International Journal of Geography, Geology and Environment

P-ISSN: 2706-7483
E-ISSN: 2706-7491
IJGGE 2022; 4(1): 13-15
Received: 07-11-2021
Accepted: 09-12-2021

Wesan Fadhel Khalef
Department of Biology, College of Sciences, University of Thi Qar, Iraq

Shaimaa Talib Abedali
Department of Biology, College of Education for Women, University of Thi Qar, Iraq

Huda Natiq Faris
Department of Biology, College of Sciences, University of Thi Qar, Iraq

Corresponding Author:
Wesan Fadhel Khalef
Department of Biology, College of Sciences, University of Thi Qar, Iraq

Assessment of the water quality of the Hafar river using the water quality index (Canadian model)

Wesan Fadhel Khalef, Shaimaa Talib Abedali and Huda Natiq Faris

Abstract
The water quality index is an efficient way to assess the water quality of water sources and determine the validity of its use for various activities. The water quality guide (the Canadian model) was applied as an effective means in assessing the water quality of the Al-Haffar River within the city of Nasiriyah. Drinking water and for living purposes and for irrigation purposes in finding the values of the water quality index, which are: Air temperature Water temperature, flow velocity, electrical conductivity, total dissolved materials, salinity, turbidity, pH, total alkalinity, dissolved oxygen, BOD, total hardness, effective nitrate, reactive phosphate, sulfate, chloride, sodium, potassium, calcium, magnesium, boron, sodium adsorption rate, residual sodium carbonate, carbonate, bicarbonate, iron, lead, copper, bacteria, fecal colon. Principal Component Analysis (PCA) studies showed that iron, lead, biological oxygen demand, boron, copper, cadmium, fecal coliform bacteria, chlorine, total solids, and sodium are the most important variables responsible for the variance in the quality of drinking water, and thus the most determinant of the suitability of the river for drinking water supply. It was followed by calcium, total hardness, turbidity, effective nitrate, sulfate, magnesium, electrical conductivity, pH, dissolved oxygen and total basicity, respectively. All the variables were inversely correlated with the evidence used except for dissolved oxygen, total alkalinity, pH, electrical conductivity, magnesium and sulfate. While iron, lead, boron, cadmium, water temperature, the vital requirement for oxygen, copper and total solids were the most important variables responsible for the variation in water quality for living purposes, and thus the most determining the extent of the river's viability for living organisms, followed by chlorine, effective phosphorous, turbidity, effective nitrate, pH and dissolved oxygen, respectively. . And that all these variables were inversely correlated with the evidence, except for dissolved oxygen, pH and nitrates. While boron, bicarbonate, cadmium, iron, lead, chloride and copper were the most responsible variables in influencing the quality of irrigation water, and thus the most determinant of the suitability of the Euphrates River water for irrigation purposes, followed by electrical conductivity, pH and sodium adsorption rate, respectively, and the remaining sodium carbonate had no effect on The value of the evidence because its values were imperceptible in the studies. All the variables were inversely correlated with the evidence except for the pH and the rate of sodium adsorption.

Keywords: negligence, nursing, malpractice

Introduction

Water is life, health is wealth, and wasting wealth is tampering and neglecting the water resources around us, which can be devastating to life, health and wealth. Providing water suitable for human use has become one of the difficult problems facing the world in many regions, as large numbers of diseases are transmitted through water (Al-Safawi and Al-Assaf, 2018) [2]. The quality of fresh water is one of the important and critical issues in many countries of the world, especially with regard to the sources of that water, which will be scarce in the future. Therefore, water quality control programs have become necessary to protect the sources of that water from pollution (Pesce and Wunderlin, 2000) [20]. The discharge of untreated waste water results in continuous expulsion of quantities of organic matter and nutrients to the receiving water body, leading to a number of clear effects on its environmental components, including severe changes in water quality, including a lack of dissolved oxygen and an increase in the concentration of nutrients (such as nitrites and nitrates), and an increase in turbidity Water, blackening in the lower layer of the water body (Santra, 2010) [15]. Water quality control is an important protection issue. And that the physical, chemical and biological characteristics of the river water are important to assess the effects of the deterioration of the river. This is necessary to maintain water quality and

reduce the effects of degradation. (Al-Tikrity, 2001) [3] The process of preserving water quality from deterioration requires the application of efficient monitoring methods in order to communicate the necessary information about water quality in a simple and accurate way to specialists and decision-makers. It is based on that information to take appropriate decisions and formulate policies to protect and preserve water quality from change (Karakaya and Evrendilek, 2010) [12]. Also, one of the main objectives behind water resources monitoring programs is to inform people about the suitability of that water for different uses (drinking, irrigation, swimming...etc). , as the general public wants to get simple and direct answers to their inquiries about the quality of water, and is it clean and suitable for different uses, or is it deteriorating? Therefore, specific objectives should be set for the monitoring program That Tergats are important (WWQTG, 2006) Although there are many scientific methods used to assess the quality of water, but it is not easy to say that this water is good, or that water is not good, the water may be suitable for a specific purpose, but it is not suitable enough to be used for another purpose, as the required water quality depends For any use of a nature Usage (Sarkar and Abbasi, 2006) [16] Water must be monitored and that monitoring includes determining the quality of the aquatic environment, and how the environment is affected by the release of pollutants through human activities or waste treatment facilities, and it is called monitoring damage (UNEP/WHO, 1996). In order to ensure the safety of water, it is uytnecessary to understand the relationship between human activities and their effects on living organisms, for example, phytoplankton that may cause the phenomenon of eutrophication (MPCA, 2008), which has negative effects on the aquatic environment and organisms, which occur when large quantities of nutrients reach the environment. With the availability of suitable temperatures and calm weather, this phenomenon increases and accelerates due to the increase in organic matter and nutrients in the aquatic environment (Brito *et al*., 2010) [4]. The quality of water, whether it is surface water or groundwater, will be affected either by natural processes or by human activities or by both. Without human influences, the water quality is affected by erosion of minerals from the rocky bottom, the processes of deposition of gases from the atmosphere, dust and salt aerosols by wind, the natural deposition of organic matter and nutrients from the soil and hydraulic factors that can change the chemical, physical and biological properties of water, and as a result, water in nature contains Many Soluble and Partially Soluble Substances Many dissolved salts and minerals form essential compounds that help maintain the integrity and vitality of organisms that depend on the components of this ecosystem (Stark *et al*., 2000) [19]. Some water systems that are greatly affected by natural conditions are able to resist the change in water quality without any detectable effect, while there are ecosystems that are sensitive to minor changes in the chemical, physical and biological properties of the water surface, and this can lead to the degradation of ecosystem components and loss of Biodiversity. As for the deterioration of water quality, physical, chemical and biological, resulting from human interventions, which are often gradual and unnoticeable effects of the water system, it is often not easily detected (Scheffer *et al*., 2001) [17]. It has become necessary to find scientific methods to explain the huge amount of water quality data to be easy to understand and clear and give quick results without the need to go into the interpretation of the factors and variables indicating water quality individually, so the simplest way to assess the status of water quality is to use water quality indicators (Salim *et al*., 2009) [14]. The first to propose a water quality guide is the scientist Horton (1965) to summarize large amounts of statistical data on water quality into a single useful or understandable value. The water quality index can be defined as a mathematical tool used to convert large quantities of water quality data into a single value (a number, word or term) and represents a certain level that can be expressed about water quality (Ŝtambuk-Giljanovic, 1999. While he defined it Nasirian (2007) as a means of summarizing a large number of water quality data and transforming it into simple terms such as (good or poor) to communicate it to decision-makers, administrators and the general public in a simple and understandable manner. The traditional studies that have been conducted to assess the water quality of any body of water necessitated conducting several tests for the physical, chemical and biological water quality variables. In those studies, the values of those variables are relied on in assessing the quality of water (Štambuk-Giljanovic, 1999), the variable whose value deviates from the permissible limits. It is considered as the determining factor in classifying water quality in terms of its use and pollution (Dojlido *et al*, 1994) [9]. Many different methods have been developed for calculating the water quality index, but in general they are all similar in dependence on physical, chemical and biological factors, but differ in the method of calculating the index values (Ŝtambuk-Giljanovic, 1999). The guide determines the extent to which the measurements or values deviate from the normal or ideal concentrations, and the guide is more suitable for understanding the state of water quality for different types of water bodies during a period of time. (UNEP/GEMS, 2007). Comprehensive information and knowledge about water quality in its various sources plays an important role in the water resource management plan (Salim *et al*., 2009) [14]. Presenting data on the quality of the aquatic environment for the average person without compromising the technical integrity of the data has always been a difficult task, and in recent years reporting on water quality has become easy after the development of the Canadian Water Quality Index (CCME WQI) (Canadian Council of Environment Ministers Water Quality Index) The CCME WQI was developed by a committee of water quality experts in Canada in the late 1990s to provide a tool to simplify the reporting of water quality data (CCME, 2001c). The Canadian Water Quality Index is thus a standard tool that allows its users to summarize large amounts of water quality information from The control positions are reduced to a single number or a single value (Rocchini & Swain, 1995). The guide also provides a meaningful summary and provides a broad view of the interpretation of water quality data that is useful to technicians, politicians, lay people (non-specialists) as well as professionals interested in water quality outcomes. The Canadian Water Quality Index is an efficient mathematical model in evaluating water quality for its ability to summarize a number of Large amounts of water quality data are transformed into information that can be easily understood and interpreted by decision makers, administrators and the general public (CCME, 2001a). The application of the guide depends on basic steps that can be

summarized by defining the time period and selecting the variables, as well as choosing the standard criteria and calculating the water quality index. It is very important when using the guide to specify the period of time during which the water quality is required to be monitored. Usually one year is used for monitoring, because the data is usually collected to reflect the water condition during that period (monthly or quarterly) and this is subject to the objectives of the study (CCME, 2001b) [7]. It is necessary to take into account the selection of the appropriate variables according to their importance for each of the different water activities (CCME, 2001b) [7], as the evidence associated with a particular activity includes variables related to the nature of that activity, such as the preparation of drinking water, irrigation and living of neighborhoods, the variables were studied by a number of researchers Mustafa (2009 (On the Euphrates River in the city of Ramadi and Obais and Al-Fatlawi (2012) on the Hilla River and Al-Heety *et al*., (2011) on the Euphrates River between Heet and Ramadi. During their study on the water quality index, the Canadian model can be used to assess the quality of water for different activities, and this depends on the nature of the standards and standards included in the model (in other words, standards and standards for drinking water, and standard specifications for irrigation water are used to evaluate the quality of irrigation water....etc) (Khan *et al*., 2010) [10]. Water quality indicators have been applied in many countries to assess the condition of water bodies in general, such as India (Tiwari & Mishra, 1985), the United Kingdom (House, 1989) [11], Egypt (UNEP, 1995), the United States (Canter, 1996) [5] and Canada (CCMC, 2001). Salim *et al*. (2009) [14] evaluated the water quality of the Gheshlagh River in Iran using two water quality indices, the British Columbia Water Quality Index (BC WQI) and the National Sanitary Foundation Water Quality Index (NSF WQI). The results indicated the presence of pollutants in high concentrations that were from urban activities. Such as the run-off of waste water coming from the city into the river as well as the leakage of pollutants from landfill sites.

References

1. A l- Heety, EA M Turki, AM, AL- Othman EMA. Assessment of the watr quality index of Euphrates river between heet and Ramadi cities, IRAQ. International Journal of Basic and Applied Sciences IJBAS-IJENS. 2011;11:06.
2. Al-Safawi, Abdulaziz Younis Tamei, Asaf Azhar Younis Reda. Qualitative evaluation of the water of the Tigris River using water quality factors for drinking purposes in Nineveh Governorate, northern Iraq, under publication in the Journal of Environmental Studies, Sohag University, 2018.
3. Al-Tikrity, HN. Forecasting of Pollution Levels in accordance with Discharge Reduction in Selected Area on Euphrates River, M.Sc. Thesis, College of Eng., Uni. of Baghdad, 2001.
4. Brito AC, Newton A, Tett P, Icely J and Fernandes TF. The yield microphytobenthic chlorophyll from nutrients: Enriched experiments in microcosms. J. Exp. Mar. Bio. & Ecol. 2010;384:30-43.
5. Canter LW. Environmental Impact Assessment. 2nd Edition, Mcgraw- Hill Inc., New York, USA, 660pp. 1996.
6. CCME, Canadian Council of Ministers of the Environment. Canadian Water Quality Guidelines for the protection of Aquatic Life: Canadian Water Quality Index 1.0 Technical Report .In Canadian Environmental Quality Guidelines, 1999. Winnipeg: Canadian Council of Ministers of the Environment, 2001a, 14.
7. CCME, Canadian Council of Ministers of the Environment. Canadian Water Quality Guidelines for the protection of Aquatic Life: Canadian Water Quality Index 1.0 Technical Report. In Canadian Environmental Quality Guidelines, 1999. Winnipeg: Canadian Council of Ministers of the Environment, 2001b, 5.
8. CCME, Canadian Council of Ministers of the Environment. Canadian Water Quality Guidelines for the Protection of Aquatic Life: Canadian Water Quality Index 1.0 Technical Report. In Canadian Environmental Quality Guidelines, Winnipeg, Manitoba. 2001c.
9. Dojlido J, Raniszewski J and Woyciechowska J. Water Quality Index applied to rivers in the Vistula river basin in Boland. Environ. Monit. Assess. 1994;33:33-42.
10. Horton RK. an Index Number System for Rating Water Quality. J of Water Poll. Control Federation. 1965;37(3):300-306.
11. House MA. A Water Quality Index for River Management. Water and Envir. J. 1989;3(4):336-344.
12. Karakaya N and Evrendilek F. Water Quality time series for Big Melen stream (Turkey): its decomposition analysis and comparison to upstream. Environ. Monit. Assess. 2010;165:125-136.
13. Khan H, Abdel-Gawad S, Dawe P and Khan AA. An Environmental Security and Water Resources Management System Using Real Time Water Quality Warning and Communicatio. Balwois-Ohrid, Republic Of Macedonia. available on-line at 2010. Http://Balwois.Com/Balwois/Administration/Full_Paper/Ffp- 1907.Pdf.
14. Salim BJ, Gholamreza NB, Amir S, Masoud T and Mojtaba, A. Water Quality Assessment of Gheshlagh River Using Water Quality Indices. Envi. Scie. 2009;6(4):19-28.
15. Santra SC. Environmental science. New central book agency. London. 2010.
16. Sarkar C and Abbasi SA. QUALIDEX-A new software for generating water quality indice. Environ. Monit. Assess. 2006;119:201-231.
17. Scheffer M, Carpenter S, Foley JA, Folke C and Walker B. Catastrophic Shifts in Ecosystems. Nature. 2001;413:591-596.
18. Štambuk-Gilijanovic N. Water Quality Evaluation by Index in Dalmatia. Water Rese. 1999;33(16):3423-3440.
19. Stark JR, Hanson PE, Goldstein RM, Fallon JD, Fong AL, Lee KE, Kroening SE and Andrews W. Water Quality in the Upper Mississippi River Basin, Minnesota, Wisconsin, South Dakota, Iowa, and North Dakota, 1995-98. United States Geological Survey, Circular 1211, Reston, Virginia. 2000, 36. available on-line at. Http://Pubs.Usgs.Gov/Circ/Circ1211/Pdf/Circular1211.Pdf
20. Pesce SF and Wunderlin DA. Use of Water Quality Indices to Verify the Impact of Cordoba City (Argentina) on Suquia River. Water Res. 2000;34(1):2915-2926.