Some material that contain information related to the beneficiaries and needs addressed:

1. Project Goal

Most of the Palestinian areas dispose of their wastewater matters using cesspits and most of these are left without cement basement which causes serious environmental problems and severe health diseases. Therefore, ARIJ recommended promoting Small Scale Wastewater Treatment Plants (SSWWT) to replace the current cesspits in the rural areas of Bethlehem and Hebron governorates which are located in the Southern part of the West Bank.

The major goal of this project was to test the efficiency of a small scale wastewater treatment technology on household level, imported or locally developed, that is low-cost, potentially appropriate for urban environment and will enable households to treat and reuse the wastewater in agriculture production. This achievement will improve waste water management on household level through the adoption of proper technology.

2. Project Objectives and Indication of Change:

During the project period, 180 small scale wastewater treatment plants (SSWWTP) recipient households practiced improved waste-water management and used treated wastewater as an alternative to the use of high quality drinking water for irrigation. This in turn has contributed in improving food security and income generation to 180 recipient households and also helped farmers in developing gardens by finding additional water sources for irrigation. Not forgetting to mention the improvement of the environmental conditions which Recipient households' experienced through the increased usage of SSWWT. **Table 1** below gives details of project objectives and indication of Change.

Table 1: Objective and Indication of Change

Objective	Indication of Change
Objective 1: 180 SSWWT recipient households practice improved waste-water management and use treated wastewater as an alternative to high quality drinking water for irrigation.	• 180 recipient households are experiencing a new water resource that is currently being utilized for Irrigation purposes • All beneficed families that used to pay monthly for the services of a vacuum tanker, as concept of getting rid of their wastewater are no more in need to this costly crevice. • 180 recipient households are economizing in domestic water utilized for irrigation.
Objective 2: Improved food security and income in 180 recipient	• 180 households are irrigating their trees with treated wastewater. • 115 dunums of fruit trees and other suitable crops

households resulting from the development of farmers' gardens and additional water sources for irrigation	is being Irrigated with treated wastewater. • 180 beneficed families are trained to deal with their wastewater treatment and reuse system. • More than 1400 of planted fruit trees trough this project are improving food security to beneficed families. • Beneficed families were encouraged by the new source of water in a manner that they planted more trees than the provided trough this project, improving in this manner their food security.
Objective 3 Recipient households experience increased health through increased usage of SSWWT	• In 180 households, the risk of contaminating the domestic water cisterns with discharged wastewater was eliminated. • 180 households now are experiencing healthier environment, since beneficed families dispose their wastewater in an environmental friendly manner. • 180 beneficed families now are no more experiencing wastewater flooding problems from overloaded cesspits, and that used to pollute the ground surface and gather insects.

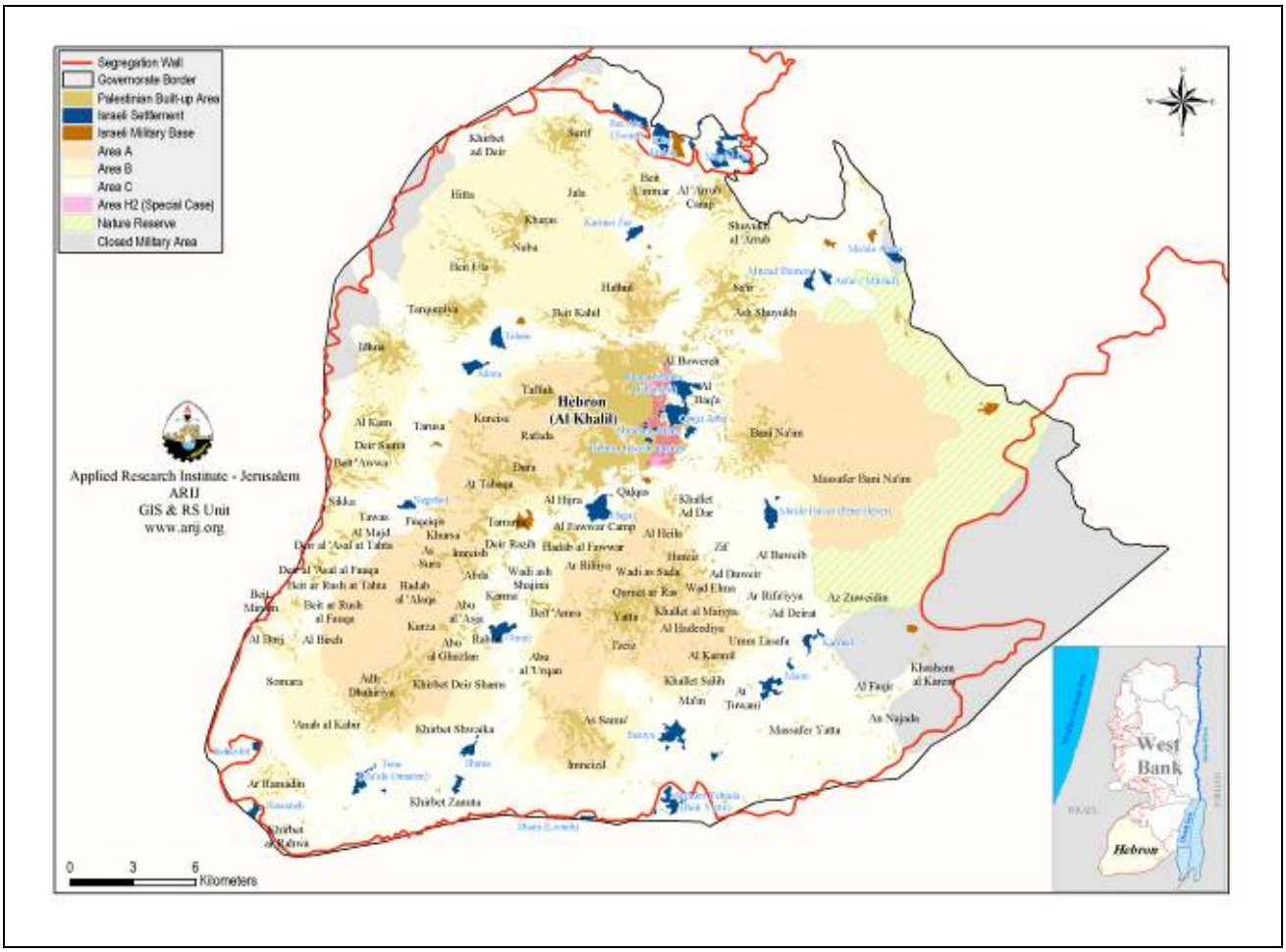
3. Project location description

The Project activities were carried out in 17 localities in Hebron and Bethlehem Governorates. Section 6 will cover project activities in more details.

4.1 Hebron governorate

4.1.1 Location and Physical characteristics:

The Hebron Governorate is located 36 km south of Jerusalem City, in the southern part of the West Bank. It is bordered by Bethlehem Governorate to the north and the 1949 Armistice Line (The Green Line) from all other directions. Hebron Governorate has a total area of 1,067,539 dunums with six major land use classes distinguished, they are: Palestinian built up area, Israeli colonies, closed military area and bases, nature reserves, forests and cultivated areas. See Table 1 & Map 1



Map (1): Location and Borders of the Hebron Governorate
ARIJ Geographical and Information System Unit, 2010

There are 182 Palestinian built-up areas in the Hebron Governorate, 17 of which are run by municipalities. There are also two refugee camps run by the UNRWA and the remaining built-up areas are run by village councils and project committees. Palestinian built-up areas comprise 7.8% of the total area of the Hebron Governorate.

The total area of Hebron Governorate is estimated to be 1,067,539 dunums[1] (GIS 2010), with nearly 530,632 dunums of agricultural lands; of which are 195,320 dunums of permanent crops, 16,584 dunums of mixed agriculture, 749 dunums of protected agriculture and 317,980 dunums of arable lands, where part of it used to be cultivated with seasonal crops. **See Table 2**

There are 18 forested areas in the Governorate with a total area of about 14,253 dunums. Most of these forests are located on fertile soil types.

[1] 1000 dunums = 1 square kilometers

Approximately 32,323 dunums of the Hebron Governorate lands are cultivated where 457 dunums are devoted to irrigated agriculture. The remaining agricultural area is cultivated with rained crops, such as fruit trees, field crops and vegetables.

Table (2): Land Use/ Land Cover in Hebron Governorate, 2006	
Land use / Land cover Type	**Area in Dunum**
Arable land	317,980
Forests	14,253
Heterogeneous agricultural areas	16,584
Industrial, commercial and transport unit	2,519
Mine, dump and construction sites	10,237
Open spaces with little or no vegetation	226,371
Pastures	169,924
Permanent crops	195,320
Plastic Houses	750
Shrub and/or herbaceous vegetation associations	14,815
Wall zone	149
Cemetery	106
Palestinian Built-up Area	83,224
Israeli colonies	13,466
Israeli Military Base	1,841
Total Area	**1,067,539**
(ARIJ GIS Unit, 2010) *1 km2 = 1,000 dunums Source: ARIJ Geographical and Information System Unit, 2010	

The Hebron Governorate is characterized by great variation in its topography and altitude. The Governorate is dominated by the Mountain Belt on the western side of the Jordan Rift Valley. This belt is formed of sedimentary rocks originally deposited as flat layers, but later folded by the tectonic movements in the southern and central areas. The highest elevation of approximately 1,014 meter above sea level is found in Halhul area. The eastern part of the district is characterized by sharp slopes, called the Eastern Slopes, where elevation drops from 1,014 to 100 meter above sea level. The lowest elevation is 140 meters below see level at Ar Rawain area.

The climate of the Hebron Governorate ranges from arid to semi-arid with an increase in aridity towards the Negev Desert in the south and the Jordan Valley in the east. The mean annual rainfall in the Hebron Governorate is 473.5 mm, whereas the average annual temperature is 18° C (ranges from 7.5 - 10° C in the winter to 22° C in the summer), and the average annual humidity is 57%.

4.1.2 Population

The estimated total population of Hebron Governorate in the year 2007 was 552,164, forming about 23.6% of the total population of the West Bank. According to the Palestinian Central Bureau of Statistics (PCBS 2007) classifications; about 85.3% of the population in Hebron Governorate live in urban areas, 12.1% live in rural areas, while 2.6% lives in refugee camps.

4.1.3 Labor Force

Hebron is an agricultural marketing and trade center; there are glass and leather manufactures in the Governorate. Productive agriculture activities exist only in the western parts of the region where the climate and soil condition are favorable. Major industrial activities in the district include stone and aggregate quarrying, stone and marble cutting and tanning industry, etc.

The unemployment rate in the Hebron Governorate reached 22.5% in the year 2009 compared with an average of 17.8% in the West Bank. **See Table 3**

Table (3): Labor Force Participation Rate, Unemployment Rate and Average Daily Wage for Wage Employees in Hebron Governorate, 2009

Governorate	Average Daily Wage in NIS for Wage Employees	Unemployment Rate	Labor Force Participation Rate
Hebron	74.8	22.5	47.3

Israel and Colonies are excluded.
Source: PCBS, Labor Force Survey, Annual Report: 2009, April 2010

In 2009, the agricultural sector ranked number one in terms of the number of working people in Hebron governorate with a percent of 20%, commerce, restaurant and hotel industries ranked in the second place with 18.8% and quarrying and manufacturing sector ranked third in place with 17.9%. **See Table 4**

Table (4): Percentage Distribution of Employed Persons in the Hebron Governorate by Economic Activity, 2009

Economic Activity	Governorate	
	Hebron	**West Bank**
Agriculture, Hunting and Fishing	20.0	13.7
Mining, Quarrying and Manufacturing	17.9	14.5
Construction	15.6	15.6
Commerce, Restaurants and Hotels	18.8	19.4
Transportation, Storage and Communication	4.5	5.7
Services and other branches	23.2	31.1
Total	**100**	**100**

Source: PCBS, Labor Force Survey, Annual Report: 2009, April 2010

4.1.4 Educational Status

According to the 2007 PCBS census, 6.75% of residents are illiterate; women comprised a greater percentage (70.9%) of the illiterate population than men (29.1%). Of the literate population, 14.8% could read and write, 25.88% had completed elementary education, 28.65% had completed preparatory education, 14.25% completed their secondary education and only 9.51% had achieved higher education. **Table 5** shows the education status in the Hebron Governorate by sex and educational attainment in 2007.

Table (5): Population (10 Years and above) in Hebron Governorate by Sex and Educational Attainment, 2007												
Sex	*Educational Attainment*											Total
	Illiterate	Can read and write	Elementary	Preparatory	Secondary	Associate Diploma	Bachelor	Higher Diploma	Master	PhD	Not Stated	
M	7,223	28,191	51,676	53,835	26,645	6,592	11,327	250	1,112	444	186	**187,481**
F	17,581	26,311	43,448	51,485	25,731	5,657	9,244	92	217	27	240	**180,033**
T	24,804	54,502	95,124	105,320	52,376	12,249	20,571	342	1,329	471	426	**367,514**
Source: PCBS 2008, Population, Housing and establishment, Census -2007, Final Results												

The Hebron Governorate is divided into 3 educational directorates; the third one was established in the year 2007/2008. The governmental sector has the biggest share of schools in Hebron Governorate, which is about 85.7% of the total number of schools. There are 17 schools administered by the UNRWA. The private sector has the smallest portion in the educational system in the Hebron Governorate. There are 46 private schools; 34 of them are coeducational.

4.1.5 Health Status

In Hebron Governorate, there are 147 health care centers; 84% of these centers are run by the governmental sector. (**See Table 6**) There are also 5 general hospitals and 5 maternity hospitals; however, half of these are located in Hebron city. All hospitals are located on the eastern parts of the governorate; people from small and distant villages face great difficulties reaching to these hospitals.

Table (6): Distribution of Public Health Care Centers in Hebron Governorate by Provider, 2007					
Total Population	Providers			Total	Population per Center
	MoH	NGOs	UNRWA		
562,141	124	16	7	147	3,824
Source: MoH-PHIC, Health Status in Palestine 2008, Sept 2008					

4.1.6 Water Resources

Water shortage is a serious problem facing the Hebron Governorate, not only due to the arid and semi-arid climatic conditions and rainfall variability in the area, but also due to the Israeli strict control over the Palestinian water resources.

The Water Resources in the Hebron Governorate consist primarily of ground and surface water resources. The Hebron Governorate is located above the Eastern and Western Basins of the West Bank Mountain Aquifer System. It is worth mentioning that Hebron Governorate is the most arid area in the West Bank and is highly populated particularly in the south and southwest, where many rural communities reside.

The main sources of drinking water in the Hebron Governorate are domestic wells and springs, agricultural wells and resources purchased from the Israeli company, Mekorot, which controls part of the Hebron water resources from abstraction to distribution.

There are 3 groundwater wells in the Hebron Governorate owned by the Hebron Municipality which consist of Fawwar wells No.1 and No.2 and Al Safi well No. 3. There are 4 wells supervised directly by the West Bank Water Department, where Mekorot Company is responsible for the administration and maintenance, which include: As Samu', Herodion No 1, No 2 and No 3. It should be noted that there are 9 newly wells dug south of the West Bank in an attempt to solve the water crisis in the governorates of Bethlehem and Hebron. These wells are owned by the Palestinian Water Authority. (PWA, 2009). **See table 7.**

Moreover, there are approximately 89 wells and 63 springs in the Hebron Governorate which are freely used by the surrounding population without restrictions for small scale domestic and irrigation purposes.

Table (7): Wells in the Hebron Governorate by Ownership and Amount Produced, 2008

Well	Owned by	Production (MCM)
Fawwar 1	Hebron Municipality	0.416
Fawwar 2		
Al Safi		0.406
Herodion 1	West Bank Water Department Wells	0.544
Herodion 2		2.207
Herodion 3		1.127
As Samu'		0.328
9 PWA wells	PWA	8.724

Source: PWA, 2009
MCM (million cubic meter)

The Hebron water supply network provides coverage for approximately 93.2% of the population (PWA, 2009).

While the city of Hebron and the surrounding villages are well connected, the governorate hosts a large number of small rural communities, largely Bedouin, with no water service provision. Currently, 6.8% of the total population in Hebron Governorate is not connected to the water network, (PWA, 2009). These rely entirely on cisterns and water tankers for their domestic water uses.

In 2008, a total of 16.698 MCM of water was supplied to the Palestinian population in the Hebron Governorate, (PWA, 2009). Of this, approximately 59% was purchased from Mekorot Company and 41% was provided from Municipal Wells.
Based on the World Health Organization (WHO) recommendations, each person should receive a minimum quantity of 100 liters of fresh water per day. In Hebron Governorate, the total real deficit in domestic water supply for 2008 was 19.548 MCM, which includes water losses (around 30% in the governorate (PWA, 2009)*).* Thus, on average; domestic water supply covered is only 53.6% of demand. This deficit is expected to worsen as the population grows. It should be noted

that the average of water supply in Hebron Governorate does not exceed 80 litters per capita per day.

4.1.7 Wastewater

The existing practices for managing domestic wastewater in the Hebron Governorate are limited to the collection of the generated wastewater by sewage networks and/or cesspits and discharge it into open areas. Wastewater collection in the Hebron Governorate is limited to major cities and the two refugee camps, where only 7 communities out of the 182 communities in the governorate are connected, either totally or partially, to sewage network which serves approximately 27% of the Hebron Governorate population; while the remaining population uses cesspits and open channels for waste water collection. (ARIJ, 2010)

The total wastewater generation in the Hebron Governorate in the year 2007 was 9.7 MCM, distributed as follows: 2.6 MCM collected in sewage pipes and networks while the rest 7.1 MCM are collected in cesspits and/ or discharged into open charnels.

4.1.8 The Geo-Political Status of Hebron Governorate

The Hebron Governorate is the largest Governorate in the West Bank in terms of size and population. Its area before the 1948 Arab Israeli war was 2076 km^2 and when the 1949 Armistice line (1949 Armistice Line) was drawn, it lost around 51% of its area.

The Oslo II Interim Agreement signed in September of 1995 between the Palestinian Liberation Organization (PLO) and Israel, concluded Israel's withdrawal from areas of the West Bank, and that the Occupied Territory be classified into Areas “A”, “B” and “C”, designating varying levels of control. This jagged distribution has scattered the Occupied Palestinian Territory and turned it into isolated cantons; physically separated from each other.

Under the signed agreement, the Hebron Governorate was fragmented to areas (A=24%), (B=22%) and (C=48%), in addition to 6% of nature reserve area.

In the Hebron Governorate, the Israeli colonies' program started as early as the Israeli occupation of the West Bank (including East Jerusalem) and the Gaza Strip in 1967 and continued to progress in slow pace.

The real surge in colonies' construction took place during the 1980's. These colonies are distributed along three nearly parallel lines, in addition to the existence of a 'belt of colonies' at the southern section of the Governorate.

Today, 28 Israeli colonies are built on lands of Hebron governorate; all of which have a total master plan area of 59.2 km^2 (5.5% of the total area of the Hebron Governorate).

Hebron Jewish Quarter that is located in the center of Hebron city is one of the two Israeli colonies created during the first year of the Israeli occupation. This colony which is situated in the middle of a Palestinian city has provoked serious incidents since its establishment. According

to the "Protocol Concerning the Redeployment in Hebron" in January 1997, Hebron City was divided into areas H-1 and H-2, due to the presence of Israeli colonies within the city boundary. The Palestinian National Authority exercises civil control over Palestinians in both areas, while Israel retains control over internal security and public order in H-2.

The Israeli Segregation Wall in the Hebron Governorate has the total length of 160 km (excluding parts of the eastern wall route). The existing Wall route starts at Gush Etzion colonies' bloc and ends in Hathallin Bedouin area in the eastern slopes of the Hebron Governorate. About 93 km of the wall length have been completed, some 16 km extending from the Gush Etzion colonies bloc until Al-Jab'a village is under construction; while the remaining 51 km are in planning phase.

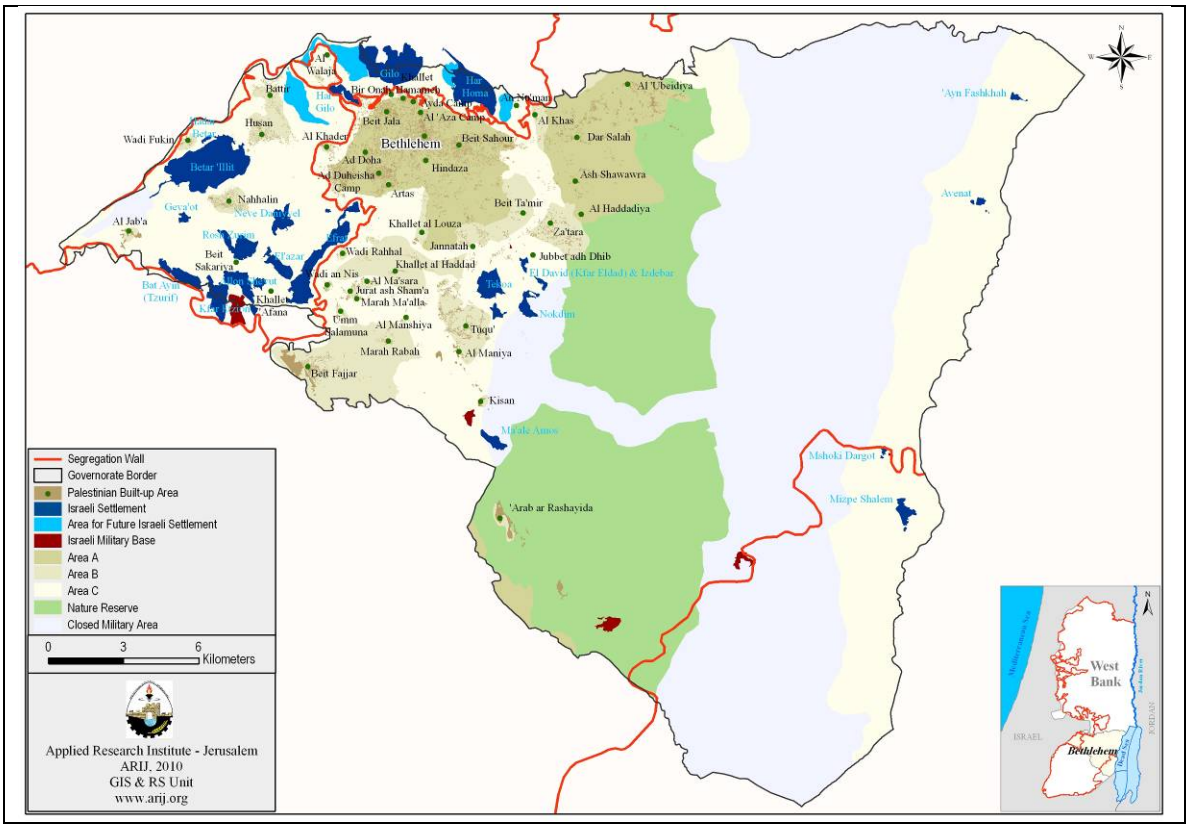
The total land area devastated under the path of the Segregation Wall is estimated at 16 km^2 (1.5% of the total area of Hebron Governorate), while the total land area isolated west of the Wall is estimated to be 105 km^2 (9.8% of the total area of Hebron governorate). The overall area of land devastated or isolated behind the Segregation Wall is 121 km^2 (11.3% of the total area of Hebron Governorate).

4.2 Bethlehem governorate

4.2.1 Location and Physical characteristics:

The Bethlehem Governorate is located south of the city of Jerusalem, in the southern part of the West Bank. It is bordered by the Hebron Governorate to the south and southwest, the Dead Sea to the east, and the 1949 Armistice Line (the Green Line) to the west.

The Bethlehem Governorate has a total area of 659,111 dunums (659.1km^2) with six major land use classes distinguished. These include Palestinian built up areas, Israeli colonies, closed military areas, military bases, nature reserves, forests and cultivated areas. See Map 2



Map (2): Location and Borders of the Bethlehem Governorate
ARIJ Geographical and Information System Unit, 2010

There are 40 Palestinian localities in the Bethlehem Governorate; 10 of which are run by municipalities and three refugee camps which are run by the UNRWA in the Governorate. Other localities are run by village councils (21 communities) and project committees (6 communities). Palestinian built-up areas comprise 1.47% of the total area of the Bethlehem Governorate.

The total area of the Bethlehem Governorate is estimated to be 659,111 dunums, with nearly 621,748 dunums classified as agricultural land; of which 54,627 dunums are permanent crops, 42,323 dunums are seasonal crops, and 199 dunums are protected agriculture. **See Table 8.**

Table (8): Land Use/ Land Cover in the Bethlehem Governorate, 2009

Land use / Land cover Type	Area in Dunum
Agricultural Land	621748
Industrial, Commercial and Transport Unit	9466
Wall Zone	260
Palestinian Built-up Area	9715
Israeli Colonies	17301
Israeli Military Base	536

Mine, Dump and Construction Sites	85
Total Area	**659111**
*1 km2 = 1,000 dunums Source: ARIJ GIS Unit, 2010	

The Bethlehem Governorate is characterized by a great variation in its topography and altitude. The Governorate is dominated by the Mountain Belt on the western side of the Jordan Rift Valley. Its elevation varies between 400m below sea level in the southeast to 997m above sea level toward the west. The lowest elevation is at the coast of the Dead Sea.

The climate of Bethlehem Governorate ranges from semi-arid to arid with an increase in aridity levels towards the Jerusalem desert to the south and south-eastern direction.

Summers in Bethlehem Governorate are hot and dry, while the quantity of mean rainfall varies from year to year. The mean annual rainfall in the Bethlehem Governorate is 508mm, noting that the western parts of the Governorate enjoy greater amounts of rainfall, snow and hail. The average annual temperature in the Bethlehem Governorate is 16.57° C (ranging from 7^{o}C in the winter to 22^{o}C in the summer), and the average annual humidity is 60.4%. (ARIJ GIS Unit, 2010).

4.2.2 Population:

The total population of Bethlehem Governorate in 2007 was 176,235 (PCBS 2007), forming about 7.5 percent of the total population of the West Bank**.** According to the PCBS classification for the types of the Palestinian communities and the 2007 census, about 70.2% of the population in the Bethlehem Governorate lives in urban areas, and 22.5% of the population live in rural areas, while 7.3% live in refugee camps.

4.2.3 Labor Force:

The unemployment rate in the Bethlehem Governorate reached 20.2% in the year 2009 compared with an average of 17.8% for the West Bank. The labor force forms 48.2% of the population. The average daily wage is up to 86.8 NIS. **See Table 9**

Table (9): Labor Force Participation Rate, Unemployment Rate and Average Daily Wage for Wage Employees in the Bethlehem Governorate, 2009

Governorate	Labor Force Participation Rate	Unemployment Rate	Average Daily Wage in NIS for Wage Employees
Bethlehem	48.2	20.2	86.8

The workers in the Israel and Colonies are excluded.
Source: Palestinian Central Bureau of Statistics, 2010. Labor Force Survey: Annual Report: 2009.

The annual report of the labor force survey for the year 2009 showed that the services and other branches of the economic sector ranked number one in terms of the number of working persons with 33.1% followed by the construction sector in second place with 18.1%, mining, quarrying

and manufacturing in the third place with 16%, commerce, restaurants and hotels ranked fourth in place with 15.7%. The agriculture, hunting and fishing economic sector ranged fifth in place with 13.1% as listed in **Table 10** (PCBS, 2010).

Table (10): Percentage Distribution of Employed Persons from the Bethlehem Governorate by Economic Activity, 2009		
Economic Activity	**Governorate**	
	Bethlehem	**West Bank**
Agriculture, Hunting and Fishing	13.1	13.7
Mining, Quarrying and Manufacturing	16.0	14.5
Construction	18.1	15.6
Commerce, Restaurants and Hotels	15.7	19.4
Transportation, Storage and Communication	4.0	5.7
Services and Other Branches	33.1	31.1
Total	**100**	**100**
Source: Palestinian Central Bureau of Statistics, 2010. Labor Force Survey Annual Report: 2009. Ramallah – Palestine		

4.2.4 Educational Status:

According to the 2007 PCBS census, 5.7% of Bethlehem Governorate residents are illiterate; women comprised a greater percentage (70.6%) of the illiterate population than men (29.4%). Of the literate population, 13.2% could read and write, 23.7% had completed elementary education, 28.1 percent had completed preparatory education, 17.4 percent had completed their secondary education and only 11.8% had achieved a higher education. **Table (11)** shows the education status in the Bethlehem Governorate by sex and educational attainment in 2007.

Table (11): Population (10 Years and above) in the Bethlehem Governorate by Sex and Educational Attainment, 2007												
Sex	***Educational Attainment***											**Total**
	Illiterate	**Can read and write**	**Elementary**	**Preparatory**	**Secondary**	**Associate Diploma**	**Bachelor**	**Higher Diploma**	**Master**	**PhD**	**Not Stated**	
M	2,018	8,115	15,351	17,894	10,815	2,201	4,060	179	601	231	77	**61,542**
F	4,840	7,780	13,306	16,079	10,243	2,360	4,174	112	261	42	106	**59,303**
T	**6,858**	**15,895**	**28,657**	**33,973**	**21,058**	**4,561**	**8,234**	**291**	**862**	**273**	**183**	**120,845**
Source: PCBS 2009, Population, Housing and establishment, Census -2007, Final Results												

The Bethlehem Governorate is one educational directorate; the governmental sector has the biggest share of schools in the Bethlehem Governorate, which is about 75.5% of the total number of schools. There are 7 schools administered by the UNRWA. The private sector has the smallest portion in the educational system in the Bethlehem Governorate as there are 29 private schools; 25 of them are coeducational.

4.2.5 Health Status:

There are 36 health care centers in the Bethlehem Governorate, and 47 percent of these centers are run by the governmental sector **(See Table 12).** There are also 2 general hospitals and another 3 maternity hospitals. However, most of these are located in Bethlehem city. All hospitals are located in the northern parts of the Governorate. People from small and distant villages face great difficulties in reaching to these hospitals.

Table (12): Distribution of Public Health Care Centers in the Bethlehem Governorate by Provider, 2008

Total Population	Providers			Total	Population per Center
	MOH	NGOs	UNRWA		
178,853	17	17	2	**36**	4,968

Source: MOH-PHIC, Health Status in Palestine 2008, Sept 2008

4.2.6 Water Resources:

The renewable water resources in the Bethlehem Governorate consist primarily of groundwater resources. The Governorate is located above the Eastern and Western Basins of the West Bank Aquifer system. There are 15 major springs in the Bethlehem Governorate. The estimated quantity of discharged water from these springs for the year 2008 reached approximately 0.346 MCM. This water is primarily used for agricultural purposes, and only 0.01 MCM is used for domestic purposes.

Drinking water resources in the Bethlehem Governorate are divided into two main sources, namely: (1) local resources from the groundwater wells, and (2) purchased resources from the Israel National Water Company "Mekorot". The local water resources consist of the 8 PWA (Palestinian Water Authority) wells which were drilled by the PWA to supply the Bethlehem and Hebron Governorates with water, and the Beit Fajjar well which is owned by the Water Supply and Sewerage Authority (WSSA). The purchased water from Mekorot is derived from three different resources, namely the West Bank Water Department (WBWD) wells, Mekorot wells inside the West Bank, and Mekorot wells outside the West Bank **(Table 13).**

Table 13: Wells in the Bethlehem Governorate by Ownership and Amount Produced in 2008

Resources	Owned by	Production MCM
Beit Fajjar well	WSSA	0
PWA well 1	PWA	1.541
PWA well 11		1.170
PWA well 3		0.360
PWA well – Hindaza		1.867
Al 'Eizariya well 1		0.571
Al 'Eizariya well 2		1.107
Al 'Eizariya well 3		0.702
JWC well 4		0.908
Herdion well 4	WBWD	1.071

Herdion well 5		0
Beit Sahour wells 2	Mekorot	No data available
Source : PWA 2009		

The Water Supply and Sewerage Authority (WSSA) is considered the main body that manages the water supply in the Governorate. WSSA supplies water to approximately 120 thousand people which represents 65 percent of the total population living in Bethlehem, Beit Jala, Beit Sahour, Ad Duheisha camp, 'Aida camp, Al 'Aza camp and some urban communities. In the remaining communities, the WBWD is responsible for providing water supply services. In 2008, a total of 9.74 MCM of water was supplied to the Palestinian population in the Bethlehem Governorate (PWA, 2009), of which, approximately 81 percent was purchased from the "Mekorot" and supplied to the Palestinian through WBWD, while 19 percent was provided from local resources.

Despite that all communities in the Bethlehem Governorate are served by the water network, it should be noted that in many cases, the water network coverage in these communities may not be complete (partial coverage). There are 16 neighborhoods with about 45,200 residents (25% of the total population) who are not served by the water network (PWA, 2009). These neighborhoods completely depend on water tankers, rainwater collection system and agricultural wells and springs.

The Governorate's total domestic water needs were estimated by 9.98 MCM for the year 2008. Therefore, the total real deficit in domestic water supply, taking into consideration water losses, reached approximately 4.07 MCM for the whole Governorate (PWA 2009). This deficit is expected to worsen as the population grows.

However, the connection to the networks alone does not automatically translate into regular and constant water supply. Many communities are suffering from the very limited quantities of water supply. In addition to water losses through leaking pipes, which is an endemic problem in the poorly designed and maintained internal water infrastructures. The percentage of water losses is high in the Bethlehem Governorate. The overall loss and uncounted for water rate was estimated to be 39% in 2008 (PWA, 2009). The total quantity of water that reaches the suppliers was 5.91 MCM in the year 2008. Approximately 3.83 MCM of water is lost from the source to the suppliers.

Taking water losses into account, it was estimated that the actual average consumption rate didn't exceed 89 liter per capita per day (l/c/d). In fact, the poor state of infrastructure, coupled with un-accounted for water and the low pressure of water supplied to the Palestinian communities causes many communities in the Bethlehem Governorate to receive no more than 50 l/c/d.

4.2.7 Wastewater

The existing practices for managing domestic wastewater in the Bethlehem Governorate are limited to the collection of generated wastewater by sewage networks and/or cesspits and to the final discharge into open areas, including Valleys and agricultural lands, without any treatment.

Wastewater collection in the Bethlehem Governorate is limited to major cities and the refugee camps. Only 9 communities in the Bethlehem Governorate are served, either totally or partially, by wastewater networks. The sewage network serves approximately 42.1 percent of the Bethlehem Governorate population, while the remaining population uses cesspits and open channels for wastewater collection (ARIJ, 2010). Approximately 4.8 MCM of wastewater is generated annually in the Bethlehem Governorate, 2 MCM collected in sewage pipes and networks where the rest 2.8 MCM are collected in cesspits and/ or discharged into open charnels

4.2.8 The Geo-Political Status of Bethlehem Governorate:

The Israeli colonial activities in Bethlehem Governorate commenced following the Israeli Occupation of the West Bank (including East Jerusalem) and the Gaza Strip in 1967. Israel's colonial' activities seek to unilaterally and illegally create facts on the ground that will ultimately undermine the Palestinian presence and sustainability create an Israeli majority on the lands extending from the Jordan River to the Mediterranean Sea. The occupation, the confiscation of Palestinian lands, the uprooting of fruit trees and the demolition of Palestinian homes have proceeded virtually without interruption.

Kfar Etzion colony was the first Israeli colony established after the June 1967 war, followed by a wave of Israeli colonies in the Governorate. Today, there are 21 Israeli colonies accommodating nearly 105,000 Israeli settlers on Palestinian lands in the Bethlehem Governorate. These colonies are built on a total area of 17.3 km^2, which constitutes around 2.6 % of the Governorate's total area.

Furthermore The Segregation Wall in Bethlehem Governorate extends across 80.4 km starting at the eastern rural area north of Al Khas village and runs south to reach Umm al Qassis village. It then extends towards the west, bypasses the southern part of Abu Ghneim mountain north of Beit Sahour, before it continues northwest of Bethlehem and Beit Jala cities and westward to run along bypass Road #60 south of Al Khader village. It then runs southeast towards Wadi an Nis to encompass Efrat colony.

After which, the route of the Segregation Wall moves further south and southwest to isolate and Segregate the western rural area of the Bethlehem Governorate along with what is known as the Gush Etzion Colonies Bloc. This area also includes 8 Palestinian communities (population PCBS 2007: 21,700) within the western Segregation Zone that will effectively become inaccessible to other Palestinians who are not residents of these communities.

Another Palestinian village which stands to face total isolation but is not included within the western rural area is Al Walaja village (Population PCBS 2007: 1895). It will be enclosed and cut off by the Segregation Wall from all of its sides with a single, but guarded and monitored exit to access Bethlehem.

In the Bethlehem Governorate, 176.1 km² of lands will be segregated behind the Wall. Also, the Segregation Wall confines the western rural villages of Battir, Husan, Nahhalin, Wadi Fukin, Al Jab'a, Khallet 'Afaneh, Beit Sakaria and Khallet al Balluta in a large canton, in addition to placing the village of Al Walaja in an isolated canton by sealing it off with a wall from three

directions (east, west and north). Meanwhile it will be sealed off by a protection road from its southern direction that will run along bypass road number 436 and will be protected from both sides with barbed wires and ditches.

Of the isolated lands in the Bethlehem Governorate, 108.6 km^2 are agricultural lands in addition to 49.1km^2 of forests and open spaces, as most of the agricultural lands in the cities of Beit Jala and Al Khader, and the only recreational forest will be segregated. In addition, about 17 springs with an average annual discharge of 172800 cubic meters are segregated by the eastern and western segregation zones and threaten the water supplied to the domestic and agricultural sectors.

4. Problem description

In Bethlehem and Hebron Governorates; wastewater is discharged untreated into the environment. Wastewater collection is limited to major cities and some refugee camps. The field survey conducted by ARIJ revealed that sewage networks serve approximately 42% and 27% of the Bethlehem and Hebron populations respectively, of which no wastewater system exists in rural areas. The remaining population uses cesspits and open channels for wastewater collection. On the other hand, wastewater collected in sewage networks is also discharged untreated into the valleys where they form wastewater streams. The number of sites where the collected wastewater is discharged directly into the environment is around 25 and 73 in the Bethlehem and Hebron Governorates respectively. The uncontrolled flow of sewage causes many environmental problems and health hazards which leads to the transmission of infectious diseases and release of foul order. Moreover, contamination of groundwater aquifers and springs as a result of wastewater percolation is a serious problem in these governorates as the case of Artas village spring west of Bethlehem which is contaminated from the percolated wastewater as a result of the unlined surrounding cesspits.

6.2 Targeted Palestinian Communities (Localities):

The project activities were carried out in 17 Communities (Localities) in Hebron and Bethlehem governorates, 6 targeted Communities (Localities) in Hebron Governorate and 11 localities in Bethlehem Governorate. **See Table 15**.

Table 15: Name of localities and total number of WWTPs

No.	Governorate	Locality	Total Number of WWTPs	Total Number of Beneficiaries	
				Households	Persons
1	Bethlehem	Nahalin	10	10	85
2	Bethlehem	Battir	10	10	50
3	Bethlehem	Al-Khader	12	12	81
4	Bethlehem	Al-Walaja	10	10	66
5	Bethlehem	Beit Jala	1	1	7
6	Bethlehem	Al 'Ubeidiya	13	13	99
7	Bethlehem	Dar Salah	14	14	78
8	Bethlehem	Beit Sahour	1	1	7

9	Bethlehem	Husan	10	10	63
10	Bethlehem	Wadi Fukin	10	10	60
11	Bethlehem	Ash Shawawra	9	9	42
12	Hebron	Sa'ir	10	10	75
13	Hebron	Ash Shuyukh	10	10	74
14	Hebron	Halhul	15	15	104
15	Hebron	Beit Ummar	15	15	102
16	Hebron	Beit Kahil	15	15	127
17	Hebron	Taffuh	15	15	112
Total		**17**	**180**	**180**	**1232**

Having by that, 180 wastewater treatment plants and wastewater reuse systems installed, with a total number of 1232 persons (ARIJ field Survey 2008-2010).

6.3 Awareness campaigns

The awareness campaigns in the targeted localities took place before the applicants fill the application forms. The importance of this campaign can be summarized in that the applicants before filling the applications form, they become aware of the project purposes, how the wastewater treatment system works, how the reuse of the treated wastewater will be, and what are engineers' reuse recommendations and advantages, etc.

As important to mention that community members who attend the awareness campaigns are not only farmers with minimum education, but also educated people who are interested in the idea of reusing the treated wastewater. **The following photos (Photos 1-6) demonstrate some of the awareness campaigns' activities in the targeted Palestinian communities**.

Photos 1-6: Awareness Campaigns at the different Palestinian Localities in Bethlehem and Hebron Governorates.

6.4 Formulation of citizens committees

The Citizens' committees were formulated right after the awareness campaign, as the case of the targeted localities. Members of the committee are: community individuals, members of agricultural societies in the selected community and members of the village council or Municipality.

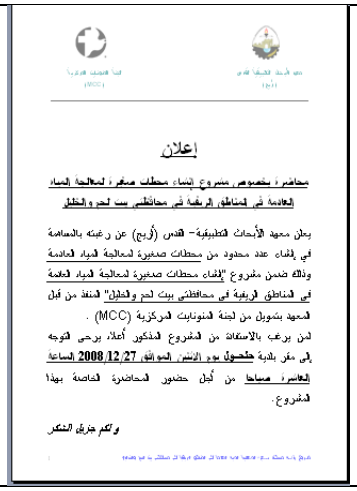
The committee's basic tasks were: (1) Introduce Beneficiaries to ARIJ working Team (2) participate in studying and evaluating applications along with ARIJ working Team and (3) Participate in site visits to applicants' homes along with ARIJ working Team to evaluate the accuracy of the information filled by the applicants in the applications and the criteria upon which beneficiaries are selected.

6.5 Application Process

can be summarized as follow:

ARIJ working team with the help of the village council or municipality published announcements in the selected communities. The announcements included a preface of the project that included the following: The donor name, the implementing NGO, a brief description

of the project activities and goals, the location and date on which the project awareness campaign will be held, date of submission of project application forms, basic conditions that applicants shall have, etc. (**See Figures 1 & 2**)



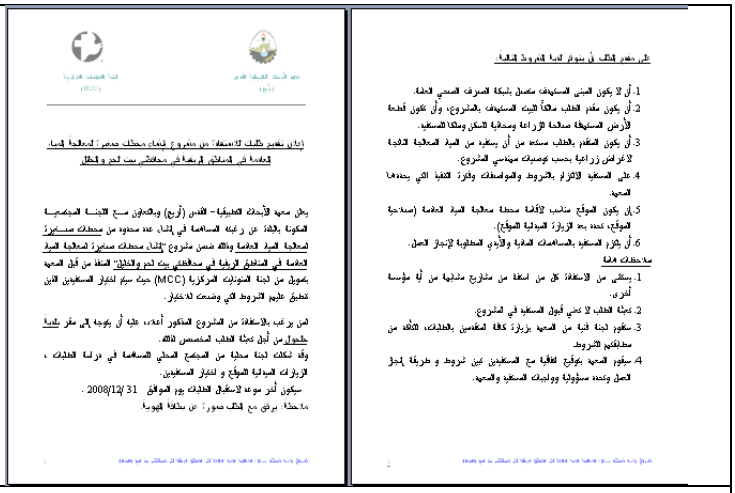
إعلان

محاضرة بخصوص مشروع إنشاء محطات صغيرة لمعالجة المياه العادمة في المناطق الريفية في محافظتي بيت لحم والخليل

يعلن معهد الأبحاث التطبيقية- القدس (أريج) عن رغبته بالمساهمة في إنشاء عدد محدود من محطات صغيرة لمعالجة المياه العادمة وذلك ضمن مشروع "إنشاء محطات صغيرة لمعالجة المياه العادمة في المناطق الريفية في محافظتي بيت لحم والخليل" الممنفذ من قبل المعهد بتمويل من لجنة الممونات المركزية (MCC) .

لمن يرغب بالاستفادة من المشروع المذكور أعلاه، يرجى التوجه إلى مقر بلدية **جلجول يوم الإثنين الموافق 2008/12/27 الساعة الخامسة مساءا** من أجل حضور المحاضرة الخاصة بهذا المشروع.

وتقبلوا فائق الشكر



إعلان بخصوص تقديم الاستفادة من مشروع إنشاء محطات صغيرة لمعالجة المياه العادمة في المناطق الريفية في محافظتي بيت لحم والخليل

يعلن معهد الأبحاث التطبيقية- القدس (أريج) وبالتعاون مع اللجنة الحكومية الكندية بالنيابة عن رغبته بالمساهمة في إنشاء عدد محدود من محطات صغيرة لمعالجة المياه العادمة وذلك ضمن مشروع "إنشاء محطات صغيرة لمعالجة المياه العادمة في المناطق الريفية في محافظتي بيت لحم والخليل" المنفذ من قبل المعهد بتمويل من لجنة الممونات المركزية (MCC) حيث سيتم اختيار المستفيدين الذين تنطبق عليهم الشروط التي وضعت لذا اختيار.

لمن يرغب بالاستفادة من المشروع المذكور أعلاه، عليه أن يتوجه إلى مقر بلدية جلجول من أجل تعبئة الطلب المخصص لذلك.

وقد شكلت لجنة محلية من المجتمع المحلي المساهمة في دراسة الطلبات ، الزيارات الميدانية للموقع و لاختيار المستفيدين.

سيكون آخر موعد لاستقبال الطلبات يوم الموافق 31/12/2008 .

ملاحظة: يرفق مع الطلب صورة عن بطاقة الهوية.

على مقدم الطلب أن يتوفر لديه الشروط التالية:

1. أن لا يكون المبنى المستهدف متصل بشبكة الصرف الصحي العامة.
2. أن يكون مقدم الطلب مالكاً البيت المستهدف بالمشروع، وأن تكون قطعة الأرض المستهدفة صالحة للزراعة وصديقة للسكن وملكا للمستفيد.
3. أن يكون المتقدم بالطلب مستعد من أن يستفيد من المياه المعالجة الناتجة لأغراض زراعية بحسب توصيات مهندسي المشروع.
4. على المستفيد الالتزام بالشروط والمواصفات وقبول الكلفة التي يحددها المعهد.
5. إن يكون الموقع مناسب لإقامة محطة معالجة المياه العادمة (صلاحية الموقع) تحدد بعد الزيارة الميدانية للموقع).
6. أن يلتزم المستفيد بالمساهمات العادية والأهلي المطلوبة لإنجاز العمل.

ملاحظات هامة

1. يستثنى من الاستفادة كل من استفاد من مشاريع مشابهة من أية مؤسسة أخرى.
2. تعبئة الطلب لا تعني قبول المستفيد في المشروع.
3. سيقوم لجنة فنية من المعهد بزيارة كافة المتقدمين بالطلبات، للتأكد من مطابقتهم للشروط.
4. سيقوم المعهد بتوقيع اتفاقية مع المستفيدين تبين شروط و طريقة إنجاز العمل وتحدد مسؤولياته وواجبات المستفيد والمعهد.

Figure 1: Sample of Awareness campaign announcement	Figure 2: Submission of Application forms announcement and the criteria for the selection of the beneficiaries

In the project awareness campaigns, at the targeted localities were preceded with several main activities among them are the following:

1) Presentations about the wastewater management in Palestine.
2) Detailed presentation about all project aspects.
3) Video demonstration (This video contained special material on how the systems are constructed, assembled and adjusted).
4) Distributions of hard copies, of two different leaflets specially made for this project.
5) Distribution of the application form.
6) Formation of the citizens' committee.

The application forms were distributed through the community awareness campaigns and applicants have returned the filled forms to the villages' councils or municipalities.

6.6 Beneficiary Selection

Following the application process, ARIJ working team along with the citizens' committee, paid field visits to the applicants' homes to evaluate the accuracy of the information provided in the application forms. The applications forms along with the results of the field visits were electronically documented. Thereafter, the information and the results were discussed with the citizens' committee to see which applicant succeeded in matching the project purposes and criteria. **The adopted criterion for the selection of the beneficed families was:**

- Close proximity of the community to the separation wall, colonies, or borders
- Low access to internal job markets and/or economic opportunities

- High percentage of vulnerable households; (Households with health, sanitation and socio-economic problems
- High dependency on the Israeli labor market
- Lack of linkages to nearby cities, towns, and neighboring villages due to road closures
- High potential for community participation
- Minimal site involvement by other agencies
- Presence and experience of partners in the community
- Available physical infrastructure and resources are suitable for establishing the waste water technology.

The project prioritized the chronically or long-term poor, but also help the transitory poor to avoid becoming poorer. Thus the selection of project participants conducted through a community-based identification process.

6.7 Determination of proper plant locations & Perforations.

Once the beneficiaries were selected, ARIJ engineers along with beneficiaries discussed and determined the precise location on which the wastewater treatment plant was going to be installed, taking into consideration the location and level of drainage lines, as well as the location of the land that is going to reuse the treated wastewater. The depth of perforations required for each installed system differed from another's. This is because the depth is directly related to the elevation of the drainage collection household network. As important to mention that perforation 'difficulties varied from one to another due to the differences in type of rocks and /or soil.

6.8 Water Tests

The importance of testing domestic drinking water cisterns was to evaluate if those cistern are polluted or not. As important to mention one of the mayor sources of pollution in household cisterns in the Occupied Palestinian Territory, has been the infiltration of pollutants coming from neighboring cesspits. For that reason ARIJ adopted in this project the ***Fecal Coliform Test*** as proper test to evaluate whether the cistern on evaluation is polluted from neighboring cesspits or not.

The Fecal Coliform tests were taken before the installation of the wastewater treatment plants. (**See Photos 7 & 8**) As important to mention, among the tested drinking water cisterns, some resulted polluted. Directly after the lab tests were obtained, the beneficiaries with polluted cisterns were visited and informed. During the site visit to polluted cisterns, the pollution source was analyzed and accordingly the location of the wastewater treatment plant was determined. **(See Annex 1 for more details about Fecal Coliform Lab Tests)**


Photos 7& 8: Cistern Water Tests (*Fecal Coliform Test*)
Photo Courtesy of ARIJ - 2009

ACKNOWLEDGMENT:
The material of this document is part of a progress report presented by The Applied Research Institute- Jerusalem (ARIJ) during ARIJs implementation of a project entitled:" Introducing Small Scale Activated Sludge Filtration System for Wastewater Treatment in the Rural Areas of Bethlehem and Hebron Governorates in the West Bank", and which was Implemented by The Applied Research Institute- Jerusalem (ARIJ) ,and funded by the Mennonite Central Committee (MCC).