOD.
Lowest rate of 1 ± SD TSS in January and July had the highest amount of 311 ±.
Lowest standard deviation of TDS on August 6/0 ± and highest in the month of September, 3/163 ± had
Turbidity levels in the months of November the lowest standard deviation (0 ±) and highest in June (262 ±) has. The turbidity of the river regime is the rainy season varies depending on the rains in early spring and late summer, the higher the turbidity is due.

Discussion

The highest average of margalef biological index and the Shannon weiner diversity is belonded to station and the lowest score is assigned belonging to some stations. Base on diversity index of Shannon weiner, Macrobenthos diversity of some station have bean very few and minor. Results show that some stations duets pressure form domestic and urban waste water entering,washing machin shop, Babolroud fish sales and discharging of urban waters around the river with high pollution load, sand and gravel factories, Authorized and unauthorized removal of sand and gravel from river creates relatively poor condition in some season in the year. Due to increasing of population and expanding urban and rural areas, industrial units and mineral and agriculture lands makes the environmental issue to be very important [1]. The most important undesirable is caused by increasing the utilization of nature and non normative productivity from biological resources and huge amounts of waste and residues in the environmental and the pollution of large areas placed in constant arrival and unloading the waste are river that have a major role in the distribution of pollution, river pollution of the crisis in water management [6&9]. Many rivers in urban and semi urban areas are exposed to untreated solid waste and wasting the contaminated water [3]. This high pollution is threating and in many cases changes the ecological status from a large member of river, a household waste and more important industrial waste due to having mineral and matter disposal in the environmental causes the surface water and ground water to be contaminated. Industrial due to corrosively and more acidity level and more existing toxin compound sand because of fewer existing the organisms in it has more risks rather domestic sewage, domestic sewage will contain pathogens and oxygen demand, organic carbon and suspended solids, it quick and inexpensive way to detect and identify various contaminants including pollution caused by aquaculture which is the study of benthos community in recent decades has emphasized on its performance [7&16]. In the fewer decades ages the river quality assessment was possible based on chemical data, but the chemical and physical data in retrieved from the water is sampling at the moment and is due to by a set of parameters which is considered as limitation. Macroben this members live in aquatic ecosystem that are a year or more of the life cycle and large distance. These invenmtories are stressed and the changes occur in a aquatic ecosystem. These changes and stresses are mainly from human activities and high food on the environment which are resulting from discharges and renewable resource emissions. One of the east practical and economical methods for preparing ecological water health, and determine weather human activity causes water quality reduces or not, is assessing and biological monitoring. Results of measurements of heavy metals in the following 12 months at 7 stations in the river bed are shown Babolrood. First results in different stations in different seasons and is given as follows: The present study to examining the effect of pollution on population and biodiversity in river of Babolrood spring, microbenthic invertebrates were based on biological indictors. sample monthly is done for one year in so many stations by sampling randomly from sideline and middle of the river. Then we mix with 4% formalin or 95% ethanol and transfer them to laboratory by using the loop and are done the light below and reliable identifications keys were used to estimate the relative abundance of bioindicators f water quality in research station. review the composition was began to count identified physic-chemical and biological quality factors, for determining the macrobenthic in study station based on its weight, the sample corresponding to each station were placed blotting a few minutes on blotting paper to the laboratory and then by using weights corresponding to Each row of scale sensitive to 1 mg and weigh data were recorded in the table. Shannon weiner diversity index is one of the most biological indicators that are used in aquatic and terrestrial ecosystems. Shannon index that is randanly this sampled sets, more number and distribution of species diversity is further increased in very station. It is calculated by this following formula:

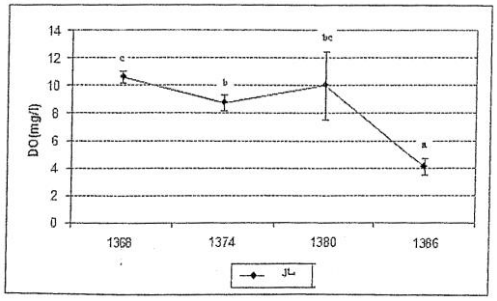
$$\mathbf{H'= -\sum_{i}^{n}\left(\frac{ni}{n}\right)\ LN\ \left(\frac{ni}{n}\right)}$$

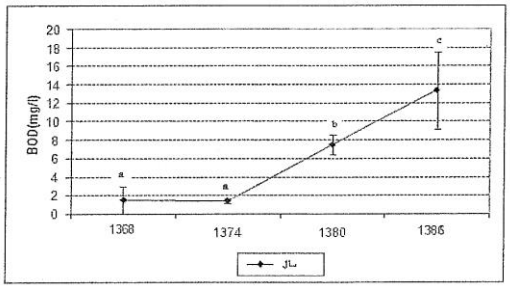
n^i: the frequency of (i) grade individual in sample
In: logarithm based on neperin.
n: the whole frequency of (i) grade individual in sample

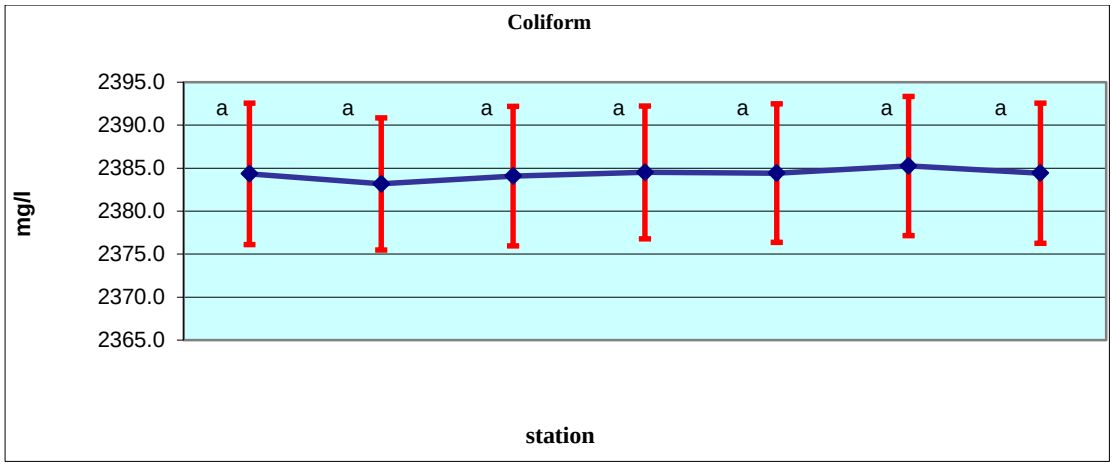
H: Shannon weiner diversity index
Morgalef index reflects the diversity in biological population and ideal index for comparing macrobionthic community and effects ecosystem levels of rich and poor in terms of a large number of species. The numerical value, the higher health the body water in terms of biological gets.
D = (S-1) / log2
S: number of species
D: number of in diversity index
Analysis of data obtained was performed using statistical software. Version 16 with this software in order to evaluate different means of physical and chemical data and biological indicatory among the stations of variants' analyses was used[8&14]. To examine differences in mean abundance and biomass research station of the krushkal-wall is test, as for analysis average of dun can test at 5%.level was calculated using the data and draw graphs were done with software package.

References:

1-Barbour M.T., Plafkin J.L., Bardley B.P., Graves C.G. and Wisseman R.W. Rapid bioassessment protocols foruse in streams and wadeable river: pryphyton, benthic nvertebrates and fish, 2 nd edition EPA, Wshington D.C., 408 p.(1999)
2-Barbour M.T., Plafkin J.L., Bardley B.P., Graves C.G. and Wisseman R.W. Evaluation of EPTs rapid bioassesment metrics: Mertic redundancy and variability among reference stream sites. Environ Toxicol.Chem. 2: 437-449 (1998)
3-Boaventura R., Pedro A. M., Coimbra J., Lencastre E. Trout Farm Effluents: Characterization and Impact on the Receiving Streams. Environmental Pollution, 95 (3),- 379 – 387.(1997)
4-Camargo J.A., Gonzalo C., Alonzo A. assessing trout farm pollution by biological metrics and indices based on aquatic macrophytes and benthic macroinvertebrates: Acasestudy.Ecol.Indicat. doi:10.1016/j.ecolind.(2010)
5-Davies A. The Use and limits of various methods of sampling interpretation of benthic macroinvertebrates,(imon,60(suppl):1-6.(2001)
6-Fore L. S., Karr J. R. Wisseman R. W. Assessing Macroinvertebrate Responses to Human Activity, Journal of North American Benthological Soc. 15(2): 212-231. (1996)
7-Hugh F. Clifford, Aquatic Invertebrates of Alberta. The University of Alberta press. ISBN: 0-88864-233-4. 538p.(1991)
8-Loch D.D.,West J.L.,&Perlmutter D.G.The effect of trout farm effluent on taxa richness of benthic macroinvertebrates.Aquaculture,147:37-55.(1999)
9-Lental D. A biotic index for southeastern United Sataes,Derivation and list of tolerance values with criteria for assessing water quality ratings.JNABS.12:179-290.(1993)
10-Mccafferty P. ,Provonsha A .Aquatic Entomology.the fishers and Ecologysts Illustrated Guide to Insect and Their Relativs. Jones and Bartlett Publishers London. ISBN: 0-86720-017-0. 448 p.(1981)
11-Ogbogu s.s., Olajide S.A. Effect of sewage oxidation pond effluent on macroinvertebrate communities of a tropical forest stream, Nigeria.Journal of Aquatic Science 17, 22-27.(2002)
12-Ortize J. D., Puig M. A. Point source effects on density, biomass and diversity of brnthic macroinvertebrate in a meditaranean stream,river Res.Applic.23:155-170.(2007)
13-Pennak Robert W. Fresh-Water Invertebrates of the United States. Second Edition. John Wiley & Sons. ISBN: 0-471-04249-8. Xviii, 803p(1987)
14-Plafkin J.L., Barbour M.T., Porter K., et al, Rapid Bioassessment Protocols for Use in Streams and Rivers: Benthic Macroinvertebrates and Fish, Washington, DC, EPA 440/4-89/001.(1989)
15-Robert L.D ,Voshell R,Dietrich A. Benthic Macroinvertebrate Susceptibility to Trout Farm Effluents. Blacksburg, Virginia.(2005)
16-Sioli H. Tropical Rivers as Expressions of thire Terrestrial Environment, Trend in Terrestrial and Aquatic Research. Springer-verlag Pub., New Yourk.(1975)
17-Semenchenkov V. P. Moroz M. D, Comparative Analysis of Biotic Indices in the Monitoring System of Running Water in a Biospheric Reserve. Water Resources, Vol. 32, No. 2, 2005, pp. 200–203. Translated from Vodnye Resursy, Vol. 32, No. 2, 2005, pp. 223–226. (2005)
18-Spelman F. R. and J. E. Drinan. Stream Ecology and Self Purification. Lancaster Technomic Pub. Inc.U.S.A., 26lp.(2001)
19-Tello A., Corner R.A., Telfer T.C, How do land-based salmonid farms affect stream ecology? A reviwe. Environmental Pollution 158, pp. 1147–1158.(2009)



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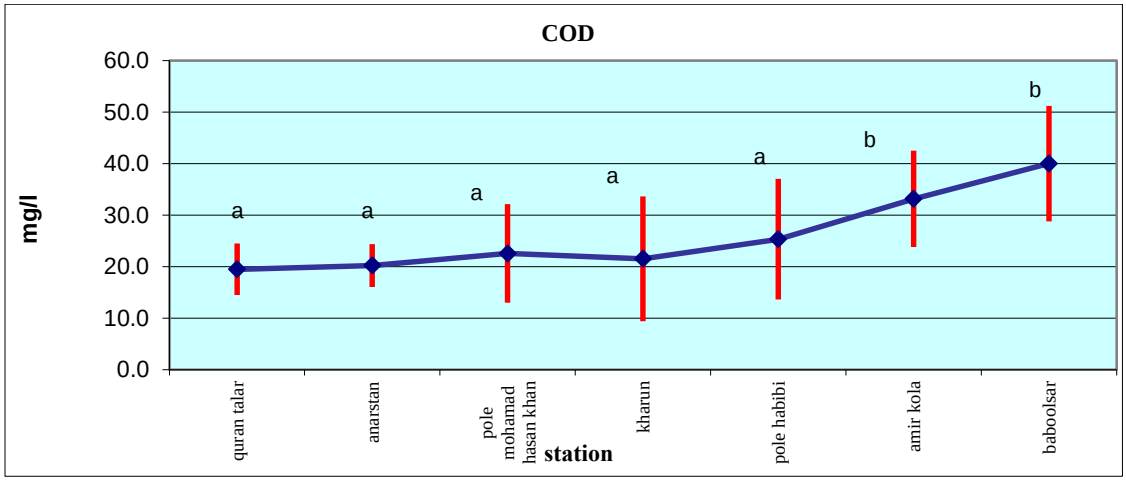
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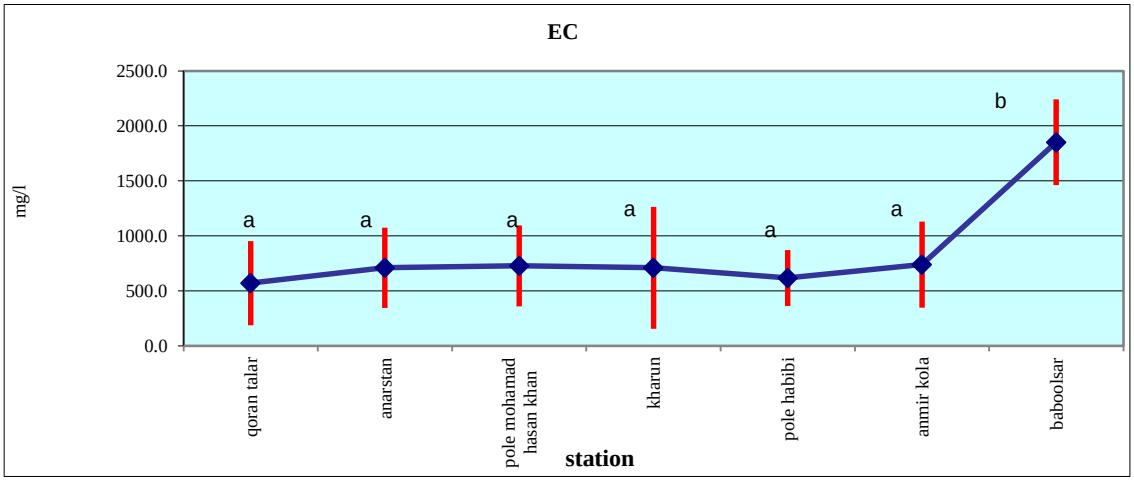
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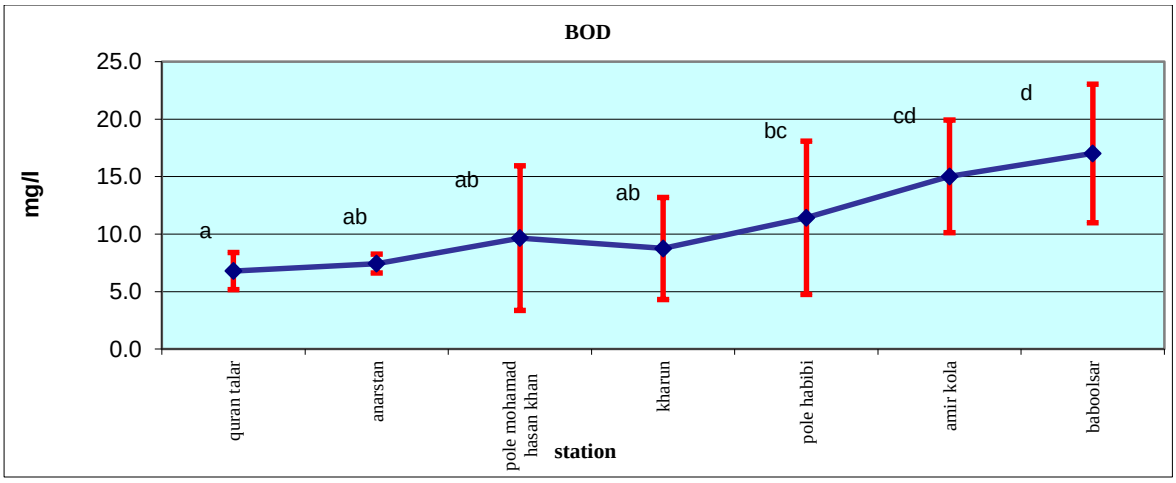
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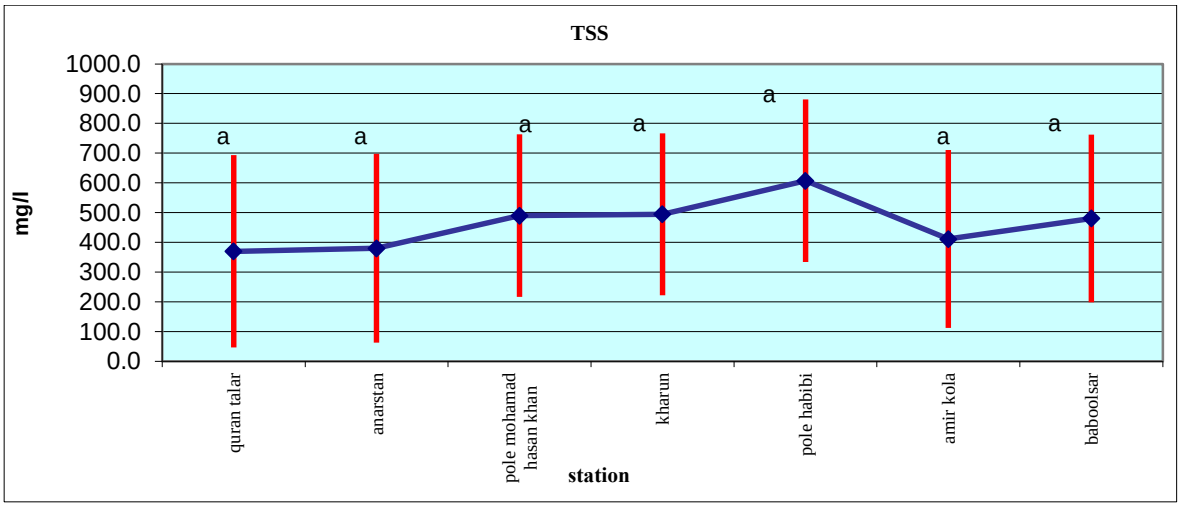
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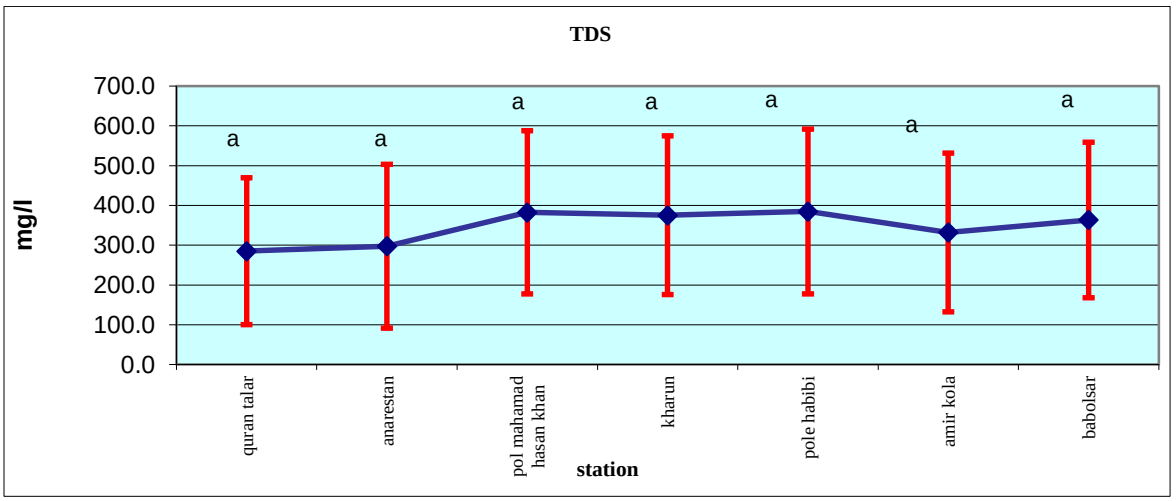
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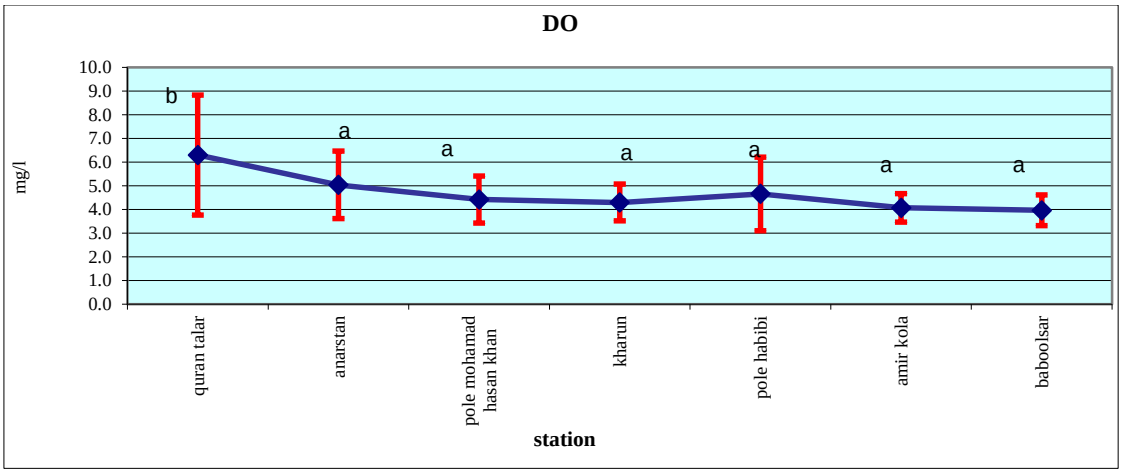
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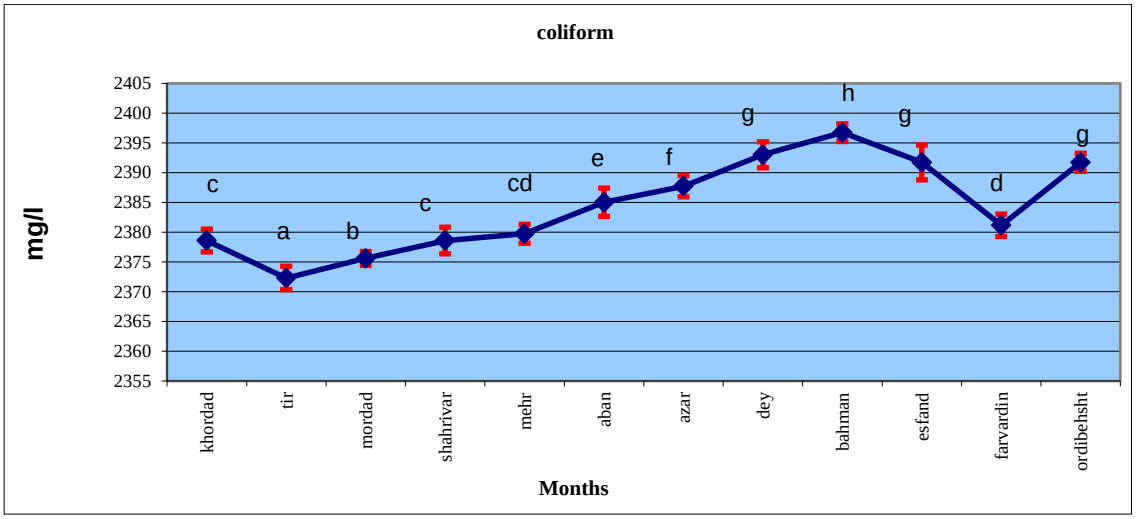
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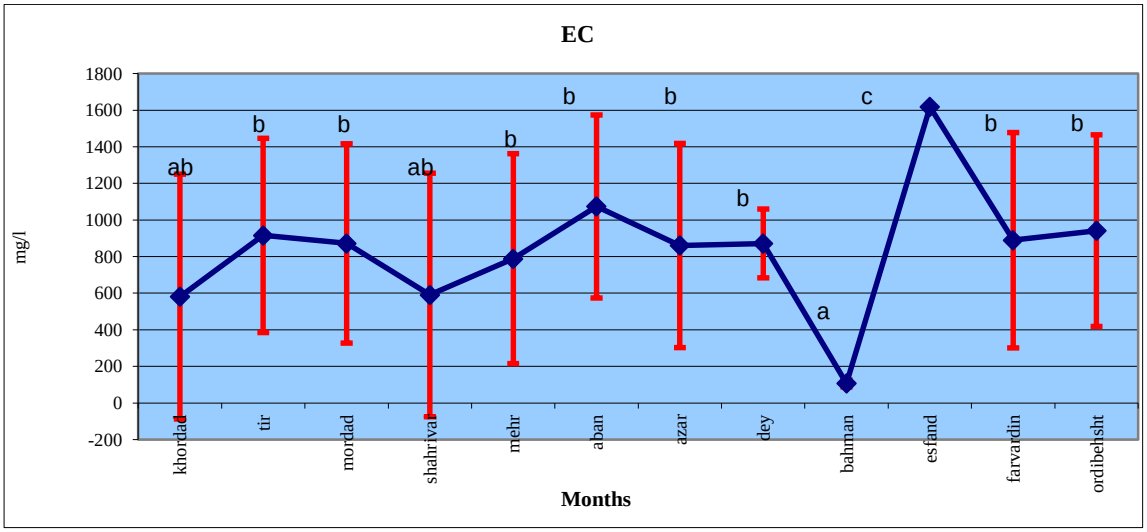
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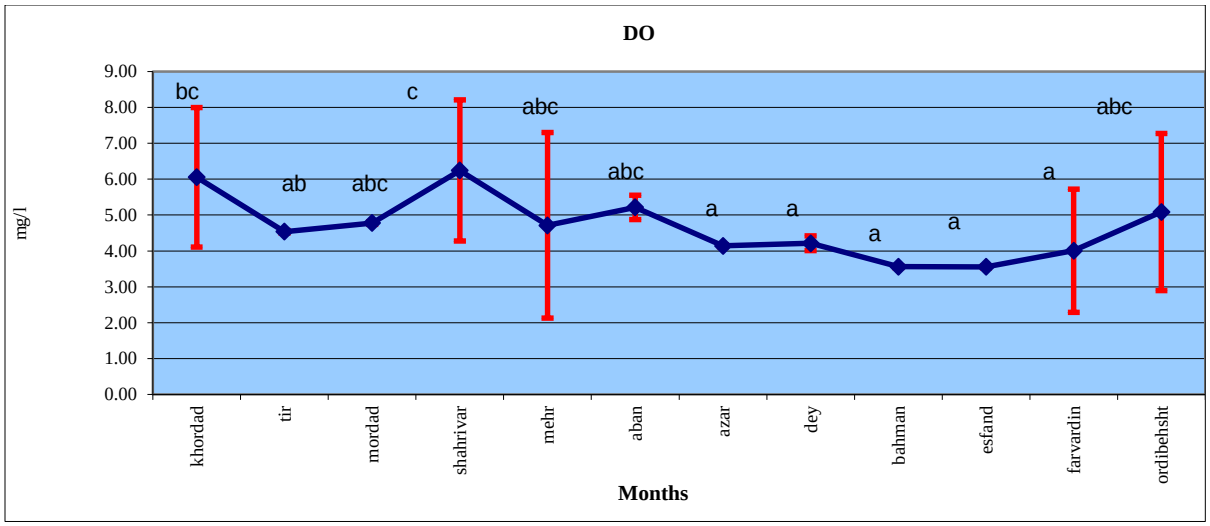
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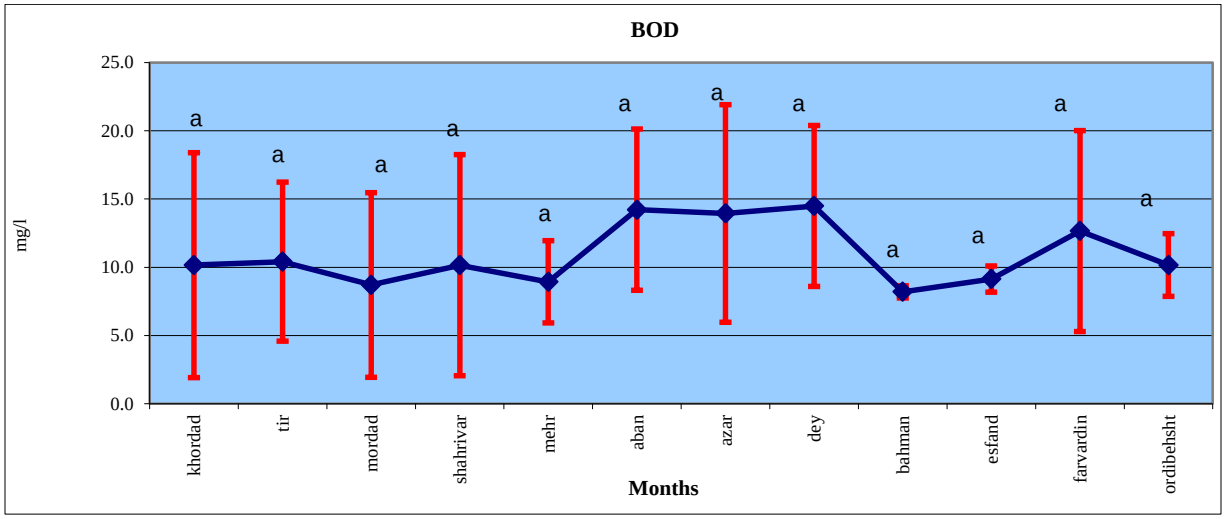
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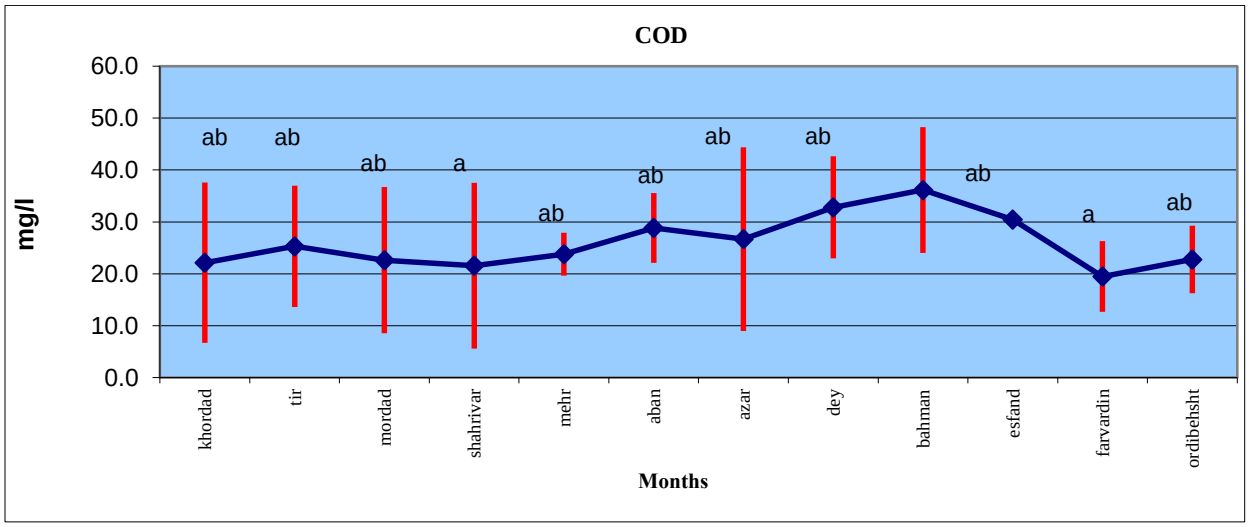
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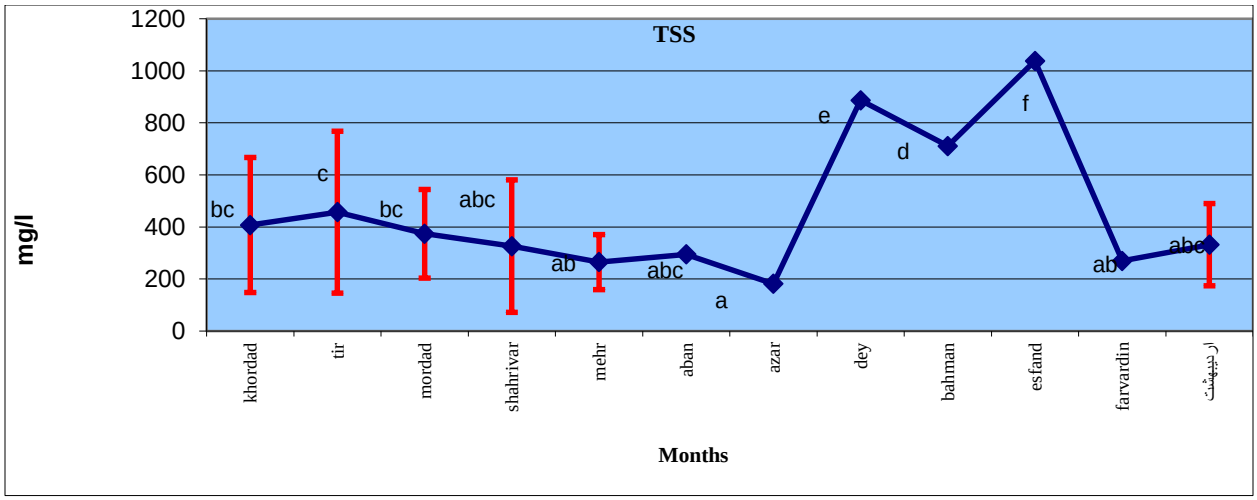
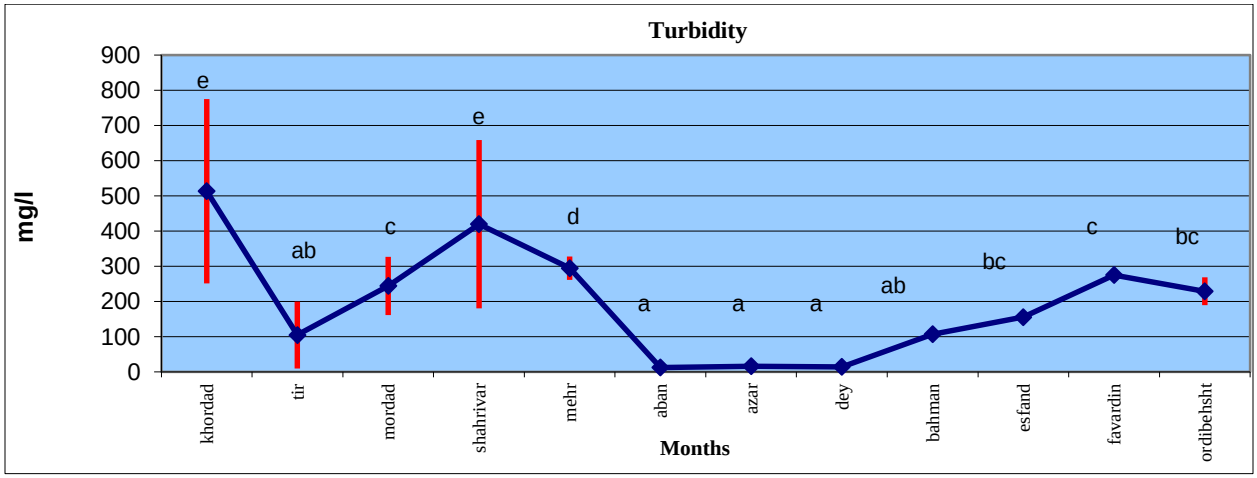
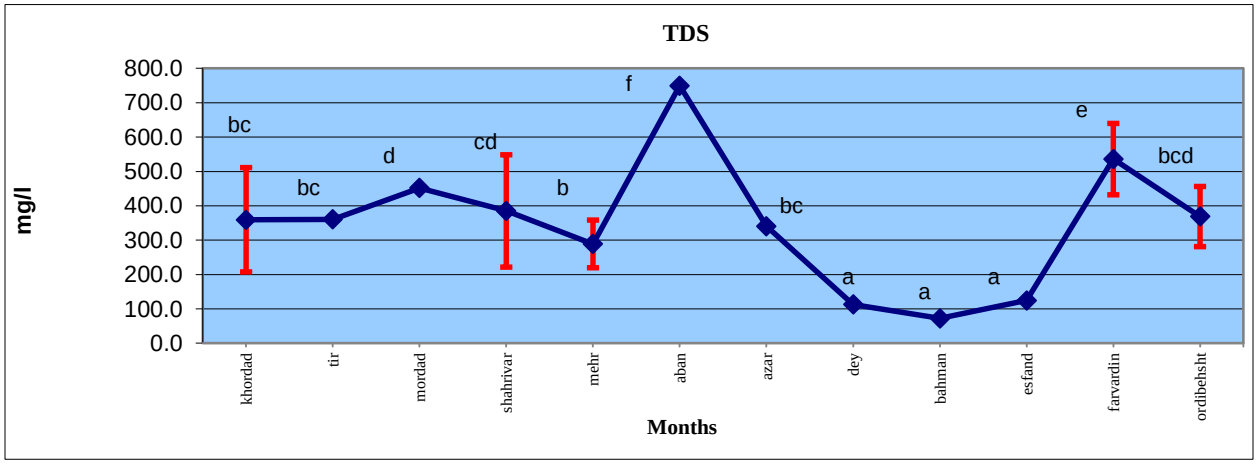
mg/l
60.0
50.0
40.0
30.0
20.0
10.0
0.0
ab
ab
ab
a
ab
ab
ab
ab
ab
a
ab
khordad
tir
mordad
shahrivar
mehr
aban
azar
dey
bahman
esfand
farvardin
ordibehsht
Months


TSS
mg/l
1200
1000
800
600
400
200
0
bc
c
bc
abc
ab
abc
a
e
d
f
ab
abc
khordad
tir
mordad
shahrivar
mehr
aban
azar
dey
bahman
esfand
farvardin
اردیبهشت
Months


Turbidity
mg/l
900
800
700
600
500
400
300
200
100
0
e
ab
c
e
d
a
a
a
ab
bc
c
bc
khordad
tir
mordad
shahrivar
mehr
aban
azar
dey
bahman
esfand
favardin
ordibehsht
Months


TDS
mg/l
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
bc
bc
d
cd
b
f
bc
a
a
a
e
bcd
khordad
tir
mordad
shahrivar
mehr
aban
azar
dey
bahman
esfand
farvardin
ordibehsht
Months