

## **The Socio – Economic Impact for the Spring Water Use in Natuv Catchment/ Ramallah West – Palestine**

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### **Abstract**

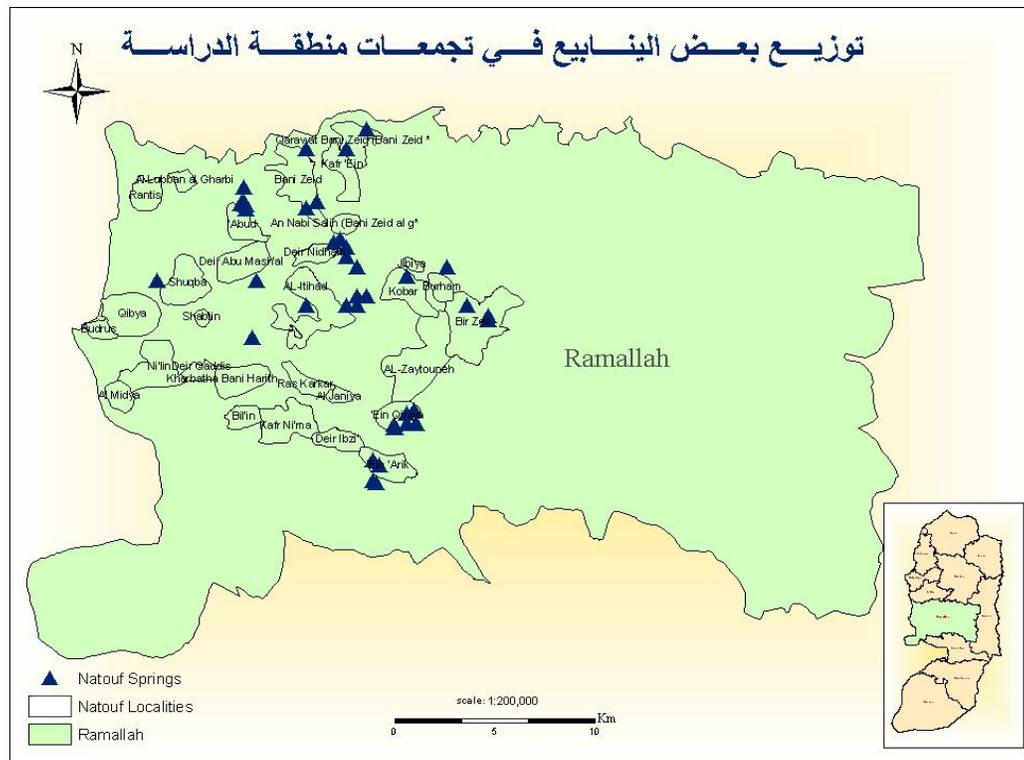
*This study aims at determining the impact of cesspits to contaminate water springs in the Natuv basin - west of Ramallah, and at studying social and economic impact of the use of spring water for the human life. One hundred questionnaires were distributed to the farmers using the spring's water in the study area and analyzed using SPSS statistical software. The results of the analysis show that 38% of the solid waste, which is disposed near the springs leads to contamination. The low discharge of some springs is due to the erratic rainfall in the study area. The impact of Israeli settlement on spring's water pollution is also studied. 43% of the springs near the settlements were contaminated with the wastewater and 48% of them are contaminated with their solid waste.*

**Key words:** Springs, cesspits, Natuv Catchment

### **Introduction**

The area of study is the Natuv catchment which is located in the western side of the city Ramallah. It contains the springs in villages of Beitillu, Deir Ammar, Jamala, Deir Izbai, Ein Arik, Ein Qania. Few studies were conducted in the study area. There is 130 springs in the study area, including 100 in the village of Beitillu alone (Map No. 1). The inhabitants in the study are of 80 thousand people (Central Bureau of Statistics, 2007).

Different uses of water springs were observed between the past and the present time. It had been more reliable uses by residents in the past in the springs of nearby villages for their domestic individual's needs and their animals as well as their agricultural purposes. It has led to a decrease dependence on spring water in many rural communities after the provision of public water network to those communities. There are also many economic and social factors that rely on spring water uses in the past for their main dependence on agriculture. But now with their shift occupations and reluctance population for land cultivation and the spread of education and the emergence of jobs and work opportunities in the Israeli market made the springs of less important as they were in the past. There are also other factors led to the reduction of agricultural land area, especially the scarcity of water springs flows. This makes the tracts of agricultural land that was their dependence on spring water of less productive, in addition to the cost of high crop production and their limited incomes.



Map No. (1): The study area where the springs are located

The purpose of this study was to investigate the effect of cesspits to contaminate spring water through the water quality in the basin Natuv. The water quality of these springs is considered to be good in the springs outside the communal villages (Shalash and Ghanem, 2007). The economic and political impact as well as the environmental impact of the use of spring water is changing from time to time. It also aimed to know the change in spring water uses between the past and the present and their relationship to the pollution index.

### Methodology

Two approaches are adopted in this study, descriptive from previous studies and analytical approach. 100 questionnaires were distributed to the farmers and land owners from all the study area and analyzed statistically using several methods and statistical tests by SPSS statistical software. It contains 25 questions about the owners of the springs and agricultural land around, including information on the stacker form in terms of, gender, age, income level public ownership of agricultural land around the springs and area of this land, and the type of profession and before or after their spring water uses and for the extent of their dependence on the spring water in their daily lives, whether for domestic or agricultural uses such as: the source of drinking and irrigation source and others. The questionnaire also included environmental aspects such their land cropping is near or far from the springs and the distance of the cesspits and the waste disposal sites from the springs.

### Results

Many aspects of economic, environmental and political have been analyzed. These results were about spring pollution sources. The results focused on the agriculture dependent mainly on the springs in addition to its development or decline refer to the pollution of these springs. The SPSS analyses results demonstrate the relationship between organic agriculture and spring waters. Through the use of the logistic regression and the dependent variables, the relationship between the cesspits and spring water pollution were determined. There were three independent variables: the absorbance of cesspits near the spring, and capacity of the springs discharge and the time period needed to be discharged from these springs. It was found that there are statistically significant at the 0.05 level of significance and that the single most important variable affecting pollution is the leakage of wastewater directly and thus spring water pollution.

The study indicates that the independent variable near springs from cesspits is 79%, which is likely to pollution.

Table (1) shows that the logistic regression equation is:

$$\text{Log } y = -2.773X + 5.606$$

Where:

y: pollution springs from cesspits.

X: near the spring of cesspits.

In the sense that the more approaching springs from cesspits by 1 percent, there is the possibility for the contamination of the springs by 5.6

Table 1: Variables in the logistic regression Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1 <sup>a</sup>	q5	6.998	2.038	11.792	1	.001	1094.987
	q6	.767	.629	1.485	1	.223	2.153
	q7	.302	.393	.591	1	.442	1.353
	Constant	-6.831-	2.917	5.483	1	.019	.001
Step 2 <sup>a</sup>	q5	6.937	1.993	12.115	1	.001	1029.543
	q6	.949	.592	2.566	1	.109	2.582
	Constant	-6.290-	2.758	5.199	1	.023	.002
Step 3 <sup>a</sup>	q5	5.606	1.262	19.740	1	.000	272.000
	Constant	-2.773-	1.031	7.235	1	.007	.063

a. Variable(s) entered on step 1: q5, q6, q7.

There are a lot of results associated with and are affected each other, where linked both the level of general income per capita in the study sample and scientific qualifications. Around 50% of the owners income, which more than 3000 shekels a month (750 US \$) have their education on the secondary or higher education. This leads to the open job opportunities in front of them more than the uneducated and gives them a steady income. While the proportion of 17.7% of the sample of low-income earners are from uneducated people. It was found that 33% of their incomes are less of 1000 shekels (250 U.S. \$) a month are illiterate, which is due to the decline of work opportunities for them.

It was shown that there is a relationship between the area of cultivated land and irrigation method used by farmers, as an example the large agricultural areas excess of 4 acres used modern irrigation methods such as drip and sprinklers. This is because of the primitive irrigation methods need more time and effort and consume more water that must be exploited for the crops than the others. The study proved the hypothesis that whenever cesspits closer to the springs leads to more springs contamination. The study shows that there is a relationship between income level and the age of the study sample. It was found that 44.6% of the study sample with incomes over 3,000 shekels (750 U.S. \$) per month are of young people aged between 30 - 45 and the fact that this category has members of completed educational phase passes the working age of the farmers.

It was found that during the study the higher capacity cesspits need longer time to pump its wastewater than smaller ones. It was found that 43% of the cesspits that have capacities of more than 4 cubic meters need pumping wastewater every more than six months, and this in turn affects positively the springs exposed to pollution directly from wastewater. But in the end, the wastewater infiltrates partly into the ground and polluted the springs. It is recommended that linking these villages of the study area with a sewage network will reduce this impact. The largest percentage of farmers relies on spring water mainly to irrigate their crops and a very small percentage depends on the municipal water network. The largest percentage of the springs is used for agriculture and a few of them used for drinking purposes. This is due to the contamination of the springs in addition to the presence of the other sources of the public water network.

There are two basic problems documented on these springs: pollution from the cesspits and solid waste landfills in the study area, in addition to the decreasing of the spring discharge, which is due to the erratic rainfall. It was noticed that the farmers have more cropping in the past and their cropping was influenced by the decrease of the spring water discharge.

There is a direct impact of the Israeli settlements on the pollution springs where it was found that 43% of the springs near settlements contaminated from wastewater, and 48% are contaminated by landfills of solid waste. It was found during the study that there is a relationship between waste collection and method of disposal, where the proportion of waste that is collected is disposed by burning will pollute in many different ways. 46% of them are disposed by combining within municipal services, as was 38% of the waste collected is disposed near the springs, leading to contaminated by the solid waste leachate. The study shows that in the past were 57% of the study sample who have incomes of more than 2000 shekels (500 U.S. \$) a month from their agriculture output affect positively of their self-sufficiency of their families. At present, this figure has dropped to reach only 6% of the study sample, and it was the lack of water flow from springs in addition to the spring water contamination.

All workers in agriculture and the level of income are linking at the present time significantly. It was found that 73% of the study sample who their incomes less than 1000 shekels (250 US \$) a month working in agriculture alone. 65% of individuals who their incomes of 1000-2000 shekels (250-500 US \$) a month are working in the agriculture alone or with family based jobs while it was 64% of the study sample who have incomes of more than 2,000 shekels (500 U.S. \$) per month rent workers to work with them in the ground. The study shows that there is a relationship between the area of irrigated land and the number as well as the nature of workers employed, with an average area of irrigated agricultural land of 3000 dunums, the farming owners work with hire workers.

### ***Conclusion***

The study are of Natuf springs in the west of Ramallah shows that spring water is one of the important sources for irrigation for the owners of agricultural land located around these springs in addition to spring water usage for drinking purposes. It turns out that the cesspits affect the quality of spring water in the study area, both located between the communities through direct leakage of wastewater. There was an impact of solid waste landfills that is disposed of in valleys to the quality of these springs. The springs that exist between communities such as the springs of Ein Arik and Ein Qania are the most polluted springs.

### ***References***

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