Human rights violations as a Destruction of the biodiversity elements: Case study Wadi Saride Catchment / Salfeet City – Palestine.

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Abstract

This study discussed the social- economic and environmental impacts of wastewater on Sarida drainage basin. This study has been accomplished through carrying out biological and physio-chemical characterization for water samples from various springs in Sarida valley in order to specify the quality of the springs' water. Moreover, the socio-economic effects of wastewater on the population in the study area were discussed. The study was relied mainly on using the analytical field methodology to analyse the samples of the springs water. It also used the applied quantitative methodology to check the results of the questionnaire that was distributed between the farmers in Sarida valley.

The study has found that the flowing wastewater from the Israeli settlements that lie in the study area is regarded as the main source in polluting the underground water in the basin. The results also revealed that 84% of the population of the Palestinian villages that lie in Sarida basin use open septic tanks in getting rid of their wastewater then draining it in the nearby valleys which in turn increased the percentage of pollution. Moreover, results also pointed that 82% of Sarida valley population has left their homes in Sarida valley to the nearby villages because of the spread of bad smells in the

valley. The results also revealed that 45.5% of Sarida valley farmers have stopped planting their agricultural lands because of wastewater which in turn lowers the percentage of agricultural production.

It was obvious through analyzing the water samples that all the springs in the study area are biologically polluted by the bacteria which is regarded as an indicator wastewater pollution. The chemical analyses also revealed that all elements lie within the allowed limits according to the World Health Organization except iron which exceeded the allowed limits in Al-Fawwar and Al-Maasser springs which indicates the pollution of these springs.

Key words: Spring, Sarida, Salfeet, wastewater pollution

Introduction

Wastewater is a major contaminant of the environment in the world, especially in the beautiful rural areas (Al-Tai, 2013), where the world produces a high proportion of wastewater and disposed it without treatment. Palestine suffers from these problems due to the steady increase of population which led to an increase in the quantities of wastewater that reached about 92 million cubic meters in the West Bank. The proportion of untreated wastewater reached 90% of the quantity of wastewater that is disposed randomly (Arij, 2013). The percentage of Palestinian households disposing of their wastewater through the sewage network is 55% and 36% of the households use cesspits as means of wastewater disposing, 8% use the endowment, 1% use open networks (PCBS, 2013)). The West Bank and the Gaza Strip have six wastewater treatment plants with low production

capacity. The rest of the wastewater is disposed of either by discharging it directly into the valleys or by withdrawing wastewater from the cesspits and dumping it into the valleys (Karabsa, 2006) affecting the social impact on the nearby population.

The study area is located in the Sarida Valley, which is located within the mountains of Central Palestine, which extends from Karmel north to the south of Hebron. The mountains of Palestine are characterized by a terrain diversity of plains, valleys and mountains. The study area extends over an area of about 229 km2 (Karzem, 1997) (Figure 1). The total number of communities in the study area is 54, with a population of 176580 and 15 Israeli settlements (PCBS, 2016). The population of these settlements is 58195 (B'Tselem, 2013). The Sarida Valley basin is characterized by many springs located along the sides of the valley. Seven of these springs are located in areas under Israeli control, where Palestinians are prevented from approaching them. Farmers use their water to irrigate agricultural crops, irrigate sheep (Mansour, 2017).

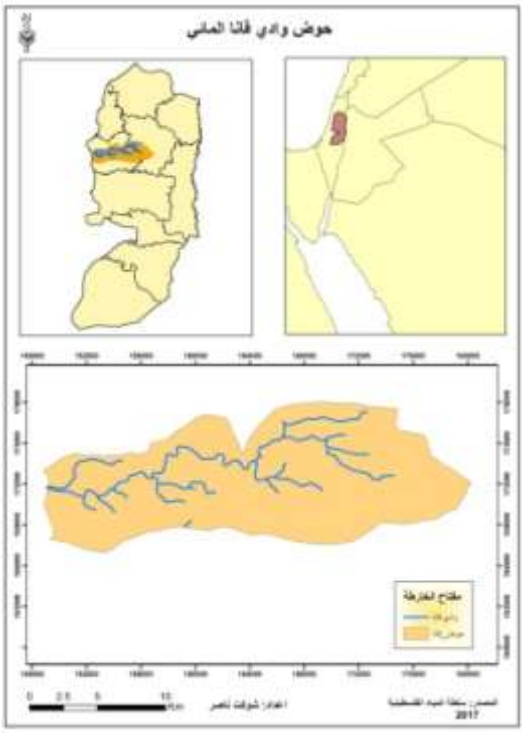

Figure 1: Map of the location of the Sarida Basin

Methodology of the study

In order to obtain results on the environmental, social and economic impacts of wastewater on the Sarida basin, the descriptive approach was used to study the current situation of the study area and describe it in terms of population growth, the disposal of wastewater from the population and the role of the Israeli colonies in increasing wastewater in Sarida basin. The analytical method was used by sampling spring water in Wadi Sarida, which was analyzed chemically, physiologically and biologically in the laboratories of Birzeit University in order to determine the concentration of calcium carbonate, potassium, magnesium, sodium, nitrate, acidity, pH and fecal Coliform bacteria. Analyses of heavy metals was conducted in Al-Quds University laboratories in Abu Dis. Questionnaire was used to understand the impact of spring water on the health, economic and socio-economic of

the farmers in the study area as well as environmental aspects. It was distributed to farmers who own land in the Wadi Sarida of about 200 farmers (Zidane, 2017).

Discussions and Results

Social, economic and environmental aspects

The questionnaire included many questions related to the environmental aspects like the methods for the disposal of wastewater at their homes. The results show that most of them disposed it using the cesspits, which reached 84.1% of the sample. 9.8% of them using open network, while the method for running wastewater in open channels had the lowest percentage of 6.1%. It is also possible to observe the presence of an indicator of groundwater pollution in Wadi Sarida, especially that the cesspits are disposed by random discharge in the open areas and valleys near the Sarida Valley springs, which affects the springs, due to the possibility of leakage into the ground and thus 4.8% of the sample indicated that there is contamination to the spring water. The pollution is due to the wastewater discharged by the villagers adjacent to the springs in an open areas and close to the springs, and the Israeli colonies surrounding Sarida Valley are disposing their wastewater into the Sarida Valley, which may seep into the groundwater.

The results showed that 90.1% of the respondents confirmed that the wastewater has an effect on the wild plants in the study area, while 2.3%

indicated that the damage of the wastewater has little effect on the valley plants. The result of this damage is the lack of quantity, number and density of wild vegetation surrounding the area. The results showed that 75.8% of the respondents indicated that the wastewater has an effect on the aesthetic dimension of the nature, and these are water smells foul especially in summer times from the spreading of wastewater pools next to farmland, trees and natural plants. On the other hand, 55.3% of the respondents indicated that the wastewater has changed the color of the soil in Wadi Sarida. It is clear from the results that 92.4% of the sample feel bad from the smells emitted from the wastewater. On the other hand, 97.7% of the sample found that the smell emanating from the valley is in summer times higher than winter. The reason for this is that the rain water mixed with the winter water, which reduces the smell, but in summer, the proportion of wastewater is high because of the lack of rain water dilution, which increases the spread of bad smell.

Social Impact on the study community

It is clear from the results that most of the sample have changed their place of residence as a result of the negative effects of wastewater in the valley, which amounted to 82.6%. The impact of wastewater on the place of residence can be confirmed, as there are currently no farmers living near the Wadi Sarida, and the proportion of agricultural land is less than in the past as a result of wastewater disposal. On the other hand, 27.3% of those who had left their lands in the valley are without cultivation, due to wastewater spreading in the valley. Accordingly, there are social and economic impacts on farmers of the study area.

87% of the respondents believe that the wastewater has directly or indirectly affected the public health of the population in the study area. Moreover, 46.2% reported that they suffered from diseases due to the current wastewater in Wadi Sarida, and 53.8% reported that they did not suffer from diseases due to wastewater in the valley.

Economic side of the study community

96.2% of the respondents believe that the wastewater in the valley damages the sheep wealth. This is evidenced by the decline in the number of sheep in Wadi Sarida, where the number of sheep living in the Sarida Valley in the early 1980s exceeded 50 thousand, but in 2017 did not exceed three thousand, which left economic effects on poor breeders of animals in Wadi Sarida (Zidane, 2017).

It was found that 87.9% of the farmers who owned agricultural lands adjacent to the Wadi Sarida had not cultivated their lands in 2017. In addition, 58.3% of the respondents mentioned that the discharge of wastewater and access to agricultural land reduced the agricultural production in these lands (Table 1). For those farmers who still in the area, 68.9% of them use spring water to irrigate their fruit trees, citrus and almonds (Table 2).

Table 1: Effect of wastewater on economic aspects

Domain	Yes	No	Total
Do you own agricultural land adjacent to the Wadi Sarida	87.9%	12.1%	100%

Has these lands been cultivated in the past	84.8%	15.2%	100%
Are you cultivating these lands now?	82.6%	17.4%	100%
Has the discharge of wastewater and access to agricultural land to reduce the production of land from agriculture	58.3%	41.7%	100%
Is agricultural land considered a primary source of family income?	50%	50%	100%
Do Palestinian Authority institutions support farmers in the Sarida Wadi	44.7%	55.3%	100%

Table 2: Type of use of spring water in Wadi Sarida

What is the type of water use for these springs	**relative distribution**
For irrigating fruit trees	68.9%
Irrigation of fruit trees and watering of animals	14.4%
To irrigate fruit trees and irrigate crops	12.1%
For irrigation of animals and for irrigation of trees and crops	4.4%
Total	100%

The Israeli occupation has a negative affects the spring water in study area in polluting them by discharging their wastewater into the Sarida valley. The survey found that 73.5% of the respondents found that the presence of the Israeli settlements hindered the farmers' to access to their lands around the valley, which affecting in decreasing the ability of farmers to use their land. 68.9% of them said that the Israeli settlements have a significant impact on increasing the quantity of wastewater in the Wadi Sarida.

Spring water Quality and Analysis

Six spring water samples were collected from Wadi Sarida basin in order to determine their physical, hydrochemical and biological characteristics, five

of which were taken from the spring sources, and the sixth was taken from the spring water pool used for irrigation (Figure 2). The spring water samples were analyzed at the water laboratory at Bir Zeit University and the Each one of laboratories of Al-Quds University - Abu Dis on 1/10/2017. which is 500 ml, has Their suitability for domestic and agriculture use were determined**.**

Figure 2: location of springs of the study area

Physical properties of spring water

The electrical conductivity average of the spring waters of the Wadi Sarida basin is 200 µm /cm^3, which lies within the standard limits of World Health Organization (WHO) of human use suitability (1000 µ-simens /cm^3). The average rate of the dissolved oxygen is 11.2 mg / L, which considered as oxygenated water according to WHO. Water is considered to be pure if the

TDS is less than 1000 mg / L and saline if it exceeds 1000 mg / L (Daghrah, 2005). The average of the TDS in the spring water samples is 550 mg / L, which indicates of low salinity type (Fig. 3). The highest TDS in the study area showed in Al Juza spring of 746 mg / L and the lowest was shown in Al Maaser spring 378 mg / L. The pH of the spring water in the study area ranges between 6.8 and 7.2 and the average temperature for all springs is 20.2 Cº .

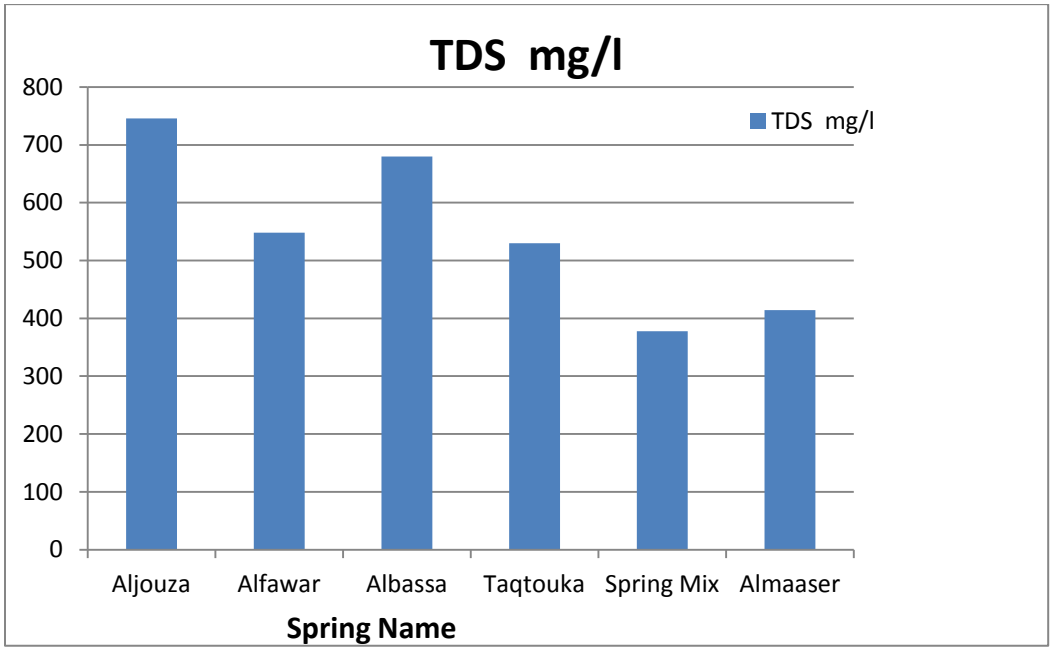

Figure 3: The TDS concentration in the springs of the study area

Hydrochemistry

The anions and cations concentrations are illustrated in Figures 4 and 5. The results showed that all springs have NO_3 concentrations less than 10 mg/L, which is lower than the allowed concentration of 45 mg/L (WHO). The samples showed that all the springs in the study area contained chloride

within the permissible limit, with an average of 39.8 mg / L ranging between 49.5 and 33.4 mg / L. The concentration of bicarbonate was found in these springs within the world limit of 400 mg / L. The average rate of bicarbonates in the study area is 179 mg / L due to the limestone forming reservoirs (Samhan, 2007). The percentage of sulphates in the study area is within the permitted percentage according to the World Health Organization (WHO) of 200 mg / L ranging between 30.8 and 19.2 mg / L. The low percentage of the springs in the area is due to the possibility of gypsum in the rocky layers of limestone and marl. Using of agricultural pesticides increase sulfer concentration in groundwater and contribute to the increase of sulphates in spring water (Abu 'Alan, 2013).

The highest concentration of Sodium and potassium was found in the Aljouza spring of 20 and 2mg/L, respectively. The average of calcium and Magnesium concentrations was found to be 15.5 and 25.5 mg/L. Cation concentrations was found to be less than the WHO standard for domestic use of the springs.

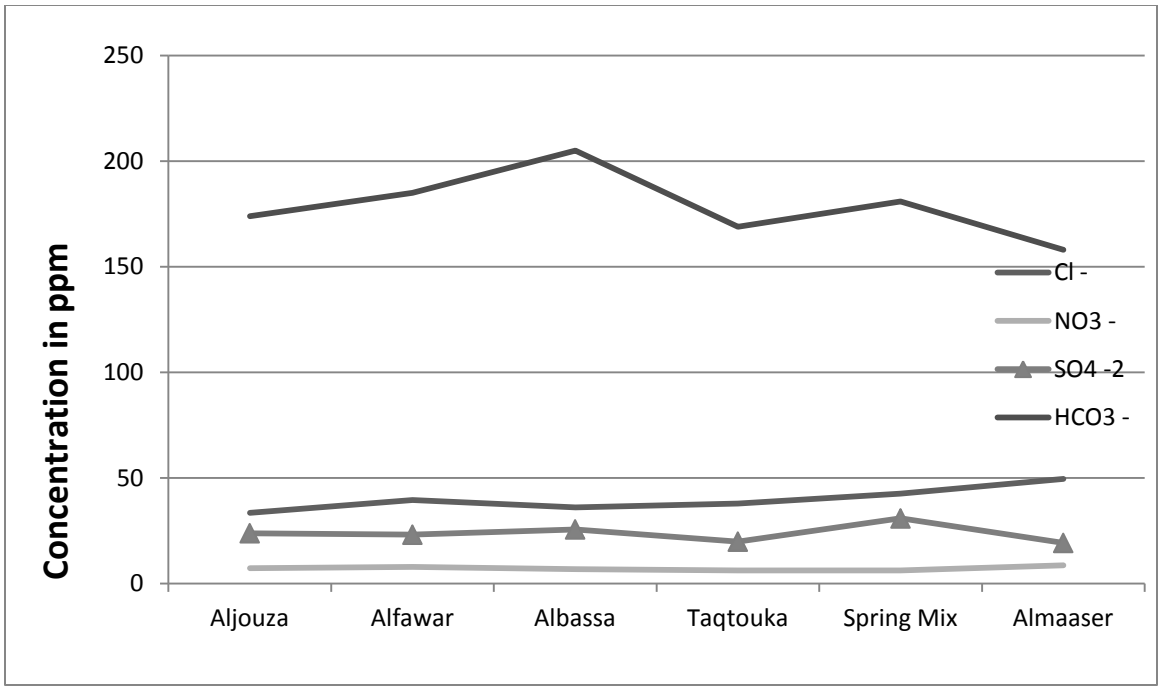

Figure 4: The anion concentration of the springs of the study area in ppm

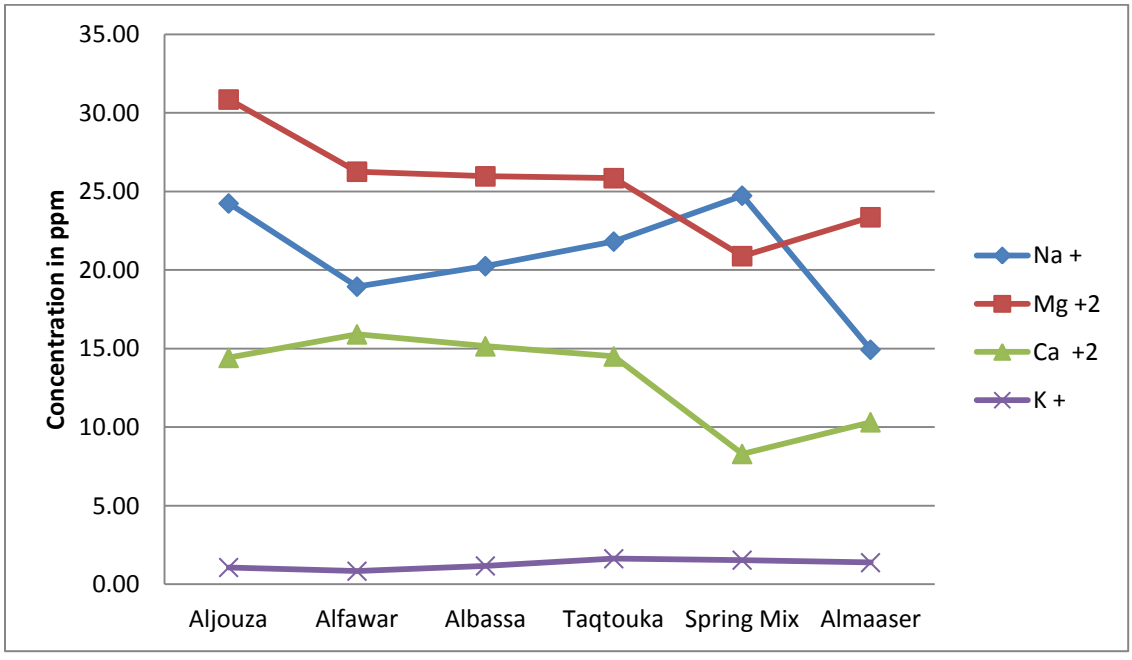

Figure 5: The cation concentration of the springs of the study area in ppm

Heavy Metals

The spring water samples was analyzed for heavy metals of B, Fe, Ba, Ti, Pb, Al, Cr, Ni, Cu, Zn, Ag and Cd at the laboratory of the University of Jerusalem - AbuDais. It was found that the spring water contains heavy metals concentration of less than the WHO (300 µg / L) (Fig. 6 and 7). However, the iron shows high concentrations ranging between 305 and 332 µg / L.

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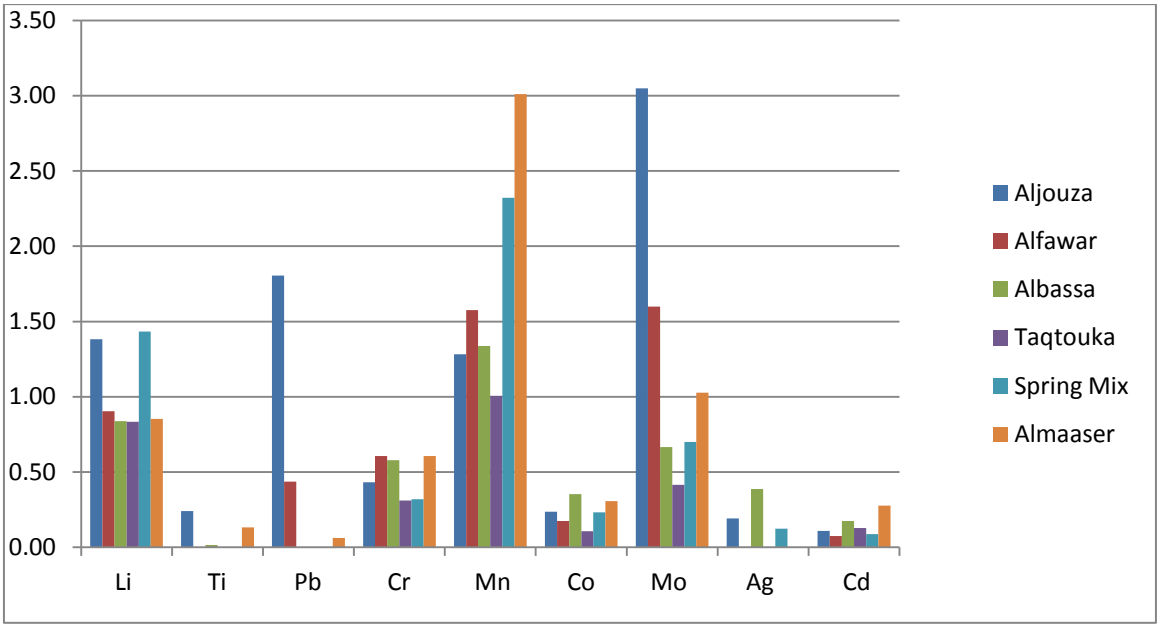

Figure 6: Heavy metals in the springs of the study area of less than 3.5 µg / L

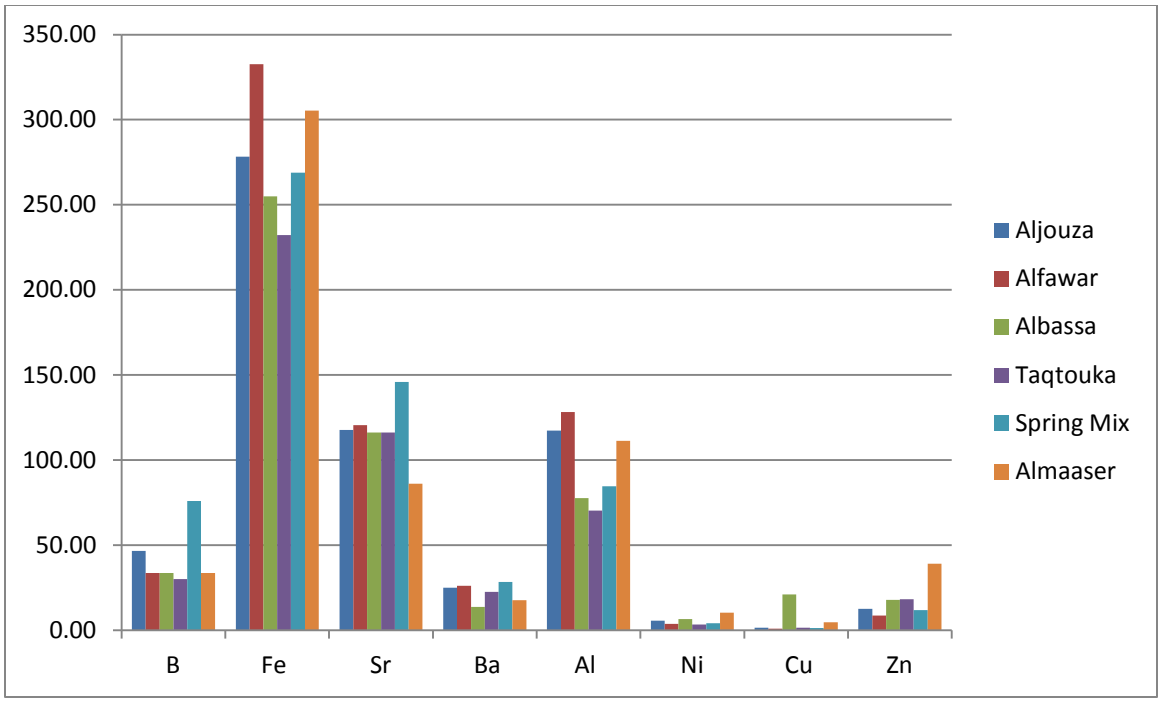

Figure 7: Heavy metals in the springs of the study area of less than 350 µg / L

Biological Analyses

Biological characteristics of spring water samples from the study area showed that all springs were contaminated with total coliform bacteria and that three springs were contaminated with fecal coliform bacteria (Fig. 8). Pollution rates vary from one spring to another and it is due to the mixing of wastewater flowing in the valley with these springs. It was also found that the spring of the Bossa has the coliform bacteria colonies of 184 / 100 ml, which exceeds the permissible levels for drinking purposes due to its contamination with wastewater. The results showed that three samples were found to be contaminated with fecal bacteria: the springs complex, the Bossa and the Al Maaser, the highest in the springs complex, which has 66, 52 and 20 colonies / 100 ml, respectively.

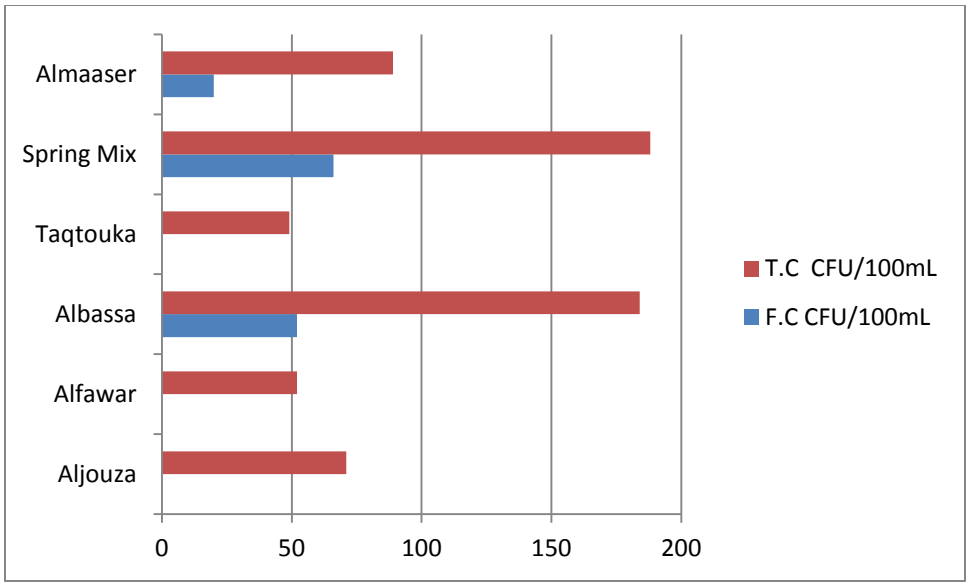

Figure 8: The fecal and Total Coliforms of the springs in the study area in Colonies / 100ml

Conclusion

This study aims to identify the environmental, social and economic impacts of wastewater on the springs of Sarida basin, as well as to identify the physical, biological and hydrochemical characteristics of its springs. The Israeli settlements adjacent to the Wadi Sarida forming the main pollution sources to the groundwater in the study area through seeping their untreated wastewater into the valley. The results of the survey showed that 82.6% of the residents of Wadi Sarida abandoned their place of residence to the neighboring villages because of the effects of the untreated wastewater to their lands and social lives. The results of the survey showed that 45.5% of the farmers in Wadi Sarida abandoned their agricultural lands in the Wadi Sarida due to wastewater in the valley, indicating a decline in agricultural production in the study area. The general view of the landscaping was affected negatively by the wastewater flow in the wadi. Hydrochemical

concentrations of the cations and anions of spring water samples shown concentrations within the WHO concentration standards. The calcium carbonate type of the spring water passes with the geological outcroppings of springs emerging rocks. Iron element shows higher concentration in the spring water of the study area, which is due to industrial pollution through wastewater. Biological tests indicated that all the springs are not suitable for drinking purposes because of their contamination with E. coli and fecal bacteria. This indicates of wastewater pollution causing health problems for the residents of Sarida area.

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