Annex 9

Social Assessment Methodology Socio Economic Baseline Assessment Willingness Survey Results Cost Analysis and Tariff Surveys Results

# Social Impact Assessment Methodology

### Social Impact Assessment Methodology

This section will highlight the different objectives of the ESIA study, due to the fact that this is not a customary Social Impact Assessment study as it has more than one component that mightneed to be addressed using different tools that are not likely to fall under standard ESIA procedures i.e. measuring the willingness to pay for the water and sludge.

### 1. Study objectives

The interventions of the Effluent Recovery, Irrigation Scheme and Remediation Works Project were not previously identified during the preparation of the original ESIA for the NGEST project, therefore; the justification for the Supplementary Environmental and Social Assessment (ESIA) is clear as the environmental and social benefits/impacts were not addressed in the original ESIA. The objective of the study in the following statement: "The supplementary Environmental and Social Impact Assessment (ESIA) is in anticipation of restructuring the project to include expanded effluent recovery and reuse and to assess the impacts of the specific plans for remediation of the land formerly covered by the BeitLahia effluent lake." The study team identified five specific objectives for the ESIA, which we understand to be the following:

The objective of the study in the following statement: "The supplementary Environmental and Social Impact Assessment (ESIA) is in anticipation of restructuring the project to include expanded effluent recovery and reuse and to assess the impacts of the specific plans for remediation of the land formerly covered by the BeitLahia effluent lake." The study team identified specific objectives for the ESIA, which are:

- 1. Identification of the possible social impacts of the proposed effluent recovery and reuse scheme and the rehabilitation plan for the former BeitLahia effluent lake and the decommissioning of the existing BLWWTP after opening of the new WWTP
- 2. Identification of any potential temporary or permanent land acquisition requirements associated with civil works
- 3. An Environmental and Social Management Plan (ESMP) to manage mitigate and monitor any possible negative impacts during the construction and operation phases of the project. Moreover, a capacity assessment of the implementing party to implement the ESMP and recommendations for any capacity-building needs
- 4. Identify positive and negative impacts on the local market in change in demand for local services, as well as access to social infrastructure
- 5. Highlight the legislations under which the project will be implemented
- 6. Outline the vulnerable groups that might be affected by the project and identify the appropriate mitigation measures,
- 7. Identify the methods of quality assurance and monitoring system needed during the construction and operation phases, Finally, try to propose a Social Management Plan that might be responsible for any potential social problems
- 8. Try to investigate the different potential alternatives of the current project. Provide various option to minimize the need for involuntary resettlement

### 2. Social Study Methodology

### 2.1. Primary Data

Primary data collection involves collecting data primarily from different potential stakeholders and project target groups.

Due to having more than one component under this project, the study will rely upon different sources of data using multi-levels of tools that will enable the project authority to apply proper mechanisms and decisions related to the project. In order to fulfill the requirements of this project, it is crucial to collect detailed information during short period. Therefore, applying a Participatory Rapid Appraisal (PRA) survey will enable the study team to fulfill the requirements accordingly during the planned period. However, the verification of data should be assured according to the multi levels' tools that might be applied on different social groups and stakeholders during three surveying phases that might be summarized as follow:

### 1) *Data collection scoping phase*.

During this phase the study team has done the following activities in order to be able to collect the needed data based on a real situation with a clearer overview of the situation in different areas. Under this phase the following activities have been done:

- A kick off meeting for the project introduction as well as the relevant project background for starting the assignment
- The first site visit and data collection was done during the negotiation session on May 6 and 8, 2012. This date was considered to be the beginning of the Consultant team mobilization and preliminary data collection. EcoConServ and UG team accompanied by the Client representatives visited the two sites (old and new sites).



Figure 1 Meeting conducted during the site visit to treatment plant



Figure 2. Site visit to the project area

### 2) <u>Pilot phase and tools testing:</u>

During this phase the survey team tried to dig deeper in order to collect the preliminary data that might work for enhancing the data collection tools as well as enable the study team to collect data from different sources. During this phase the following activities have been done:

- a) Site visits have been paid in order to identify the current status of the workers inside each treatment plant,
- b) The first public consultation that aimed at bringing the project forward to community people in order to get their perceptions, worries and comments on the methodologies,
- c) Applying in-depth meetings with the key players in order to investigate their main contribution to the project, potential impacts and mitigations, barriers and how to overcome, and community participation
- d) Two opinion pool workshops to be applied with different stakeholder in order to discuss different issues related to the project: following is detailed table about topics to be discussed.

Main topic	Discussion points							
The Social and Institutional	itional Workshop							
1- Institutional framework	1. Actual institutional frames							
	<ol> <li>Suggested institutional frames different views</li> <li>Available capacities and needed capacities (human</li> </ol>							
	Available capacities and needed capacities (human resources and equipment's)							
	resources and equipment's)							
	4. Suggestions on other related issues.							
2- Water pricing and cost	1. The actual costs of 1. Collection 2. Treatment 3.							
coverage	Conveyance system 4 institutional							
	2. Competition with water pumping from privet wells vs							
	(PWA wells )							
	3. Water use profitability in different cropping activities							
	4. Selling water to neighbors.							
	5. Current water pricing policies							
	6. Plans for future water pricing suggestions.							
	7. Pricing of sludge							
	8. Other related issues							
3- Land acquisition	1. Total land needed to the project and potential							
	extension							
	2. How can this land be accessed							
	3. Different entities participating in this process							
	4. Land prices, cost, cash flow, and procedures							
	5. Potential effect on the livelihood status of the							
	expropriated people (PAPS)							

### Table 1.Discussed topics during the Opinion Pool Workshops

North Gaza Emergency Sewage Treatment Project (NGESTP) Effluent Recovery and Reuse System and Remediation works

Main topic	Discussion points
	6. Potential problems results from the expropriation,
	grievances and remedies
	7. Monitoring and follow up for such activities
	8. Legal barriers that might face the process
The Technical Workshop	
1-Public health and	1. Effect of using recovery water and sludge on public
environment	health either directly or indirectly.
	2. Effect on Soil
	3. Effect on aquifer
	4. Monitoring on environment
	5. Monitoring on public health
	6. Mitigation measures
	7. Cost of mitigation measures
	8. Suggestions on other related issues.
2- Agriculture technical	1. Expected water quality
potentialities	2. The actual land use activities in the project area
	3. Technical restrictions such as irrigation systems
	restrictions
	4. Optimal cropping patterns and other production
	restrictions
	5. Sludge use as fertilizers (technical restriction, suitable
	crops, competition with other fertilizers and costs)
	6. Potential effects on farm income
	7. Other related issues

e) Two focus group discussions were implemented in the BLWWTP site and NGWWTP. The main objective of these two workshops was to investigate people's perception towards their willingness to use the treated water and sludge and their perception on the new treatment plant and the decommissioning of the old one



Laborer camps in the NGWWTP



First Public Consultation



Electrical supply station in BLWWTP



Social and Institutional Workshops



FGD in BLWWTP Bedouin Village



FGD in NGWWTP in EzbeitAbdRaboh

Figure 3. Activities during data collection during scoping phase and Pilot phase and tools testing

## *3) Data collection and analysis phase*

The data collection process was planned to start from 11<sup>th</sup> of July till the 25<sup>th</sup> of July. Nevertheless, due to having Ramadan (Fasting month for Muslim people) the data collection lasted till the beginning of August.

The primary data collection relied upon the following tools to collect the needed data:

### a) <u>Quantitative tools</u>

The qualitative tools are divided into the following types based on the target group to be investigated:

### 1. Consumer structured questionnaire

That is mainly tailored for potential customers who might purchase the crops irrigated by treated water, or fertilized by sludge. This tool covered the following indicators:

- Basic socioeconomic characteristics
- Purchasing attitudes and behaviors
- Bases to purchase the crops
- Quality of water
- Perception towards the proposed project
- Willingness to reuse treated water and sludge in agriculture
- Willingness to trade in vegetables irrigated by treated water
- Willingness to trade in labeled products
- Media strategies to be applied to encourage community people to purchase products irrigated by treated water

### 2. Wholesalers and retailers structured questionnaire

That is mainly tailored for potential wholesalers and retailers who might sell the crops irrigated by treated water, or fertilized by sludge. This tool covered the following indicators:

- Basic socioeconomic characteristics
- Purchasing attitudes and behaviors for customers according to traders perception
- Bases to trade in certain crop
- Quality of water as basis for the willingness to trade in a crop
- Perception towards the proposed project
- Willingness to reuse treated water and sludge in agriculture
- Willingness to trade in vegetables irrigated by treated water
- Willingness to trade in labeled products
- Media strategies to be applied to encourage community people to purchase

products irrigated by treated water

### 3. Beneficiaries farmer who will use the reused water

This tool is modified according to comments raised during the public consultation and the site visits during the second phase of this study. The main indicators covered were:

- Basic socioeconomic characteristics for the farmers
- Agriculture status and most faced problems
- Perception towards the project
- Their willingness to use reused water and sludge in planting products
- Project impacts on the sector and water reused
- Their willingness to pay for reused and sludge. In addition their proposed tariff

### b) **Qualitative tools**

Due to the diversity of the groups that should be covered by the qualitative tools, namely, in- depth and FGDs, the study team developed different guidelines to suit each groups which mainly cover the following generic indicators

- Basic information about the project
- How treated water might be disposed off
- Cost of using pure water in irrigation
- Feasibility to use treated water
- Potential incentives to be given to the farmers to use treated water
- Using of sludge benefits and drawbacks
- Awareness strategies to apply
- Gap analysis for the organizational capacity
- Monitoring for different activities
- Total lands to be expropriated
- Prices of lands
- Mechanism for expropriation
- Grievances and redress
- Budgeting and time plan
- Organizational responsibilities
- Plans for decommissioning
- Obstacles and barriers facing the decommission and how to overcome
- Site monitoring

However some indicators might be used with certain group i.e. the guideline of Awqaf covers lands that might be expropriated from their assets. Regarding the qualitative tools used, they were as follow:

### 1. Focus Group Discussion

That was applied with the residents in Om El Nasr village close to BeitLahia Waste Water Treatment Plant and EzbetAbdRabouh. In addition to one with the owners of wells who might be affected due to the implementation of the project. The main topics discussed in these FGDs were:

- Basic socioeconomic characteristics
- Ever heard about the project
- Perception towards the proposed project
- Willingness to reuse treated water and sludge
- Willingness to buy vegetables irrigated by treated water
- Proposed prices of vegetables and fruits irrigated by treated water
- Proposed prices for water treated and sludge reuse
- In case of not reusing treated water and sludge how they can be final disposed
- Prices of lands in areas by dunum
- Awareness about expropriation laws
- Acceptance to be expropriated
- Proposed compensation (Highest-least)
- Awareness about the implementing agencies
- Ever was expropriated
- Strategies to apply expropriation activities with no disputes
- Perception concerning the current site
- Perception towards decommissioning
- Proposed plans to use the site after decommissioning

### 2. In-depth Interviews

They were implemented with the stakeholders. The main topics discussed are:

- Basic information about the areas
- Health conditions in the area
- Role of organization in the project (pre-during- post construction) and how they cooperate with PWA
- Potential unfavorable impacts of the project and how to mitigate
- Perception towards sludge and treated water reuse
- Willingness to apply the reuse of treated water and sludge
- In case of not reusing treated water and sludge how they can be final disposed
- Role of organization in the decommissioning and land acquisition
- Potential unfavorable impacts of the decommissioning
- Auditing for the project
- Most urgent environmental hazards in the project areas

• Quality of underground water

### 3. Workshops for opinion pooling

In the aformentioned , two workshops were applied in order to collect the needed information related to five main topics, which are:

- 1- Institutional framework
- 2- Water pricing and cost coverage
- 3- Land acquisition
- 4- Public health and environment
- 5- Agriculture technical potentialities

This type of opinion pooling provides a comprehensive amount of verified data due to the fact that the majority of stakeholder attended the workshops. Their contribution was active and the information provided was of a reliable status

### 2.2. Secondary data

Secondary activities involve collection of different national reports through reviewing available sources of secondary data and assess requirements for primary data collection; the above mentioned lists of reports were reviewed. A list of all reviewed data was prepared:

- 1- Human Development Report 2009/10 Investing in Human Security for a Future State- occupied Palestinian territory
- 2- Palestinian Environmental Law .7, 1999
- 3- Palestinian Laws
  - Palestinian Labor Laws 7/2000
  - Health and SafetyLaw 3/2011
  - Land Ownership Law 2/1953
  - Expropriation Law (Istmlak)
  - Antiquities Law 1966
  - Basic laws
  - Basic Laws declaration for Palestinian Human Right
  - Law 21Consumer protection laws
  - JSC Regulations
  - Joint Service Council (JSC) Regulations
  - Palestinian Reform and Development Plan PRDP (2008 2010)
  - Local Council Law 1/1997
- 4- Palestinian Environmental Assessment Policy
- 5- World Bank OP.4. 12 concerning Involuntary Resettlement
- 6- Basic Information about BeitLahia- Wikipedia
- 7- Standards for the re- use of treated wastewater for irrigation, www.arriyadhenv.com
- 8- Palestine Water Authority, organization and tasks, PWA website
- 9- The North Gaza Emergency Sewage Treatment project, World Bank website

- 10- Health conditions in the occupied Palestinian territory, including east Jerusalem, and in the occupied Syrian Golan
- 11- Environmental Assessment North Gaza Emergency Sewage Treatment Plant Project
- 12- Literature review of factors influencing public perceptions of water reuse
- 13- Treated water reuse in agriculture and the potential health impact, A.Gad Allah Aboud, Damascus University.
- 14- Goa, health at the front line, Real Health News the magazine of real action and research No. 9 May 2008
- 15- Socio-economic Assessment of Using Treated Wastewater in Irrigated Agriculture The Case of Northern Gaza, Dr. Ahmed A. Abu Shaban
- 16-Technical proposal for the Supplementary Environmental and Social Assessment North Gaza Emergency Treatment Project
- 17- The Palestinian Central Bureau of Statistics, (http://www.pcbs.org/populati/est\_n1.aspx)

### 2.3. Data management and analysis

- 1- Data was reviewed, edited and entered
- 2- The quantitative data was analyzed using the SPSS 16 Statistical Package for the Social Science which enabled the study to have detailed analysis. As well, it enabled the team to enhance the quality of analysis for Data
- 3- Using different methods to analyze the contents of the qualitative data. Relying upon computerized techniques and manuals in order to have the rich text needed

Through applying different analysis techniques enriched the results of the data collected which enabled the study team to verify data collected. In case of having any discrepancy in data, the team tried to find the most reliable data from other sources either primary or secondary sources

### 3. Targeted Groups Identification and Sample Selection

### 3.1. Target Groups

Due to the nature of this project, the identification of the survey targeted groups will be based on different components. Some determinants took part in identifying the targeted groups i.e. area, gender and project component. Figure 4 below presents an initial identification for the targeted groups from the survey:



Figure 4. Key target groups

In addition to the above mentioned categories and target groups, the study will rely upon an observation checklist for the study areas.

### 3.2. Sample selection based on survey tools

Both qualitative and quantitative tools were applied to obtain the baseline information needed. However, the quantitative sample should be representative for the different components and the targeted households, the targeted population among different areas. The samples were selected as follows:

### 1- Quantitative Sample

This was covered using different structured questionnaires:

- The diversity of activities is suggesting that the research team will develop a stratified random sample. That is mainly due to having a list of farmers among which **34 farmers** were selected randomly. However, it is worth mentioning that the study team tried to interview more farmers but their refusal worked against the questionnaires' implementation
- Regarding the consumers of the agricultural products willingness to pay assessment, **51 dealers** (including retailers and wholesalers)

• **696 of the customers** in the different markets surrounding the project areas were selected conveniently,

### 2- Qualitative Sample

Using FGDs, workshops opinion pool and in-depth interviews the following were investigated:

- 2 FGDs with the surrounding communities to the decommissioning site, diversity regarding age categories and education should be put into consideration
- **1 FGD** with the owners of wells in Jabalia
- 1 FGD with the farmers and well owners in Jabalia

### • In- depth interviews with the following:

- Al Mezan Center for Human Rights
- Palestinian Water Authority
- Ministry of Endowment (Awqaf)
- Gaza Municipality
- Jabalia Municipality
- Palestinian Agriculture Relief PARC

# • Workshop was conducted to collect data attended by the following categories:

- 11 from Palestinian Water Authority
- 2 with Environmental Quality Authority
- 1 from Coastal Municipality of Water Authority
- 2 from Palestinian Agricultural Relief Committee
- 4 Gaza municipality
- 1 Palestinian Contractor union
- 1 Nasr NGO for Agricultural Development
- 1 Human Rights Center
- 1 Ministry of Endowment (Awqaf)
- 2 UG consultation
- 1 Ministry of Health
- 2 Islamic University

In addition to the above mentioned sample, scoping sessions were applied with different stakeholders to collect basic data that were the bases for verification and developing surveying tools

project Field observations were conducted to assess areas. land use characteristics/ownership, community structure and planned development activities (including tourism and cultural properties). In-depth analysis of present and projected population, public health related to water use, gender issues as well as educational background were given. These analyses will implicate the willingness to pay and contribute to the improved effluent scheme as well as acceptance of the effluent reuse purposes.

### 4. Additional Consultation Activities

It is worth noting that the stakeholders' consultation activities were not limited to the activities mentioned above. Further public consultation through plenary event has been/ are planned to be conducted. This includes a scoping consultation session with the main objective of reviewing the ESIA scope of work and ToRs with stakeholders and obtaining their views on issues that need special attention during the field investigations and analysis.

Additionally a plenary public consultation session is also planned after drafting the ESIA in order to validate and review the study findings with the relevant stakeholders and potentially affected groups. The results of the public consultation were included in the final ESIA. The various consultation and participatory activities largely contributed to enriching and validating the findings of this ESIA.

### 4.1. Sample description of the social survey

### 4.1.1. Sample socioeconomic profile

Due to having different components of the project that might result different impacts and aspects the study team tried to have a representative sample for all project affected or target groups. Not only has that but also had an appropriate mixed sample from different stakeholder. Due to applying different survey tools that varied between qualitative and quantitative. The sample was also selected according to the tools. This section will present the detailed sampling of the project.

### A. Quantitative Sample

This was covered using different structured questionnaires:

- Due to having a list of farmers, it was relatively easy to select 34 **farmers** which were selected randomly. However, it worth mentioning that the study team tried to investigate 110 farmers but their refusal worked against the questionnaires implementation. Thus, more FGDs were conducted to fill the gaps.
- Regarding the consumers of the agricultural products willingness to pay assessment, **51 dealers**(including retailers and wholesalers) were interviewed in three types of markets one day market, supermarket and permanent market. The sample was not selected randomly due not to having a list of traders. Therefore, the sample selected conveniently during the study and data collection time.
- **696 of the customers** in the different markets adjacent the project areas were selected conveniently during certain data collection period. Thus the sample was statistically acceptable.

### A.1. Trader sample

The first group sampled was the traders who are up to 51 male traders among which 39.2% of them interviewed in El Wasta and 60.8% were from Gaza Governorate. Different types of markets were covered in order to have the diversity of all traders. 39.2% of the traders were in El Noseirat. Followed by Moasker El Sahteamarket (The Beach Camp Market) 21.6% of the traders was from there, whereas, 17.6% were from El Remal. The distribution of the trader



sample by type of market revealed that 39.2% of the traders were from the one day market, followed by the supermarket 33.3% and the permanent market 27.5%.



The distribution of the sample by age category revealed that about third of the sample surveyed were among the age category 40-49 years old. While a quarter of the sample surveyed were at the age category 30-39 years old. 15.7% were among the age category 50-59 years old. This diversity of age categories reflected on their responses and attitudes regarding the project.

North Gaza Emergency Sewage Treatment Project (NGESTP) Effluent Recovery and Reuse System and Remediation works





The main level of education reached by the traders was secondary education 43.1%; while 33.3% reached the preparatory stage. 11.8% only were among university graduates. This is relatively consistent with the description of the population reported in the socioeconomic chapter. Due to the fact that part of this study deals with the attitudes and perception, the diversity according education was recommended to be achieved in order to have a wide range of attitudes and diversity in perceptions



Investigating the owners of shops was not the target of this study, therefore, the owners represented only 17.6% of the sample surveyed in addition to 15.7% of the workers. The vast majority was among fruit and vegetable sellers among which half of them are vendors. They were mainly among those who work in the mobile one day market.



### A.2 Consumer sample

The second main target group interviewed was the consumers who were represented by 696 individuals among which 401 were from El Wasta, 203 from Gaza and 92 from Khan Younis. 82.9% of the sample was males versus only 17.1% females. That might reflect the types on potential customers that will be targeted in the advertising strategy.

The sample was selected 13 markets in different governorates; the following figure shows that El Noseirat, 22.7% followed by Deir El Balah 13.8%, Khan Younis 13.2%, ElMoghazy 11.8% and El Berieg 9.3%. The markets were of different types and sizes 57.5% of them were among one day market, while, 18.2% were among permanent markets and14.4% from supermarkets. This mainly reflects the types of market according to their customers' size. The one day market was characterized with the most customers followed by permanent markets and supermarkets.



According to age distribution it was notable that the customers' age ranged between 18 to 70 years old. The average value was 46.19 with mode value of 48 years. The third of the sample surveyed lied in the age category 40-49 years while 29% were 50-59 years. The younger age categories were the least as only 7.4% were less than 29 years old.



The diversity of the sample according to the type of education in gender was notified as 30.3% of the female sample was of primary education versus 4.0% of the male sample. 21.8% of the females have completed their preparatory stage versus only 11.8% of the males. 53.9% of the males were university graduates, while only 28.6% continued their university education. That might reflect the gap between males and females regarding educational level.

			Gender			
Educa	tional status	Male	Female			
	Illiterate	1.6%	4.2%	2.0%		
	Primary	4.0%	30.3%	8.5%		
	Preparatory	11.8%	21.8%	13.5%		
	Secondary	18.9%	10.1%	17.4%		
	Vocational education	5.9%		4.9%		
	University	53.9%	28.6%	49.6%		
	Above university	4.0%	5.0%	4.2%		
Total		100.0%	100.0%	100.0%		

Table	2.	% Di	stribu	tion	of the	consumer	sample	by e	educational	status	and	gender
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The gender gap was not notified in the educational status but also reflected on occupation as the majority of females were housewives 59.7% followed by administration work 15.1% and educational sector 10.9%. Whereas, 36.2% of the male consumer sample surveyed

wasamong clerks and administrative workers, 10.1% were among sales person. It is worth mentioning that 16.3% of the males were unemployed. This is another indication of the prevailing unemployment in the Strip.

0	ccupation	Gen	der	Total
		Male	Female	
	Specialist	3.6%	5.0%	3.9%
	Technical and assistance	.2%		.1%
	Clerks and related administrative workers	36.2%	15.1%	32.6%
	Sale and service workers	10.1%		8.3%
	Craftsman and related workers	5.5%	.8%	4.7%
	Production workers and related workers	.5%		.4%
	Common workers	9.2%	5.9%	8.6%
	Teacher	4.7%	10.9%	5.7%
	Police officer	6.9%		5.7%
	Farmers/fishermen	.2%		.1%
	Student	.3%		.3%
	housewife		59.7%	10.2%
	Pensioner	6.2%	.8%	5.3%
	Unemployed	16.3%	1.7%	13.8%
T	otal	100.0%	100.0%	100.0%

 Table 3. % Distribution of the consumer sample by occupation and gender

Purchasing attitudes were covered under this study in order to have detailed information about their willingness to purchase. The data collected revealed that the majority of sample surveyed prefer the fixed shop or vendors. Mobile vendors are not welcomed in the communities.

# Table 4. % Distribution of the consumer sample by purchasing attitudes and market type

Place where respondent purchase fruits and vegetables from			Total		
		One day market	Super market	Permanent	
Fixed shop	Ν	348	100	87	535
	%	87.00%	100.00%	44.40%	
Fixed vendor	Ν	348		171	519
	%	87.00%		87.20%	
Mobile vendor (using cart)	Ν	116		38	154

Place where respondent purchase fruits and vegetables from		Total		
	One day market	Super market	Permanent	
0/0	29.00%		19.40%	
TotalN	400	100	196	696

Multiple responses

The motives to purchase from certain market were investigated as part of purchasing attitudes. The main two motives reported were the availability of all types of fruits and vegetables in addition to appropriate pricing. Regarding the supermarkets' customers the quality of products was the main reason followed by the place of the supermarket that should be adjacent to the house or work.

# Table 5. % Distribution of the consumer sample by purchasing reasons and market type

		I	Market Ty	pe	Total
Reasons for purchasing from the	is market				
		One day market	Super market	Permanent	
Close to my house	Ν	36	48	100	184
	%	9.00%	48.00%	51.00%	
All fruits and vegetables are available	Ν	268	0	34	302
	%	67.00%	0.00%	17.30%	
Appropriate prices	Ν	268	0	43	311
	%	67.00%	0.00%	21.90%	
I trust the sales people	Ν	2	5	5	12
	%	0.50%	5.00%	2.60%	
Close to my work	Ν	22	8	18	48
	%	5.50%	8.00%	9.20%	
Good quality products	Ν	76	46	26	148
	%	19.00%	46.00%	13.30%	
Total	Ν	400	100	196	696

Multiple responses

### A.3 Farmer sample

The third sample interviewed were the farmers who will be the potential beneficiaries for the recovered water. Originally they were 644 farmers among which 34 interviewed. All of them have source of water. They plant mainly citrus, olives and vegetable.

No.	Crop	Total Areas (dunum)	No. of Farms	Farm property (Private)	Farm property (Awqaf)
1	Rainfed	12055	398	379	19
2	Citrus	688	68	68	0
3	Olives	600	58	57	1
4	Unfruitable Citrus Unfruitable	510	69	69	0
5	Olives	14	3	3	0
6	Vegetables	280	32	30	2
7	Fruits	184	11	10	1
8	Almond	53	5	5	0
	Total	14385	644	621	23

	Table 6. Potent	ial beneficiaries	for the re	ecovered water
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Source: PWA

About half of the sample surveyed was at the age 40-59 years old. A quarter of them were at the age category 60+. Few percentages lied under age category 20-29 years. 44.1% of them were among secondary education graduates while 20.6% were university graduates and the same sample was among preparatory graduates



It was notified that their main occupation was farming 55.8%, while few of them work as administrative staffs 8.8% and 8.8% were acting as unidentified workers.

Occupation	Ν	%
Legislators, high officials and managers	1	2.9
Clerks and related administrative workers	3	8.8
Sale and service workers	2	5.9
Craftsman and related workers	1	2.9
Common workers	1	2.9
Unidentified workers	3	8.8
Farmers	19	55.8
Student	1	2.9
Pensioner	3	8.8
Total	34	100

### Table 7. % Distribution of the farmers sample by occupation

Regarding their socioeconomic characteristics, about half of them live in apartment building while 47.1% live in separate house. The majority of them 76.5% own their house while 17.6% are partially owners (brothers and sisters own the same unit). The small percentage reported was for those who live in a rented house 5.9%.



Regarding the main source of drinking water was mainly from municipal water 82.4% while those who use their wells for drinking water represent 17.6%. The whole sample survey has access to electricity.

North Gaza Emergency Sewage Treatment Project (NGESTP) Effluent Recovery and Reuse System and Remediation works

#### Annex 9



The total area of lands they own varied between 0.6 dunum to 23 dunum. The mode value was 2 dunum per each household while the average was 5.4955. The data collected revealed that almost a quarter of the sample surveyed own between 1-less than 3 dunums. While 18.2 own between 3 to less than 5 dunums. The same percentage of farmers own 9 and more dunums.





Regarding income and expenditure distribution, it was notable that the monthly income for a third of families was around 1001-1500 Shekel, followed by 26.5% who earns between 500-1000 shekel. Due to asking about expenditure first the reliability of data was relatively high and consistent with the income mentioned

Monthly income	Ν	%	Monthly expenditure	Ν	%
No income	1	2.9	500	3	8.8
Less than 500	2	5.9	500: 1000	5	14.7
500: 1000	9	26.5	1001:1500	7	20.6
1001:1500	11	32.4	1501: 2000	8	23.5
1501: 2000	5	14.7	2001: 2500	4	11.8
2001: 2500	4	11.8	2501:3000	3	8.8
More than 3000	2	5.9	More than 3000	4	11.8
Total	34	100	Total	34	100

$\mathbf{T}$	Table 8. % Distribution	of the farmers	sample by monthl	v income and ex	penditure
--------------	-------------------------	----------------	------------------	-----------------	-----------

Regarding the main problems facing the farmers was mainly the security conditions which affects their work severely especially the farming of trees. "Whenever we plant trees the Israeli force invade our farms, destroying our trees. Therefore we are not much in favor for the plantation of trees any more" reported one of the farmers in the FGD. The second problems ranked were the lake of water and lack of fuel. Problems related to the operation of wells were ranked as the fourth problems. Bad odor, dust and flies result during the construction of the infiltration pond reported as the fifth problem the farmers face. The FGD provided detailed information about problems they face.

Sector			
Problems face farming	Respon	% of Cases	
	Ν	%	
Security conditions	8	22.20%	23.50%
Lack of fuel	6	16.70%	17.60%
Scarcity of water	6	16.70%	17.60%
Problems related to the wells	4	11.10%	11.80%
Bad smelling from ponds- Dust-	3	8.30%	8.80%
Smoke			
Deterioration of vegetation	2	5.60%	5.90%
Lack of basic services	2	5.60%	5.90%
No problems	1	2.80%	2.90%
I don't do farming now	3	8.30%	8.80%
Doesn't know	1	2.80%	2.90%
Total	36	100.00%	105.90%

Table 9: % Distribution of the farmers sample by problems facing the agriculture sector

Multiple responses

The famers'strategies to overcome these problems are through the provision of fuel and electricity in addition to provision of subsidy to farmers. Having security and peaceful conditions might support to solve the faced problems. A long list of strategies suggested can be summarized in the following table.

Strategies to overcome problems	Responses		% of Cases
	N	0⁄0	
Provision of fuel and electricity	7	21.90%	25.00%
Provision of subsidy to farmers	7	21.90%	25.00%
Security and peaceful conditions	5	15.60%	17.90%
Provision of services	3	9.40%	10.70%
Spraying the insects	2	6.20%	7.10%
Cooperative organizations	2	6.20%	7.10%
Digging wells close to land	1	3.10%	3.60%
Protect agricultural lands	1	3.10%	3.60%
Enhance the quality of plants	1	3.10%	3.60%
No solution	1	3.10%	3.60%
Doesn't know	2	6.20%	7.10%
Total	32	100.00%	114.30%

Table 10: % Distribution of the farmers sample by suggested strategies to overcome farming problems

Multiple responses

Farmers' information about types of crops that should be planted to use the treated water was highlighted by the farmers. The main objective of this issue is to draw attention to any potential misconception related to the types of crops to be planted in order to include the accurate information in the awareness raising activities. Based on the responses provided it was notified that information is accurate and no misconceptions reported. Traditional crops and tree crops are the suitable ones to use recovered water for.

Types of crops that can be irrigated	Respon	% of Cases	
by treated water	Ν	⁰∕₀	
Traditional crops	13	37.10%	38.20%
Tree crops	13	37.10%	38.20%
Based on experts opinion	2	5.70%	5.90%
Based on the level of treatment	2	5.70%	5.90%
All crops but water should be well	2	5.70%	5.90%
treated			
No crops	2	5.70%	5.90%
Doesn't know	1	2.90%	2.90%
Total	34	100.00%	102.90%

Table 11 % Distribution of the farmers	sample by types of	crops irrigated by tre	ated
water			

Multiple responses

The last topic discussed with the famers was the sufficiency of water supply. The majority of farmers reported that water was sufficient particularly during winter time

Sufficiency of water	Sufficiency of water during summer		Sufficiency during v	of water vinter
	Ν	0⁄0	Ν	0⁄0
Sufficient	25	73.5	29	85.3
Sufficient to some extent	4	11.8	2	5.9
Not sufficient	4	11.8	3	8.8
Missing	1	2.9		
Total	34	100	34	100

### Table 121 % Distribution of the farmers sample by sufficiency of water

### **B** Qualitative Sample

### 1- Qualitative Sample

Using FGDs, workshops opinion pool and in-depth interviews the following were investigated:

- 2 FGDs with the surrounding communities to the decommissioning site, diversity regarding age categories and education should be put into consideration
- 1 FGD with the owners of wells in Jabalia
- 1 FGD with the farmers and well owners in Jabalia
- In- depth interviews with the following:
  - Al Mezan Center for Human Rights
  - Palestinian Water Authority
  - Ministry of Endowment (Awqaf)
  - Gaza Municipality
  - Jabalia Municipality
  - Palestinian Agriculture Relief PARC
- Workshop was conducted to collect data attended by the following categories:

### B.1 FGDs sample

### Table13: Sample of the land and well owners

Well number	Participants	Total area of lands irrigated by wells	Total partners in the lands	Average land ownership	Total monthly salary of well operator	
FGD 1						
<b>Q</b> 53	Male farmer	118	100	1.18	Dinar 200	
Q56	Male farmer	140	40	3.5	Dinar 250	
<b>Q</b> 54	Male farmer	42	8	5.25	Dinar 200	
Q52	Male farmer	60	40	1.5	Dinar 200	

Well number	Participants	Total area of lands irrigated by	Total partners in the	Average land ownership	Total monthly salary of well operator
0%	Mala farmar		lands 25	4.4	Dipar 200
Q00	Male faither	110	25	4.4	Dillar 200
Q14	Male farmer	120	30	4	Dinar 200
Q15	Male farmer	120	30	4	Dinar 200
Q16-A	Male farmer	148	40	3.7	Dinar 200
		F	GD 2		
Partic	ripants		Owned	d lands	Affected lands
Male	farmer		100	$0 \text{ m}^2$	$400 \text{ m}^2$
Male	farmer		500	$0 \text{ m}^2$	$1300 \text{ m}^2$
Male	Male farmer $10000 \text{ m}^2$				
Male	Male farmer 850 m <sup>2</sup>				$42 \text{ m}^2$
Male	Male farmer 8500m <sup>2</sup>				
PWA representative					
PWA representative					
Jabalia Municipality representative					
Cons	sultant	-			
Cons	ultant				

\* Wells highlighted in red will be terminated

In addition to the above mentioned sample 2 FGDs were conducted in EzbetAbdRabouh and Um El Nasr Village in order to identify the potential impacts of the decommissioning of BL treatment plant. 11 persons attended the discussions. Following are their characteristics:

- 1- Their age varied between 32-76 years old with mode age of 30-40 years old
- 2- About their education, four were university graduates, 4 were secondary graduates, 2 were preparatory graduates and one was illiterate.
- 3- All of them were married with at least one child to 9 children
- 4- Monthly expenditure ranged between 400-3500 Shekel monthly with mode value ranged 1000 -2000 shekel.
- 5- The average family size ranged between 3- 13 persons with economical dependency ratio of 0.08

### B.2 In- depth sample

- Al Mezan Center for Human Rights
- Palestinian Water Authority
- Ministry of Endowment (Awqaf)
- Gaza Municipality
- Jabalia Municipality
- Palestinian Agriculture Relief PARC

### **B.3** Workshops sample

- 11 from Palestinian Water Authority
- 2 with Environmental Quality Authority
- 1 from Coastal Municipality of Water Authority
- 2 from Palestinian Agricultural Relief Committee

- 4 Gaza municipality
- 1 Palestinian Contractor union
- 1 Nasr NGO for Agricultural Development
- 1 Human Rights Center
- 1 Ministry of Endowment (Awqaf)
- 2 UG consultation
- 1 Ministry of Health
- 2 Islamic University

# Socio Economic Baseline Conditions and Analysis

### Socio Economic Baseline Conditions

### 1. Socio-economic Environment

The potential impacts of any development project are affected by the different characteristics of the host community. Therefore, having a detailed description of theGaza Strip assists the appropriate and accurate identification of the potential impacts. This section will discuss the socio-economic environment of the project areas (in termsofavailabledata). The main sources of data are the following reports:

- 1) Palestinian Statistical Year Book ,Volume 10, 2009, Palestinian Central Bureau for Statistics
- 2) PCBS Household Environmental Survey 2011
- 3) Palestinian Human Development Report 2009/10
- 4) Health conditions in the occupied PalestinianTerritories, including east Jerusalem, and in the occupied Syrian Golan, WHO, Sixty- Fourth World Health Assembly A64/27-Provisional agenda item 15,2011
- 5) Environmental Assessment for North Gaza Emergency Sewage Treatment Plant Project

Generally speaking, the Gaza Strip is a small closed coastal area of a total surface area of 365 Km2. The Gaza Strip is amongst the mostdensely populated areas in the world. The environment in the Gaza Strip has been suffering from a great deal of abuse and negligence. The limited land resources, large and rapidly growing social and economic sectors, long-term isolation, and negligence as a result of the political circumstances have led to the deterioration of the natural resources and resulted in the amplification of several environmental shortcomings. The surface area in Gaza is very limited, with an average land availability of 0.26 dunum<sup>1</sup> per person in 2007.

The latest census conducted by the Palestinian Central Bureau of Statistics (PCBS) estimates the total population of the PalestinianTerritories to be 3,825,512, of whom 2,385,180 live in the West Bank, and 1,440,332 live in the Gaza Strip.

<sup>&</sup>lt;sup>1</sup> Land area used in the Ottoman Empire and representing the amount of land that can be plowed in a day; its value varied from 900–2500 m<sup>2</sup>. In many formerly Ottoman regions, it is now defined as exactly one decare (1000 m<sup>2</sup>) (Wikipedia)



Figure 1. Population distribution in PalestinianTerritories

The population growth rate is approximately 2.82% per year; although this represents significant growth in population, the birth rates from 1997 to 2008 have actually declined.

### 1.1. Demographic Characteristics

In 1948, the Gaza Strip had a population of less than 100,000 people. By 2007, approximately 1.4 million Palestinians lived in the Gaza Strip, of whom almost one million were UN-registered refugees. The current population is estimated to be in excess of 1.5 million, distributed across five Governorates. GazaCity, which is the biggest governorate, has about 400,000 inhabitants. The two other main Governorates are Khan Younis (population 200,000) in central Gaza, and Rafah (population 150,000) in the South. The majority of people live in refugee camps<sup>2</sup>.

### Table 1. Population and density by area

Region/Governorate	Area (km2)	Population End of year 2009		Population Density (Person/Km2
		No	%	
North Gaza	61	291,758	19.3	4.783
Gaza	74	526,793	34.9	7.119

<sup>2</sup>Environmental Assessment of Gaza Strip, following the escalation of hostilities in December 2008 – January 2009 United Nations Environment Programme

Region/Governorate	Area (km2)	Population End of year 2009		Population Density (Person/Km2
Deir El Balah	58	219,336	14.5	3.782
Khan Yunis	108	287,511	19.0	2.662
Rafah	64	185,570	12.3	2.900
Total Strip	365	1,510,968	100.0	4.139

Source: Palestinian Statistical Year Book, Volume 10, 2009, Palestinian Central Bureau for Statistics

## 1.2. Population and gender distribution

The population of the Gaza Strip according to 2011 statistics is around 1,500,000<sup>3</sup>. As could be observed from the table below, the population growth in Gaza is high and was observed to increase during the last five years. The population projection calculated by the Feasibility Study was based on the assumption that a gradual decline in the population growth rate will be seen starting in 2012. It is anticipated that population growth will reach 1.11% by2040, after peaking at 3.5% in 2011.

# Table 2. Population Distribution by Gender and year

Year	Male Female Total		Female		Total
	No	%	No	%	Number
Year 2007	708147	50.74	687573	49.3	1395720
Year 2008	730882	50.74	709450	49.3	1440332
Year 2009	754561	50.75	732255	49.2	1486816

Source: Palestinian Statistical Year Book, Volume 10, 2009, Palestinian Central Bureau for Statistics

The population distribution in the GazaStrip shows that 13.2% of the total population of the Palestinian Territories lives in Gaza Governorate; followed by 7.3% living in North Gaza;7.2% in Khan Younis;5.5% in Deir El Balah;and 4.6% in Rafah.

## Table 3 Percentage Distribution of Population in the PalestinianTerritories by Region and Governorate (Mid year 2007-2009)

Pagion / Covernerate	Year				
Region/Governorate	2007	2008	2009		
Jenin	6.8	6.8	6.8		
Tubas	1.3	1.3	1.3		
Tulkarim	4.3	4.2	4.2		
Nablus	8.5	8.5	8.4		
Qalqiliya	2.4	2.4	2.4		
Salfit	1.6	1.6	1.6		
Ramallah & Al Bierah	7.4	7.4	7.4		

Annex 9

Design /Course anota	Year			
Region/Governorate	2007	2008	2009	
Jerico& El Aghwar	1.1	1.1	1.1	
Jerusalem	9.8	9.6	9.5	
Bethlehem	4.7	4.7	4.7	
Hebron	14.6	14.7	14.8	
West Bank	62.5	62.3	62.2	
North Gaza	7.1	7.2	7.3	
Gaza	13.2	13.2	13.2	
Deir El Balah	5.4	5.5	5.5	
Khan Yunis	7.2	7.2	7.2	
Rafah	4.6	4.6	4.6	
Gaza Strip	37.5	37.7	37.8	
TotalPalestinianTerritories	100	100	100	

North Gaza Emergency Sewage Treatment Project (NGESTP) Effluent Recovery and Reuse System and Remediation works



Source: Palestinian Statistical Year Book, Volume 10, 2009, Palestinian Central Bureau for Statistics

### 1.3. Age Structure

Age structure is a graphical illustration that shows the distribution of various age groups in a population (typically that of a country or region of the world), which forms the shape of a pyramid when the population is growing. It is also used in Ecology to determine the overall age distribution of a population; an indication of the reproductive capabilities and likelihood of the continuation of a species<sup>4</sup>. Reviewing the age structure in the PalestinianTerritories, it canbeconcluded that the community has the potential for rapid, continuous growth.



Figure 2 Population pyramids for PalestinianTerritories

#### Source: Palestinian Statistical Year Book ,Volume 10, 2009, Palestinian Central Bureau for Statistics

The detailed distribution of the population by age category shows that the difference according to gender is to some extent limited, not exceeding 0.2% in total. The diversity according to gender is limited in all age categories. Taking into consideration that two thirds of the population is under 25 years old, there will be increasing demand for waste recovery.

<sup>&</sup>lt;sup>4</sup>http://en.wikipedia.org/wiki/Population\_pyramid

	Gender			
Age Categories	Males	Females	Total	
0-4	14.8	14.7	14.8	
5-9	13.9	13.8	13.9	
10-14	13.3	13.2	13.3	
15-19	12.1	11.9	12	
20-24	9.6	9.5	9.5	
25-29	7.6	7.5	7.5	
30-34	6.4	6.4	6.4	
35-39	5.4	5.4	5.4	
40-44	4.6	4.5	4.5	
45-49	3.8	3.6	3.7	
50-54	2.7	2.6	2.7	
55-59	1.9	1.9	1.9	
60-64	1.3	1.5	1.4	
65-69	0.9	1.2	1.1	

Table 4.	Percentage di	stribution fo	or population	in the Pal	estinianTerrito	ries by Age
groups a	nd Gender (M	id year 2009)	)			

Source: Palestinian Statistical Year Book, Volume 10, 2009, Palestinian Central Bureau for Statistics

0.7

0.5

0.5

100

0.9

0.7

0.7

100

#### 1.4.Birth Rate

Total Palestinian Territories

70-74

75-79

80+

The total fertility rate in the occupied Palestinian Territories was 4.6 in 2009 (4.1 in the West Bank and 5.3 in the Gaza Strip), which is comparatively high in the region. In terms of pregnant women, four out of 10 attend antenatal care while virtually all women deliver in health institutions.<sup>5</sup>

### 1.5. Death Rate

The four leading causes of deaths in the occupied Palestinian Territories are noncommunicable diseases such asheart diseases, cerebra-vascular diseases, cancer (led by trachea, colo-rectal and anal cancer) and inflammations of the respiratory system.

The infant mortality rate has shown little improvement in recent years (25.34 per 1000 live births: 22.9 per 1000 live births in the West Bank, 28.8 per 1000 live births in the Gaza Strip). The main causes of death among infants are pneumonia and other respiratory

0.8

0.6

0.5

100

<sup>&</sup>lt;sup>5</sup>Health conditions in the occupied Palestinian Territories, including east Jerusalem, and in the occupied Syrian Golan, WHO, SIXTY-FOURTH WORLD HEALTH ASSEMBLY A64/27-Provisional agenda item 15,2011

disorders (34.5%), congenital malformations (16.3%) followed by prematurity and low birth weight (13.4%).

There were 30 maternal deaths in 2008 and 2009 in the Gaza Strip, and 23 maternal deaths in 2009 in the West Bank, indicating a maternal mortality ratio of 29 per 100 000 live births in the Gaza Strip and 36.4 per 100 000 live births in the West Bank.4 Many pregnant women suffer from anemia (45% of pregnant women in the Gaza Strip and 20.6% in the West Bank). About a third of newly pregnant women are immunized against tetanus in the West Bank<sup>6</sup>.

### 1.6. Rate of Natural Increase

The total fertility rate in the Palestinian Territories has declined with 4.6 births per thousand in 2007 compared to 6.0 births in 1997. Regional disaggregation indicates that the birth rate in the West Bank was 30.6 births compared to 35.6 births in the Gaza Strip in 2008. As Table 4 .4.illustrates, the majority of the population isunder 25 years old. The natural increase in the Gaza Strip is higher than that in the West Bank. General notice was that Gaza is increasing steadily while the West Bank is decreasing with the same percentage. The proposed project mayserve a population as much as 10% higher than current numbers.

# Table 5.Estimated annual growth rates in the Palestinian Territories (Mid-year 2007-2009)

Year	Palestinian Territories			
	West Bank	Gaza Strip	Total	
Year 2007	2.66	3.2	2.86	
Year 2008	2.65	3.23	2.87	
Year 2009	2.65	3.25	2.88	

Source: Palestinian Statistical Year Book, Volume 10, 2009, Palestinian Central Bureau for Statistics

### 2. Gaza Strip Living Conditions

### 2.1. Household Size and Density

The average family size is one of the important indicators relevant to population growth. As could be observed from the table below, there is generally a high tendency for large family sizes that exceed seven persons. This observation supports the increase in the population growth rate during the last 5 years. This tendency is expected to affect the population growth rate during the coming years. Due to the absence of structured systems or interventions (e.g. family planning programmes) to tackle the large population growth, it is predicted that the preference for large family sizes will keep increasing the potential forhigh population growth. Overall, the average household size is 5.8 in the Palestinian Territories, with the average household in the West Bank having 5.5 members, compared to6.5 in the Gaza Strip<sup>7</sup>.

 <sup>&</sup>lt;sup>6</sup>Health conditions in the occupied Palestinian Territories, including east Jerusalem, and in the occupied Syrian Golan, WHO, SIXTY-FOURTH WORLD HEALTH ASSEMBLY A64/27-Provisional agenda item 15,2011
 <sup>7</sup> Palestinian Human Development Report 2009/10
Table 6.	Percentage distribution	of households b	y household s	ize average ho	usehold
size and	l region				

Household size	Palestinian Territories		
	West Bank	Gaza Strip	Total
1 person	3.6	2.3	3.2
2 persons	8.5	7.2	8.1
3 persons	9.8	6.8	8.8
4 persons	12.3	10.9	11.8
5 persons	14.1	11.6	13.2
6 persons	16.8	12.6	15.4
7+ person	34.9	48.6	19.5
Average household size 2009	5.6	6.3	5.8

Source: Palestinian Statistical Year Book, Volume 10, 2009, Palestinian Central Bureau for Statistics

The analysis of the density by region showed that the Gaza Strip is of higher density than the West Bank, as about 45% of the Gazapopulation lives with more than 2 persons per room, while only 35.5% in the West bank are of the same category. Those who are less than 1 person perroom represented 14.8% of the West Bank, while the same category represented11.0% of the Gaza Strip.



#### Figure 3.Percentage distribution of households by household density and region

#### Source: Palestinian Statistical Year Book , Volume 10, 2009, Palestinian Central Bureau for Statistics

Literature reviews and meetings with resource persons showed that the family structure in Gaza is witnessing a shift from the domination of the extended family to a higher level of prevalence for the nuclear families which constitutes now more than 80% of the family structure in the Gaze Strip(PCBS, 2010).

#### 2.2. Type of Residence

One of the main indicators ofliving conditions and welfare of families is the type of dwelling. It is notified that the majority of the population (68.1%) in the Gaza Strip live in a house

(that is a typical Palestinian type of residents), followed by 22.8% in larger residential buildings.

The majority of people use their units exclusively for living purposes (75.3%). 10.7% use the dwelling for both habitation and work, and 8.4% of the dwellings are used for work only.



Figure 4.Percentage distribution of dwelling by type of building

Source: Palestinian Statistical Year Book , Volume 10, 2009, Palestinian Central Bureau for Statistics

Type of		Utilization of the building						
building	Total	Habitation	Habitation	Work	Closed	Vacant	Deserted	Not
			& WOLK					stated
Villa	1088	916	31	0	88	52	1	0
House	97538	83388	6266	924	3498	2763	699	0
Building	32677	22845	8915	264	329	276	48	0
Tent	162	158	2	0	2	0	0	0
Marginal	801	453	29	284	35	0	0	0
	10858	0	16	10552	194	66	30	0
Establishment								
Other	67	31	1	14	21	0	0	0
Total	143191	107791	15260	12038	4167	3157	778	15
%	100	75.3	10.7	8.4	2.9	2.2	0.5	0.0

Table 7. Dwelling by type of building, region and utilization 2007 in Gaza Strip

Source: Palestinian Statistical Year Book, Volume 10, 2009, Palestinian Central Bureau for Statistics

#### 2.3. Ownership of Residence

The ownership of the house can be an important indicator of the socio-economic characteristics of the household. In the Gaza Strip the vast majority of the population owns their houses (91.6%), while only 4.7% rent their dwelling. In this case, ownership does not

necessarily reflect high socio-economic status of the community, but may instead reflect a custom and tradition of the community which encourages private ownership.



Figure 5. Percentage distribution of households by tenure of housing unit in Gaza Strip

Source: Palestinian Statistical Year Book ,Volume 10, 2009, Palestinian Central Bureau for Statistics

#### 3. Access to Basic Services

Regarding access to basic services, the government of Palestine gives a large proportion of its attention to water supply. Connectivity to the public water system was around 88% in 2008 and 2009.

Electricity coverage ismuch higher, as almost all households areconnected to the public electricity network. However, the continuity of electricity is affected byfuel supply problems.

Only 52.1% of households have access to the public sewage network. A detailed discussion of the type of sewage disposal used will be presented later.

The fourth basic service is the telephone lines, which serve 42.2% of the total households in the Palestinian Territories.



Figure 6. Percentage distribution for access to basic services in Palestinian Territories

#### Source: Palestinian Statistical Year Book, Volume 10, 2009, Palestinian Central Bureau for Statistics

The 2011 Household Environmental Survey (HES 2011) reported that 91.8% of the population of the Palestinian Territories has access to water supply. That proportion is higher in the Gaza Strip, at 96.3%. This is a good indication of the increasing installation of water supply in the Gaza Strip.

Water is one of the most challenging issuesaffecting environmental sustainability in thePalestinian Territories. The global Human Development Report2006 noted that Palestinians, especially in Gaza, experience one of thehighest levels of water scarcity per capita in the world, with physical availability and governance of shared water contributing to this shortage.

The unequal sharing of the aquifers below the West Bank between Israel and thePalestinian Territoriesis stark:average per capita water use by Israeli settlersin the West Bank is some nine times higherthan by Palestinians. With only 13% of allwells in the West Bank, settlers account for 53% of groundwater extraction. The management of the western and coastalaquifers further demonstrates the problem. Part of the Jordan Basin, the western aquifer is the single most important source of renewable water for the Palestinian Territories. Nearly three quarters of the aquifer is recharged within the West Bank and flowsto the coast of Israel. Much of the quantity andalso depth of wells. Per capita accessto water resources in the West Bank for Palestinians is a quarterof that for Israelis, and it is declining. Thereare similar problems with the waters from theCoastal Basin, which barely reach the Gaza Stripbecause of the high rates of extraction on theIsraeli side.

It is estimated that the over-abstraction of the Coastal Basin-to approximately double the sustainable limit in 2000-is now reaching dangerous levels. Only 5% to 10% of

theaquiferyields quality drinking water. The lowering of the water table coupled with increased salinization via sea water intrusionand pollution by raw sewage compromises both the quality and quantity of available water. (UNDP (2006) 'Beyond scarcity: Power, poverty and the global water crisis', Human Development Report. The Water Crisis in the Occupied Territories and its Resolution in the Final-Status Agreement Position Paper', 10)

The main contaminants in the water resources n the Gaza Strip are nitrates, chlorides, salinity, and potentially, fecal coliforms and fecal streptococcus. The Palestinian HydrologyGroup contends that the current pollutant rates are four times higher than the 2005 figures.

The main source of potable water in Palestinian Territories is the public water network.91.8% of the total population has access;89.4% in the West Bank and96.3% in the Gaza Strip. Water tanks and wells made up 9.2% of the total sources in the West Bank, while it was only 1.7% in the Gaza Strip.

Table 8. Percentage distribution of households in the Palestinian Territories by themain mean of obtaining water and region 2011

Region	Public Water Network	Water tanks	Domestic well	Other	Total
	%	%	%	%	%
Palestinian Territories	91.8	3.4	2.0	2.8	100
West Bank	89.4	4.7	4.5	1.4	100
North of West Bank	87.5	6.1	5.4	1.0	100
Middle of West Bank	97.8	0.5	0.6	1.1	100
South of west Bank	83.1	8.4	8.0	0.5	100
Gaza Strip	96.3	1.4	0.3	2.0	100

Source: PCBS: Household Environmental Survey 2011

The quality of water supply reflects not only the living conditions of the households but also their health status. The Gaza Strip experiences low quality of water, as only 5.3% of households reported good water quality, compared to 70.9% of the West Bank.

## Table 9. Percentage distribution of households in the Palestinian Territories by theHousehold evaluation of water quality and region, 2011

	Household evaluation of water quality				
	Good	Fairly good	Bad	Total	
	%	%	%		
Palestinian Territories	47.2	37.9	14.9	100	
West Bank	70.9	23.9	5.2	100	
North of West Bank	60.9	32.5	6.6	100	
Middle of West Bank	81.2	13.6	5.2	100	
South of west Bank	72.7	24.0	3.3	100	
Gaza Strip	5.3	62.8	31.9	100	

Source: PCBS: Household Environmental Survey 2011

### 4. Health Conditions and Handicapped

The discussion of health conditions in the project areas is somewhat difficult due to the scarcity of secondary non-aggregated data. The study team mainly relied upon the WHO report on health conditions in the occupied territories as source for generic information. More detailed information might be presented during the discussion of field results.

### 4.1. Health Status

Overall life expectancy is 70.5 years for males and 73.2 years for females. The population of the occupied Palestinian Territories grows at a rate of 2.9% (2.6% in the West Bank and 3.3% in the Gaza Strip). The crude birth rate declined over the last decade from 42.7 in 1997 to 29.6 in 2008. Many pregnant women suffer from anemia (45% in the Gaza Strip and 20.6% in the West Bank). About a third of newly pregnant women are immunized against tetanus in the West Bank.

The infant mortality rate has shown little improvement in recent years (25.34 per 1000 live births: 22.9 per 1000 live births in the West Bank, 28.8 per 1000 live births in the Gaza Strip). The main causes of death among infants are pneumonia and other respiratory disorders (34.5%), congenital malformations (16.3%) followed by prematurity and low birth weight (13.4%).

Despite the apparent difficulties that Palestinians faced over the reporting period, the WHO considers the general health status of the Palestinian Territories to be "commendably reasonable". Malaria has been all but eradicated, incidences of HIV/AIDS are very low and the population is largely free of poliomyelitis, tuberculosis, and measles due to a series of successful immunization programmes. Palestinians are undergoing rapid epidemiological transition. Non-communicable diseases have overtaken communicable diseases as the main causes of morbidity and mortality.

The WHO, the Gaza Community Mental Health Project, and the Ministry of Health report that poor mental health is an increasing concern in the Palestinian Territories, particularly in the aftermath of Operation Cast Lead. A study from the Institute of Community and Public Health at Birzeit University noted that respondents demonstrated high levels of fear, threats to personal and family safety, loss of incomes, homes, and fear about their future and the future of their families. Respondents also reported feeling *hamm*, meaning heaviness from worry, anxiety, grief, sorrow and distress, frustration, incapacitation and anger.

The UNDP's Social Development Assessment in Gaza highlights shortcomings in psychosocial support – for children, but also for adults – in the aftermath of Operation Cast Lead. It was found that while there has been some psychosocial support for children provided through the educational system and via child focused agencies, there has been a paucity of support for adults with no focus on older persons. Older people consistently expressed feelings of fear, insecurity and anxiety immediately following the hostilities which have not been alleviated in the present. Their lack of emotional wellbeing is largely focused on concerns about the future resurgence of hostilities. As noted by a male Focus Group Discussion participant: "...the most important concern to us as older people is the insecurity; every moment we expect another attack, we are afraid that our children will be killed...I am 62 years old and

have lived through three wars during my life, yet I have not lived through such a war as this one. It is the worst – missiles fell on us like rain."

After significant progress from 1990 to 2000, the reduction of the under-five mortality rate was slow during the period 2000 to 2008: in 2006 and 2007 the rate of 27 deaths per 1,000 live births was the same as in 1990.In 2008 the WHO documented a rate of 28.2 deaths per 1,000 indicating a regression in child mortality figures The lack of progress during the reporting period, coupled with this deterioration, reflects declining health conditions The Gaza Strip has historically had a higher child mortality rate than the West Bank. The Palestinian Millennium Development Goals Progress Report noted that mortality rates in the Gaza Strip

### 4.2. Access to Health Services

The Ministry of Health, UNRWA, nongovernmental organizations and private, commercial organizations constitute the four main health providers of health services. The following health facilities are reported:

- Ministry of Health runs 59 primary health care centers in the Gaza Strip and 381 in the West Bank.
- UNRWA operates 18 primary health care centers in eight refugee camps in the Gaza Strip and 41 centers in the West Bank.
- The non-governmental organization sector manages 194 primary health care centers and general clinics (57 in the Gaza Strip, 137 in the West Bank).

There are 75 hospitals in the occupied Palestinian Territories (50 in the West Bank, 25 in the Gaza Strip), with a total of 5058 beds in government and nongovernment hospitals. Almost three quarters of them are general beds, 16.0% specialized beds, 3.8% beds for rehabilitation and 7.5% maternity beds. Overall, there are 12.9 beds per 10,000 populations (12.7 beds in the West Bank and 13.5 beds in the Gaza Strip)<sup>8</sup>.

The Ministry of Health, with the support of donors, has continued to develop the scope and range of public health services in the West Bank. The hospital sector in particular has benefited from significant investment in infrastructure and equipment with several hospitals being rehabilitated and services developed. The Ministry of Health has also sought to strengthen its institutional and governance capacity, not least by further efforts to improve the planning process. However, the Palestinian health-care system continues to face many challenges. These include restriction of movement and access to health services. Movement within the West Bank has become a little easier over the past year as a result of the removal of some of the checkpoints, but many checkpoints and closures still remain. There are particular difficulties of access to east Jerusalem, where the maintertiary health services are provided. Administrative restrictions also have an impact on the provision of health care in rural areas classified as "Area C" under the Oslo Accords.

<sup>&</sup>lt;sup>8</sup>Palestinian Ministry of Health, Health Annual Report Palestine.; Palestinian Health Information Centre, 2010

In the Gaza Strip, the provision of adequate health services to the population continues to be severely affected both by the Israeli blockade and Palestinian internal political divisions between the West Bank and the Gaza Strip. While the hospitals and primary care clinics in the Gaza Strip continue to function, they face multiple challenges. For example, there have been growing shortages of essential drugs and consumables: 38% of essential drugs were out of stock at central store level at the beginning of January 2011. Recurrent power cuts and an unstable power supply have adversely affected medical care: sensitive medical equipment is damaged, supportive services have had to be suspended, treatments can be interrupted or need to be postponed. The functionality of medical equipment has also been deteriorating because of inadequate maintenance capacity and lack of spare parts (although a programme supported by the Government of Italy and WHO has been seeking to address this).

Many qualified health staff are not working because of the factional divide. It is also difficult to maintain or upgrade the professional knowledge and clinical skills of health staff because the Israeli restrictions on the movement of people in and out of the Gaza Strip prevent access to appropriate health care and up-to-date education and training. The closure of the Gaza Strip is undermining the functioning of the health-care system, hampering the provision of medical supplies and the training of health staff and preventing patients with serious medical conditions from receiving timely specialized treatment outside the Gaza Strip<sup>9</sup>.

A total of 8161 patients were referred to treatment outside the occupied Palestinian Territories in 2009: 3399 patients came from the West Bank and 4762 from the Gaza Strip.

### 4.3. Water Quality and Diseases

There is a high incidence of water related diseases. Water-borne disease is a major problem for Palestinians, creating substantial costs and losses. Epidemiological data isuneven, but there are many anecdotal stories of water related disease. In Nablus, for example, PWA explains: "We have a project to rehabilitate the waste water treatment plant. It is sorely needed. Yesterday 65 cases of diarrhea were treated in the hospitalthere." At Burin near Nablus, there were recently 450 cases of Hepatitis A. Students in school were infected. The health impacts on smaller communities unconnected to the network, and for people living in Area C are particularly harsh.

The health impacts can be gauged by the high incidence of diarrhea amongst infants, and the health costs of poor water and sanitation services have been estimated at 0.4% of GDP.

The 2006 PAPFAM survey found that 12% of children under 5 had suffered from diarrhea in the two weeks preceding the survey. Diarrheal conditions are strongly associated with water quality, hygiene and sanitation. Some 54% of these cases had necessitated a medical consultation.

Extrapolating from the nature and cost of the medical treatments involved and without accounting for the losses of adult productivity, it has been estimated that the annual cost of

<sup>&</sup>lt;sup>9</sup>Palestinian Ministry of Health, Health Annual Report Palestine; Palestinian Health Information Centre, 2010

the health impacts of poor water and sanitation on children 5-year old or less, is 20 million, equivalent to 0.37% of GDP

### 5. Human Development Profile

#### 5.1. Literacy Rate and Educational Attainment

As could be observed from the table below, the literacy level is generally high in the Gaza Strip,reaching almost95% of the population above 15 years of age. Gender discrepancy is not significant, except in the groups above 45 years of age. This could be attributed to an increased level of awareness of the importance of girls' education.

## Table 10. Literacy Rates of Gaza Strip Population (15 Years and Above) by Age Groups and Sex, 2009

Age group	% of literate persons from the population of the age group			
	Male	Female	Total	
15 – 19	99.3	99.2	99.2	
20 - 24	99.1	98.6	98.9	
25 - 34	98.5	98.3	98.4	
35 - 44	98.7	96.4	97.6	
45+	91.4	70.4	80.6	
Total	97.4	92.4	94.9	

Source: Palestinian Annual Statistics Book (version 11), PCBS

The level of attained education is shown in the figure below. As could be observed, the largest portion of literate population attained preparatory education 36.0%, followed by the secondary education certificate 25.0%. Here there is relatively high gender equity as well, with similar percentages of men and women attaining various educational degrees.



Source: Palestine Annual Statistics Book (version 11), PCBS

Figure 7. Percentage Distribution of Gaza Strip Population (15 years of age and above) by Educational Attainment and Sex, 2009 in Gaza Strip

### 5.2. Employment Status

The general unemployment rate in the Palestinian Territories is considered high,at24.5% of the labor force. Unemployment in Gaza is double the rate in the West Bank (38.6% versus17.8% in 2010). Gaza City has the lowest unemployment rate in the Gaza Strip at  $31\%^{10}$ .

Unemployment is slightly higher for women than men in the Palestinian Territories (26.4% versus 24.1%). However, the gap is relatively high in the Gaza Strip as 37.3% of males are unemployed, whereas 45.8% of females are not working.

The various sources of literature and the field observations showed that temporary modes of employment are dominant in Gaza market. Most of the jobs are characterized by daily wages and short term contracts. The national statistics for thePalestinian Territories showed a rise in the daily wage rates for workers in 2010, most notably in the West Bank. It also showed a modest increase in Gaza; where daily wages average remain only about 70% of wages in the West Bank. In 2010, the average daily wage recorded was NIS 59.5 per day, with a low average wage of around NIS 55 per day in Khan Younis and a high average wage of NIS 71 per day in Rafah. Although this might be a relatively high wage rate compared to the case in other developing countries, the rate is still too low to allow families to meet the basic needs and daily demands given the relatively high prices as a result of the blockade and severe economic restrictions. More information about labor status is presented below.

	Year		
Labour force status and gender	2007	2008	2009
Total Population			
In labor force	41.7	41.2	41.6
outside labor force	58.3	58.8	58.4
Total	100	100	100
Full employment	70.3	66.5	69.6
Under employment	8	6.9	5.9
Unemployment	21.7	26.6	24.5
Total	100	100	100
Males			
In labor force	67.1	66.6	67.1
outside labor force	32.9	33.4	32.9
Total	100	100	100
Full employment	68.5	64.9	69.1
Under employment	9.2	7.9	6.8
Unemployment	22.3	27.2	24.1
Total	100	100	100

## Table 11. Percentage distribution of population (15 years and above) in the Palestinian Territories by gender and labor force status year 2007-2009

<sup>10</sup> Socioeconomic Report, January 2011, UNSCO

#### North Gaza Emergency Sewage Treatment Project (NGESTP) Effluent Recovery and Reuse System and Remediation works

Annex 9

	Year		
Labour force status and gender	2007	2008	2009
Females			
In labor force	15.7	15.3	15.5
outside labor force	84.3	84.7	84.5
Total	100	100	100
Full employment	78.6	73.7	71.3
Under employment	2.4	2.1	2.3
Unemployment	19	24.2	26.4
Total	100	100	100

# Table 12. Percentage distribution of population (15 years and above) in the Palestinian Territories by gender and labor force status

	Palestinian Territories	Region	
Labour force status and gender		West Bank	Gaza Strip
Total Population			
In labor force	41.6	43.8	37.6
outside labor force	58.4	56.2	62.4
Total	100	100	100
Full employment	69.6	76	55.9
Under employment	5.9	6.2	5.5
Unemployment	24.5	17.8	38.6
Total	100	100	100
Males			
In labor force	67	69.5	62.5
outside labor force	33	30.5	37.5
Total	100	100	100
Full employment	69.1	75.1	57
Under employment	6.8	7.3	5.7
Unemployment	24.1	17.6	37.3
Total	100	100	100
Females			
In labor force	15.5	17.4	12.2
outside labor force	84.5	82.6	87.8
Total	100	100	100
Full employment	71.3	79.7	50
Under employment	2.3	1.5	4.2
Unemployment	26.4	18.8	45.8
Total	100	100	100

#### 5.3. Economic Wellbeing

With a growing population and a shrinkingeconomy, real GDP per capita is close to 30% below 1999 levels. The overall economicpicture is one of negative growth. PCBS estimates that the GDP in 2006 had a negative growth rate of 6.6 %. It estimates that real GDP growth in 2007 was a mere 0.5%, while results from the first quarter suggest that growth in 2008 slightly negative. Similarly, the International Monetary Fund recorded a drop in GDP of 0.5 % in 2007, and a modest growth of 0.8 % in 2008. This is probably due to acontinued yet marginal drop in economic activity in Gaza, given its alreadylow base, matchedwith a modest rise in economic activity in the Palestinian Central Bureau of Statistics (2007) 'Economic forecasts for 2007'. These figures are representative of already severely limited economic activity beforeOperation Cast Lead, as it resulted in the destruction of significant remaining economicassets, which means that further decline is inevitable.

The International Financial Institutions highlightthat, even more troubling than the negative growthrates over the past few years, is the changingcomposition of the economy: as GDP is increasinglydriven by government and private consumption donor aid and remittances respectively,investments have fallen to dangerously low levels,leaving little productive base for a self-sustainingeconomy. The Palestinian economy is but stressedby enormous infusions of foreign aid: in 2008, budget support alone increased by nearly 80% fromits 2007 level, and at close to USD 1.8 billion, wasequivalent to about 30% of GDP. By comparison, in2007 the estimated recurrent and developmentalbudget support added up to 5% of GDP. This, inpart, reflects the 'West Bank first' policy pursued by the international community in the aftermath ofHamas's takeover of the Gaza Strip. The cost of living in the Palestinian Territories rose significantly over the reporting period.

The poverty rate according to the monthly consumptions of individuals in the Gaza Strip has decreased from around 50% in 2007 to 33% in 2009. However, the poverty rate using the same indictor of monthly consumption is much higher in the Gaza Strip than in the West Bank,recorded at 20% and 15% in 2007 and 2009 respectively. However, the Palestinian Human Development Report, using different poverty indicators, showed that about 34.5% are under the poverty line in Palestinian Territories. This percentage is reduced in the West bank to 23.6%, and increased to 55.7% in the Gaza Strip.

			Year	
Year	2004	2005	2006	2007
Total	25.6	29.5	30.8	34.5
Male	26.0	29.8	30.3	34.5
Female	21.0	25.0	35.6	34.5
Urban	24.4	24.9	29.3	33.1
Rural	24.6	32.5	29.5	30.3
Camps	31.6	39.9	38.6	47.7
Gaza Strip	37.2	43.7	50.7	55.7
West Bank	19.8	22.3	24	23.6

#### Table 13 Proportion of population below national poverty line

Source: Human Development Report 2009/10

It should be noted that poverty in Gaza is not limited to low levels of income. It is rather characterized by serious shortfalls in other dimensions. There is a serious level of insecurity of income, food, access to infrastructure and vulnerability resulting from the strong reliance on external assistance, with very limited ability to attain sustainability of livelihoods for a large portion of households. Many families aresuffering from the consequences of war and blockade, and are generally overwhelmed by the economic and political situation<sup>11</sup>.

The high level of poverty was clearly observed during the field work conducted as part of the ESIA. Some of the observations include the domination of short term employment modes and the high rate of unemployment among youth including university graduates, in addition to the various social implications on the household level. These observations are thought to be the key causesof poverty and insecurity issues. There are several other signs that demonstrate poverty amongst the households; one example is the irregularity of paying the charges of various types of services including electricity, water and SWM. This was observed during surveys and other field investigation activities. This is partially attributed to the families' inability to pay these charges.

### 5.4. Economic Activities

Regarding the main sector of work, the data showed that the majority of employees work in services (63.3%), while people working in commerce, hotels and restaurants are only 18.3%. The diversity according to gender is relatively high as 86.6% of the females work in services sector, while 59.6% of males work in the same sector. However, 20.7% of the males work in commerce versus null of the females in the same field.

## Table14 Percentage Distribution of Employed Persons from Gaza Strip by Economic Activity and Sex, 2009

Economic Activity	Percentage of the work force		
	Male	Female	Total
Agriculture, hunting and fishing	6.5	5.6	6.4
Mining, quarrying and manufacturing	5.9	2.0	5.4
Construction	1.0	-	0.9
Commerce, hotels and restaurants	20.7	4.1	18.3
Transportation, storage and	6.3	1.7	5.7
communication			
Services and other branches	59.6	86.6	63.3
Total	100	100	100

Source: Palestine Annual Statistics Book (version 11), PCBS

<sup>&</sup>lt;sup>11</sup> Living Conditions in Gaza Strip, during and after Israel's military campaign in the winter of 2008/2009 Evidence from interviews with 2,000 households, UNFPA, 2009

#### 6. Sewage Status in the Gaza Strip

#### 6.1. Sewage Generation

The sewage is mainly generated from the households' consumption of water supply, which is about 17 million cubic meters. It is divided as follows: 11 million to the West Bank and 6 million to the Gaza Strip. Regarding the consumption ratio for water, it is 23m<sup>3</sup> in the Palestinian Territories: 23.6 m<sup>3</sup> in the West Bank and 24.3m<sup>3</sup> in the Gaza Strip

#### Table 15 Amount of consumed water in the household sector in Palestinian Territories (1000m<sup>3</sup>) and household monthly average consumption of water (m<sup>3</sup>) by region, 2011

	Household monthly average consumptions	Amount of consumed water in the household sector (thousand cubic meter)
Palestinian Territories	$23.8m^{3}$	$17.032.5 \text{ m}^3$
West Bank	$23.6 \text{ m}^3$	$11.063.0 \text{ m}^3$
North of West Bank	$23.4 \text{ m}^3$	$4.422.7 \text{ m}^3$
Middle of West Bank	$29.7 \text{ m}^3$	4.247.1 m <sup>3</sup>
South of west Bank	$17.5 \text{ m}^3$	$2.393.2 \text{ m}^3$
Gaza Strip	$24.3 \text{ m}^3$	$5.969.5 \text{ m}^3$

Source: PCBS Household Environmental Survey 2011

#### 6.2. Wastewater networks and disposal

One of the main sources of wastewater is disposal from the public sewage network, which might reach 60.9% in the urban areas among which 47.0% live in the West Bank and 83.3% in urban areas in the Gaza Strip. However, the connectivity among those who live in rural areas is 10.3%. The highest connectivity rate reported was in the camps 90.9%. Yet, the Gaza Strip was of the highest connectivity ratio to the wastewater network which is 83.1% in total.



Source: PCBS: Household Environmental Survey 2011

Figure 8. Wastewater disposal method

Table 16. Percentage distribution of households in the Palestinian Territories by the
wastewater disposal method and region, 2011

	Disposal method of wastewater						
	Wastewater	Porous	Tight	Others	Total		
	network	cesspit	cesspit				
	%	%	%	%			
Palestinian Territories	55.0	39.0	5.3	0.7	100		
West Bank	40.2	51.1	7.5	1.2	100		
North of West Bank	40.0	49.8	9.8	0.4	100		
Middle of West Bank	49.1	38.2	11.8	0.9	100		
South of west Bank	31.3	66.5	0.0	2.2	100		
Gaza Strip	83.1	15.8	1.1	0.0	100		

Source: PCBS: Household Environmental Survey 2011

Table 17. Percentage distribution of households in the Palestinian Territories by the wastewater disposal method region, and locality type, 2011

	Disposal method of wastewater							
	Wastewater	Porous	Tight	Others	Total			
	network %	cesspit %	cesspit	%				
			%					
Palestinian Territories	55.0	39.0	5.3	0.7	100			
Urban	60.9	34.7	3.8	0.6	100			
Rural	10.3	74.0	14.5	1.2	100			
Camps	90.9	8.4	0.6	0.1	100			
West Bank	40.2	51.1	7.5	1.2	100			
Urban	47.0	46.5	5.4	1.1	100			
Rural	8.8	74.5	15.4	1.3	100			
Camps	90.5	8.6	0.6	0.3	100			
Gaza Strip	83.1	15.8	1.1	0.0	100			
Urban	83.3	15.5	1.2	0.0	100			
Rural	34.5	65.5	0.0	0.0	100			
Camps	91.2	8.2	0.6	0.0	100			

Source: PCBS: Household Environmental Survey 2011

Table 18. Selected indicators of the household environment in the PalestinianTerritories during years 2004, 2006,2008,2009,2011

Indicator	2004	2006	2008	2009	2011
Percentage distribution of households by:					
Availability of public network water	89.2	88.6	88.2	88.4	91.8
Quality of households water	-				
Good	63.0	50.6	45.6	48.1	47.2
Fairly Good	27.5	26.3	30.3	23.7	37.9
Bad	9.5	23.1	24.1	28.2	14.9

Indicator	2004	2006	2008	2009	2011
Wastewater disposal method					
Wastewater network	42.9	45.3	45.5	52.1	55.0
Tight or porous cesspit	56.1	54.0	53.7	47.2	44.3
Others	1.0	0.7	0.8	0.7	0.7
Exposure to smell					
Seldom or no smell	79.6	73.6	76.6	76.4	72.2
Sometimes	10.3	11.0	12.3	8.3	12.1
Very often	10.1	15.4	11.1	15.3	15.7

Source: PCBS: Household Environmental Survey 2011

Regarding exposure to smells it was notified that 15.7% of the total population reported facing a smell problem. These odor problems often occur at irregular times.

Table 19. Percentage distribution of households exposed to smell in the Palestinian Territories by time of exposure and region, 2011

	Time of exposure							
	6 AM- 12	12 PM-8	8 PM- 6	No	Total			
	$\mathbf{PM}$	$\mathbf{PM}$	AM	specific				
	%	%	%	time %				
Palestinian	7.4	6.0	21.1	65.5	100			
Territories								
West Bank	10.3	7.2	13.7	68.8	100			
North of West Bank	17.9	8.5	15.4	58.2	100			
Middle of West Bank	7.2	9.7	22.0	61.1	100			
South of west Bank	1.7	2.1	1.8	94.4	100			
Gaza Strip	3.9	4.7	29.7	61.7	100			

Source: PCBS: Household Environmental Survey 2011

The source of smell was mainly from treated water as 37.1% in Palestinian Territories reported, while 39.6% of the Gaza Strip reported waste water as the main source of smell.

Table 20 Percentage distribution of households exposed to smell in the Palestinian Territories by the most important source of smell and region, 2011

	Source of smell							
	Waste	Dumping	Agricultural	Traffic	Others	Total		
	water	site %	waste %	%	%			
	%							
Palestinian	37.1	30.0	26.0	3.0	3.9	100		
Territories								
West Bank	35.0	24.4	31.4	4.8	4.4	100		
North of West	32.0	20.9	37.7	6.8	2.6	100		
Bank								
Middle of West	41.1	32.3	16.8	5.5	4.3	100		
Bank								

	Source of smell							
	Waste	Dumping	Agricultural	Traffic	Others	Total		
	water	site %	waste %	%	%			
	%							
South of west	33.0	21.4	37.4	1.0	7.2	100		
Bank								
Gaza Strip	39.6	36.5	19.7	0.8	3.4	100		

Source: PCBS: Household Environmental Survey 2011

#### 6.3. Cost

April 2009 Domestic tariffs for network supply are on the whole reasonable – but overall, water is asignificant item in household expenditure. Generally, water supplied through the domesticnetwork costs consumers around NIS 4/m3, and people find this fair. However, given the verylow income levels, the PCBS 2003 survey found that average the expenditure on water from allsources was about 8% of household income – and much more for low income households. This level of water expenditure is double the standard of 3.5% of householdexpenditure recommended by Unicef/WHO.<sup>12</sup>

High costs and poor service contribute to low payment rates, which may lead to increased dependence on Israel. This high cost of water in relation to income is one reason whythe cost recovery rate for network supply averages 50% nationwide. The government ends upfooting the bill – and even then the cost is deducted at source by the Israelis. The case of Bethlehem illustrates how this failure to pay is undermining the utilities and creating distorted incentives to use Mekorot water, which increases dependence on Israel.

It is the poor unconnected consumers who pay the highest costs – up to nearly half of their household budget - and run the biggest health risks. The poorest and most vulnerablecommunities are those in Area C. They are vulnerable to both access controls and to the highcost and poor quality of water. The summer months of June-October are when these communities are most vulnerable. The PCBS 2003 survey was used to compare average water expenditureshare of income for each income group. The poor who are dependent on tankers maypay out almost half their income on water, five times more than the poor who are connected.Survey results regarding the percent of income spent by low income households on tanker water appearuncommonly high in 2003, and may be subject to confirmatory updates carried out by the Water, Sanitation and Health Monitoring Program (WaSH MP) 41: "Occupationcheckpoints and curfews severely limit tanker access to communities. (The survey showed) that here are 36 fixed checkpoints across the West Bank, including the gates of the Separation Barrier, that seriously affect access of water tankers and maintenance teams to communities....Given therisks faced by drivers for their physical safety coupled with the longer routes, the price of waterthrough tankers has increased exponentially ... "

WaSH MP has carried out research on the costs faced by communities before the M&Arestrictions, and after. The survey found in 85 communities that water prices had

<sup>&</sup>lt;sup>12</sup>West Bank and Gaza Assessment of restrictions on Palestinian Water Sector Development, sector note, World Bank April 2009

increased by aminimum of 60%, and a maximum of 300%. Water prices that before the Intifada were generallyin the range 5-10 NIS/m3 were now typically in the range 10-20 NIS/m3. In addition, communities had reduced their purchases of tanker water by at least 50%.

GDP using PCBS 2003 data, a preliminary study estimated that the additional cost at thenational level of the use of tanker water over network water could be as high as 176.5 million NISannually, equivalent to 0.93% of GDP.43water tankers.

### 7. Agriculture sector in Gaza

#### 7.1. Land Use, Communities Infrastructure and Services

Agricultural activities are one of the main sectors in the Gaza Strip. The total amount of land allocated for agricultural activities is 107.9 km<sup>2</sup>. The lands are distributed according to the type of crops (permanent or temporary) and the type of irrigation (irrigated or rain-fed). The majority of lands are permanently irrigated crops which cover about 75.6% of the total areas of lands, while rain-fed represented only 24.4%. That might reflect the necessity of having a permanent source of water.

Agricultural Land Use in Gaza Strip		Cultivation Type							
Region/ Governorate	Total Agricultural	Permanent Crops (Km <sup>2</sup> )				Temporary Crops (Km <sup>2</sup> )			
	land (Km <sup>2</sup> )	Irrig	ated	Rain-fed		Irrig	ated	Rain-fed	
		200	200	200	200	200	200	200	200
		7	8	7	8	7	8	7	8
North Gaza	14.5	5.1	5.1	0.2	0.2	7.8	7.2	2.1	2.0
Gaza	16.7	22.0	13.4	0.6	3.1	1.3	1.1	1.4	1.1
Deir El Balah	21.8	12.6	12.6	1.6	1.6	6.5	5.0	2.7	2.6
Khan Yunis	37.5	14.5	14.5	2.5	2.5	12.3	10.5	12.4	10.0
Rafah	17.4	5.2	5.2	1.6	1.6	8.9	8.5	2.4	2.1
Total Strip	107.9	59.4	50.8	6.5	9.0	36.8	32.3	21.0	17.8

### Table 21. Agricultural Land Use in Gaza Strip

Source: Palestine Annual Statistics Book (version 11), PCBS

The main crops produced in the Gaza Strip are vegetables (215,251 tons), followed by crops (72,516 tons) and fruit trees (53,931 tons). This is very important as treated reused water is not recommended to be used with vegetables.

#### Table 22. Production of field crops, fruit, trees and vegetables by region 2007/2008

Region/Governorate	Field crops	Fruit trees	Vegetables
North Gaza	18,619	5,496	29,662
Gaza	863	22,606	9,400

Region/Governorate	Field crops	Fruit trees	Vegetables
Deir El Balah	3,506	12,750	38,074
Khan Yunis	26,572	8,066	64,827
Rafah	22,956	5,013	73,288
Total Strip	72,516	53,931	215,251
Production in Ton			

Source: Palestine Annual Statistics Book (version 11), PCBS

#### 8. Archaeology

The known history of Gaza spans 4,000 years<sup>13</sup>. Gaza was ruled, destroyed and repopulated by various dynasties, empires, and people originally a Canaanite settlement, it came under the control of the ancient Egyptians for roughly 350 years before being conquered by the Philistines, who made it one of the principal cities of their pent polis in the 12th-century BCE. Gaza fell to the Israelite King David in about 1000 BCE and with the fall of the Kingdom of Israel in about 730 BCE, it became part of the Assyrian empire, and subsequently, that of the Persian Achaemenid Empire. Alexander the Great besieged the city for five months before finally capturing it in 332 BCE. Most of the inhabitants were killed during the assault, and the city, which became a center for Hellenistic learning and philosophy, was resettled by nearby Bedouin Arabs. The area changed hands regularly between two Greek successor-kingdoms, the Seleucids of Syria and the Ptolemies of Egypt. The city was besieged and taken by the Hasmoneans in 96 BCE.

After the Roman Empire began its influence in the area in 63 BCE, Gaza was rebuilt under the command of Pompey Magnus, and granted to Herod the Great thirty years later. Throughout the Roman period, Gaza maintained its prosperity, receiving grants from several different emperors. A 500-member senate governed the city, and a diverse array of Greeks, Romans, Jews, Egyptians, Persians and Nabateans populated the city. On the breakup of the Roman Empire, Gaza became part of the Eastern Byzantine Empire. Conversion to Christianity in the city was spearheaded and completed under Saint Porphyrius, who destroyed its eight pagan temples between 396 and 420 CE.

Gaza was the first city in Palestine to be conquered by the Arab Rashidun Caliphate in 635 CE. The arrival of the Muslim rulers brought drastic changes, as its churches were transformed into mosques, the population swiftly adopted Islam as their religion, and Arabic became the official language. Under the Arab Muslims, the city went through periods of prosperity and decline. The Crusaders wrested control of Gaza from the Fatimids in 1100, and ruled until 1187, when the city was conquered by Saladin and the Ayyubids. Gaza was in Mamluk hands by the late 13th-century, and became the capital of an administrative unit of Bilad ash-Sham that stretched from the Sinai Peninsula to Caesarea. By the time of its incorporation into the Ottoman Empire in the 16th-century, it was but a small village. The Ottomans charged the Ridwan family with governance over the city in the early 16th-century. From the early 19th-century, Gaza was culturally dominated by neighboring Egypt, with significant numbers of Egyptian Muslims moving in and Muhammad Ali of Egypt conquered it in 1832. His brief rule ended in 1840, after the Ottomans defeated his forces

<sup>13</sup>http://en.wikipedia.org/wiki/History\_of\_Gaza

outside the city. In 1917, the forces of the Triple Entente captured the city after a third battle against the Ottoman forces there.

The 20th-century began in Gaza with two destructive earthquakes in 1903 and 1914. The city also expanded in the first half of the 20th-century under the British Mandate for Palestine. According to the 1947 United Nations Partition Plan, Gaza was assigned to the Arab state. The population of the city and the Gaza Strip swelled as a result of the 1948 Arab-Israeli War. After the war, it was held and militarily administered by Egypt until the 1967 Six-Day War, when it was occupied by Israel. Gaza was a center of political resistance in the First Intifada, and under the Oslo Accords of 1993, it was assigned to be under the direct control of the newly-established Palestinian National Authority. In 2007, Hamas emerged as the victor in Palestinian factional fighting with Fatah in the city and in the wider Gaza Strip and has since been the sole governing authority there. Israel has blockaded the Strip ever since and launched an assault in 2008–2009, which it characterized as a response to Qassam rocket attacks. The bombardment and ground assault reportedly left over 1,300 people dead in the territory, and destroyed over 4,000 buildings.

### 8.1. Archaeological Conditions of Project Sites

During the Roman-Byzantine period BeitLahia was a well-populated village possessing several temples, greatly venerated by the inhabitants for their antiquity and furnishing. The location of this village is identified with the site of Tell ad-dahab (the gold-mound), which was located to the west of the present day BeitLahia and Tell al- Khirba (the ruins-mound) located in the eastern part of BeitLahia. Many archaeological remains, such as pottery and glass fragments as well as coins were discovered in the soil of the two sites. Field surveys in the area of the BLWWTP did not identify any archaeological sites so far. The nearest archaeological remains in the area is Tell al-Khirb, situated in the eastern part of BeitLahya, 500 m south of the WWTP. In the area, archaeological remains such as mosaic fragments and pottery shards can be found over the whole of the mound. They are dated to be from the Roman Byzantine period. BeitLahia has an ancient hill and nearby ruins of an abandoned village. A mihrab, or mosque alcove indicating the direction of salaah (prayer), is all that remains of an ancient mosque to the west of BeitLahia, dating to the end of the Fatamid period and beginning of the Ayyubid Dynasty of Saladin, and two other mosques dating to the Ottoman period.

## Willingness and Cost Analysis and Tariffs Surveys Results

### Willingness Survey and Cost Analysis and Tariffs Survey Results

#### 1. Willingness Survey Results

#### 1.1. Introduction

One of the crucial issues to be investigated in the SESIA study is the willingness of people to use the recovered water and sludge. If the market is not ready for such products, this might be a problem for the project sustainability. Previous studies have covered issues of affordability, but with limited focus on people's willingness to pay. However, the current study paid more attention to measuring the willingness of farmers to use sludge and recovered water, as well as people's perceptions regarding the use of agricultural products irrigated by recovered water or fertilized by sludge. The willingness to pay survey aims to highlight the following items:

- Acceptance to use recovered water in irrigation and reasons behind actions (target groups are the farmers)
- Acceptance to use the sludgeas fertilizer and justifications for the actions (target groups are the farmers)
- Acceptance to purchase products irrigated by recovered water and reasons for different actions. (target groups are the farmers, traders and consumers)
- Acceptance to purchase products fertilized by sludge and motives for that. (target groups are the farmers, traders and consumers)

The study team tried to have a representative sample that covered the most common types of markets existing in Gaza Strip. A preliminary screening for the types of markets revealed that there are three main types of markets in the Strip:

- **One day market:** this type of market is established for one day in the Refugee Camps. Consumers purchase their needs for the whole weekin one day. This type of market is movable. For example, on Thursday it is moved to El Berig. While on Saturday it is in El Noseirat. Its prices are relatively lower than what can be found in permanent markets.
- **Permanents market:** this is a fixed market in the center of a town where agricultural products are traded. Based on observation, it is attractive to the consumers of low socio-economic conditions. There is no variation in the prices there.
- **Super markets:** The highersocio-economic groups target the supermarkets, which have the highest prices and better qualities, generally.

This discussion attempts to measure the factors that influence purchasing of vegetables and fruits. The data reveals that the type of water used was not on the focus of consumers or traders, and was actually one of the factors of lowest importance. They paid more attention to the shape, which reflects the quality of products, and the price. For the supermarkets, the traders paid less attention to the price. However, in the permanent market they paid more

attention to the price. This should be put into consideration during the preparation of the advertising strategy, as people don't pay attention to water used.

Table 1. % sample distribution by the influence of price to buy agricultural produ	cts
by the type of market	

	One day market	Super marke t	Permane nt	Tota 1	One day marke t	Super marke t	Permane nt	Tota 1
High	45.00%	29.40	71.40%	47.10	55.50		37.80%	42.50
_		%		%	%			%
	55.00%	70.60	28.60%	52.90	44.50	96.00	60.20%	56.30
Intermediate		%		%	%	%		%
Low						4.00%	2.00%	1.10
								%

Table 2. % sample distribution by the influence of shape to buy agricultural products by the type of market

	One day market	Super marke t	Permane nt	Tota 1	One day marke t	Super marke t	Permane nt	Tota 1
High	55.00%	70.60	28.60%	52.90	44.50	100.00	59.70%	56.80
_		%		%	%	%		%
	45.00%	29.40	71.40%	47.10	55.50		39.80%	43.10
Intermediate		%		%	%			%
Low							0.50%	0.10
								%

#### 1.2. Willingness to Re-use Scheme

The acceptance of farmers to use recovered waterwas relatively high, as 50% of the farmers sampled expressed their acceptance of it, with an additional 32.4% who accepted under certain conditions. Those who accepted to use sludge represented about 64.0% of the farmer sample surveyed, with an additional 12.1% who would accept the sludge under conditions.



### Figure 1: % Distribution of farmers perception to use sludge and recovered water

The acceptance of farmers to eat agricultural products irrigated by recovered water and fertilized by sludge was investigated. The percentage of farmers who would eat products which used recovered water or sludge was slightly lower than the percentage who would use the recovered water, indicating some slight aversion to consuming the end products.



## Figure 2 % Distribution of farmers perception to eat products sludge and recovered water

Regardless of the small sample size of farmers (34 individuals), due to the high rejection to be interviewed, the diversity of their perception reflected the motives behind such perceptions. The first reason mentioned was that the quality of crops is better than using recoveredwater. This is an important result since the farmers are capable of differentiating between the two choices. The second reason was that the trees and soils might absorb any parcels, indicating that no potential pollution is expected. The successful pilot project implemented by Israel encouraged thefarmers to use recovered water. Contributing to solving the water problem was also one of the reasons reported.

Heath hazards were the main motive to reject using the recovered water, followed by psychological barriers. "I can't imagine using sewage water to irrigate my plants" reported one of the farmers in EzbetAbdRabouh. There was a lack of trust in the institute that will operate the project and manage it. Another reason reported during the FGD conducted in Um El Nasr village was that there is no need to use recovered water when fresh water is available. One of the participants reportedthat he rejected using the recovered water according to religious beliefs. This positionwas verified later on with the Fatwa Department in the Islamic University.

It was also noted that the owners of wells were more reluctant to use recovered water as they have fresh sources of water. However, those who do not have a source of water are more acceptingofthe recovered water. Moreover, some of them reported that they might use the partially recoveredwater in order to reduce the cost of irrigation water. "We have to use recoveredwater, we can't rely upon the municipality water or well water because it might cost a lot, those who relied upon fresh water lost their money" reported one of the farmers in Um El Nasr Village.

Another reason reported by one of the farmers in the FGD: "Anything that might cause harm to people is banned according to religion (Islamic Religion) As well, I can't trust the farmers, and they might use recovered water to irrigate vegetables which is completely banned and not acceptable according to the restrictions... No one can guarantee a full monitoring on the farmers."

All worries related to the usage of recovered water should be highlighted in order to communicate them to the advertising team for future preparation of the awareness campaigns. Acceptance under conditions was limited to following the maximum safety procedures to ensure that the water is suitable to be used for agricultural products and doesn't ave diseases. The FGDs noted the importance of following the maximum monitoring procedures.

Reasons for accepting to eat agricultural products	Farmer sample <i>irrigated by reco</i>	% Farmer sample wered water
The quality of crops is better than using	6	50
recoveredwater		
Trees and soil absorb any parcels	3	25
It was tried before in Israel	2	16.7
To solve water problems	1	8.3
Total	12	100
Reasons for not accepting to eat agricultural produ	icts irrigated by i	recovered water
It has health hazards	4	50

 Table 3: Distribution of farmer sample by reasons for perception of eating agricultural products irrigated by recoveredwater

North Gaza Emergency Sewage Treatment Project (NGESTP) Effluent Recovery and Reuse System and Remediation works

	Farmer	% Farmer
	sample	sample
Physiologicalbarrier	1	12.5
I can't guarantee full treatment	1	12.5
Israeli use it for limited crops	1	12.5
Total	8	100
Reasons for accepting to eat agricultural products	irrigated by reco	vered water
under condition		
Safety should be guarantee	6	50
Water problem to be solved	2	16.7
Can be used for agricultural products	2	16.7
Not causing disease	1	8.3
Cost less	1	8.3
Total	12	100

Sludge use was more acceptable to the respondents, as it is better than using chemicals and has more nutrients for the soil. No potential hazards for both people and animals were one of the reasons for accepting using sludge.

Regarding those who were not willing to eat products fertilized by sludge, the main reason was psychological barriers. The second reason was being unhealthy and hazardous to people due to the heavy metals that might cause diseases. An additional reason was that it might change the taste of fruit.

For those who accept use the sludge withconditions, the reasons given were that it would not have any potential hazards and reduceconsumption of chemicals, in addition to protecting from diseases. The FGD respondents were much in favor ofsludge due to reducedusage of chemicals, as well as the reduction of importing chemical fertilizers from Israel. Based on in-depth interviews conducted with different stakeholders, the economic benefit of using the sludge is relatively high, as the new sector will develop job opportunities and reduce the importing of other fertilizers.

## Table 4: Distribution of farmer sample by reasons for perception of eatingagricultural products fertilized bysludge

	Farmer sample	% Farmer sample					
Reasons for accepting to eat agricultural products	fertilized by slud	lge					
Dissolved in the soil	3	21.4					
Better than using chemicals	4	28.6					
More nutrients to the soil	2	14.3					
Has no hazards	4	28.6					
Useful for the plant	1	7.1					
Total	14	100					
Reasons for not accepting to eat agricultural productsfertilized by sludge							
Unhealthy and hazardous	1	16.7					

Annex 9

North Gaza Emergency Sewage Treatment Project (NGESTP) Effluent Recovery and Reuse System and Remediation works

% Farmer Farmer sample sample Cause disease 1 16.7 3 **Psychologicalbarrier** 50 Change the taste of fruit 1 16.7 Total 100 6 Reasons for accepting to eat agricultural products fertilized by sludge under *condition* Has no hazards 5 45.5 Reduce the consumption of chemicals 5 45.5 Protect from diseases 1 9.1 Total 11 100

### 1.3. Willingness to Purchase Products

The second level of the market analysis concernsthe traders and consumers. They were investigated in the markets as mentioned above. Their willingness to purchase the agricultural products irrigated by recovered water or fertilized by sludge was investigated. The farmers in (small hamlet) EzbetAbdRabouh reported that the consumers can't differentiate between the crops irrigated by recoveredor fresh water, and they are not capable of knowing what crops were naturally grown orfertilized by hormones and chemicals. They noted that they, as farmers, know how to differentiate between such crops. Knowing this information might offer support in dealing with such types of crops.

64.7% of the traders of supermarketsrefused to trade in products irrigated by recovered water versus52.9% of them refused trading in crops fertilized by sludge. The highest acceptance rate reported was in the permanent markets, with acceptances of 78.6% for water and sludge. In the one day market, recovered water irrigated and sludge fertilized crops weremostly accepted under conditions(40.0%). Those who accepted using the recovered water products under condition represented 55.0% of the purchasers in the one day market.

Page 62

Annex 9



## Figure 3: % Distribution of the traders willingness to trade in products irrigated by recoveredwater or fertilized by sludge according to market type

The reasons for accepting to use the products irrigated by recovered water was mainly that customers never pay attention to ask about the source of water used to irrigate the crops and they never ask about the fertilizers used. In the supermarkets, the traders were confident sincethese techniques have already been tested before. In comparison between water used now and recovered water the traders in the permanent markets were confident that the recovered water is better.

Investigating reasons of the reluctant traders who are not much in favor of using such type of water and sludge, the results were as follows: In the supermarkets, they were much in favor of their own shops repetition. While 80% of the traders in the one day market were worried abouthealth, a high percentage of health worries was also reported in the permanent market.

Safety of people is the main worry of the traders. Therefore, accepting under condition was mainly linked with the assurance of health and safety measures. Traders in the one day marketalso reported that these products would be more profitable. The farmers in EzbetAbdRabouh reported that the customers pay attention to the price, whereas, the traders and farmers pay more attention to their profit "The crops fertilized by hormones and watered by untreated water is more profitable to the farmers. They pay no attention to the health of people, regardless of the strict monitoring... but the farmers try to gain more and more money...When we go to the market we can identify the unhealthy crops ...but other people will not pay attention for that they might care only for the shape and the price of the crops"

Table 5: % Distribution of the traders sample by reasons for perception of dealing in crops irrigated by recoveredwaterby the market type

		pe	Total	
	One day market	Super market	Permanent	
Reasons for acceptance dealing in	n crops irrigat	ted by recove	eredwater	
Ithas alreadybeen tried before		57.10%	9.10%	22.70%
Better water quality		14.30%	54.50%	31.80%
Customers don't care	75.00%	14.30%	27.30%	31.80%
Shopkeeper does not care	25.00%	14.30%	9.10%	13.60%
Reasons for rejecting dealing in c	rops irrigated	l by recovere	dwater	
Caring forshop repetition	20.00%	55.60%	33.30%	41.20%
Health worries	80.00%	44.40%	66.70%	58.80%
Reasons foraccepting(under cond	lition) dealing	<mark>y in Crops iri</mark>	rigated by recover	ered water
Under condition that safety is	63.60%	100.00%		66.70%
guarantee				
In case of customers accept it	27.30%			25.00%
If it were more profitable	9.10%			8.30%

Sludge means for the majority of sample surveyed a non-chemical substance which is better than chemical fertilizers that arerelatively more hazardous and dangerous for health. The traders noted that the consumers don't pay attention to the fertilizers used as long as the product looks in a good shape. Traders alsocare less about fertilizers. They only pay attention to the consumers' willingness.

Caring for health was the first reason among different markets that might make them unwelcoming to the crops fertilized by sludge, followed by caring for shop reputation, especially in the supermarkets. Another reason for not accepting the crops is customers' willingness to purchase such crops.

		Total		
	One day market	Super market	Permanent	
Reasons for acceptance dealing	in cropsferti	lized by slud	lge	
Better than fertilizers and		60.00%	54.50%	40.90%
chemicals				

33.30%

66.70%

16.70%

Reasons for not accepting dealing in Cropsfertilized by sludge

20.00%

20.00%

45.50%

36.40%

9.10%

33.30%

Customers don't care

Sales person does not care

Caring forshop repetition

## Table 6: % Distribution of the traders sample by reasons for perception of dealing in cropsfertilized by sludge

31.80%

27.30%

35.00%

Annex 9

North Gaza Emergency Sewage Treatment Project (NGESTP)	
Effluent Recovery and Reuse System and Remediation works	Annex 9

	-	Market Typ	e	Total
	One day market	Super market	Permanent	
Health worries	50.00%	54.50%	66.70%	55.00%
Customers willingness	33.30%			10.00%

The most important pillar in merchandizing any product is the willingness of the final consumers to purchase the product. Investigating consumers' willingness in three markets it was notable that a high acceptance rate to purchase products irrigated by recovered wateris reported in the one day market (82.0%) followed by permanent market (63.3%). While the lowest willingness reported was in the super market (43.0%). The acceptance to purchase crops fertilized by sludge was the highest in the one day market(83.5%) followed by the permanent and the supermarket. This result reflected that both traders and consumers adopted the same purchasing attitudes.



Figure 4.:% Distribution of the consumerswillingness to purchaseproducts irrigated by recoveredwater or fertilized by sludge according to market type

The motives reported regarding such attitudes wereinvestigated to get amore detailed profile regarding the willingness of people to purchase such agricultural products. High acceptance rateswerereported in the one day market (72.6%) as they don't care about type of water used. Meanwhile, almost 35.0% of the supermarket consumers reported acceptance under conditionsofapplying the maximum health and safety measures. A quarter of the sample surveyed in the permanent market reported they don't mind purchasing the products under conditions of applying safety measures. Solving the problem of water scarcity was the reason for about30.0% of the supermarket sample.

The small portion of sample whorejectedpurchasing crops irrigated by recovered water wasmainly due to health concerns, followed by psychological barriers

The farmers investigated in the FGD reported the same reasons, adding to them that there was no necessity to use recovered water as long as they have their own wells that produce fresh water.

Looking at consumers according to gender, 66.8% of the females reported that they don't care about water used, while only 55.4% of the male sample reported the same reason. While almost a quarter of the male sample reported paying attention to applying the maximum safety procedures versus only 8.9% of the female sample.

Among the small quintile of the sample who reported that they are unwilling to purchase crops irrigated by recovered water, 60.9% of the males reasoned that it will cause disease, while only a third of them reported that they have psychological reasons for not accepting. The females who refused due to psychological reasons represent half of those who declared their rejection.

			ре	Total	
		One day	Super		
		market	market	Permanent	
Acceptance crops irrigated by reco	vered	<i>water</i>			
Don't care	Ν	238	4	44	286
	%	72.6%	9.3%	35.2%	
I trust the people in charge	Ν	6	3	9	18
	%	1.8%	7.0%	7.2%	
I trust the technique	Ν	10	8	8	26
	%	3.0%	18.6%	6.4%	
Safe	Ν	22	7	10	39
	%	6.7%	16.3%	8.0%	
Under condition of applying the	Ν	52	15	32	99
maximum health and safety	%	15.9%	34.9%	25.6%	
precautions					
In order to solve water problem	Ν	4	13	23	40
	%	1.2%	30.2%	18.4%	
Rejection crops irrigated by recover	ered wa	ater			
Definitely it will cause disease	Ν	44	30	43	117
	%	61.1%	52.6%	62.3%	
I don't trust the people in charge	Ν	6	1	4	11
	%	8.3%	1.8%	5.8%	
Psychological reasons	Ν	24	26	24	74
	%	33.3%	45.6%	34.8%	

## Table 7: Distribution of the consumer sample by reasons for perception ofdealing in cropsirrigated by recovered waterby market type

#### Multiple responses

The reasons that lead to the acceptance of purchasing crops fertilized by sludge were mainly because it is better than chemical substances. However, the majority of the consumers in the one day market reported their acceptance due to not paying any attention to such issues. Being a healthier alternative to other fertilizers was one of the main reasons reported in the supermarkets.Females paid no attention to the type of fertilizers used. While males were much in favour of the sludge as it is better and healthier than the other types of fertilizers.

The rejection of using sludge was mainly due to related diseases. That was the prevailing reason reported in the three markets. The second factor reported was psychological reasons. That was the main reason reported in the one day market (51.5%), followed by the supermarket (43.3%). When divided by gender, 55.9% of males who rejected the crops did sodue to causing diseases, followed by 40.1% due to psychological problems. The limited female sample who reported their rejection was mainly due to psychological reasons 65.5%, while 34.5% reported rejection due to causing disease.

			:	Total	
		One day market	Super market	Permanent	
Acceptance crops fertilized b	y slue	dge			
Better than chemicals	Ν	46	17	30	93
	%	13.8%	51.5%	24.6%	
Don't care	Ν	210	3	42	255
	%	62.9%	9.1%	34.4%	
I trust the people in charge	Ν	4	1	7	12
	%	1.2%	3.0%	5.7%	
I trust the technique	Ν	4	2	3	9
	%	1.2%	6.1%	2.5%	
Safe	Ν	14	7	18	39
	%	4.2%	21.2%	14.8%	
Healthier	Ν	56	11	23	90
	%	16.8%	33.3%	18.9%	
Rejection of crops fertilized l	by slu	dge			
Cause disease	Ν	32	37	40	109
	%	48.5%	55.2%	54.8%	
Don't care	Ν	0	0	1	1
	%	.0%	.0%	1.4%	
I don't trust the people in	Ν	2	1	2	5
charge	%	3.0%	1.5%	2.7%	
Psychological reasons	Ν	34	29	27	90

Table 8.: Distribution of the consumer sample by reasons for accepting dealing in cropsfertilized by sludgeby market type

			Total		
		One day market	Super market	Permanent	
	%	51.5%	43.3%	ó 37.0%	
For health reasons	Ν	0		0 3	3
	%	.0%	.0%	6 4.1%	

Multiple responses

The conclusions of the above discussion are that:

- 1- High acceptance for using recovered water and sludge among different farmers. While those who own private wells are not much in favor of using such water.
- 2- Sludge is widely accepted due to no health problems and being more fertile for the plants
- 3- Consumers pay no attention to water used or type of fertilizers as the end result is a product of a good quality with appropriate pricing
- 4- The supermarkets are more reluctant to use such products as the typical consumer is of a higher socio-economic status and pays more attention to healthy products. As well, the supermarkets pay more attention to their own reputation.
- 5- The advertising plan should focus on the one day market and the permanent market as they attract more consumers, and recognize that the customers generally don't pay attention to the type of fertilizers or water used.

### 1.4. Willingness to Terminate Private Wells

The willingness to terminate the private wells was investigated as part of the willingness and perception section. About 59.0% of the sample would acceptterminating their wells under conditions of having appropriate compensation for the cost of the well digging in addition to the provision of recovered water free of charge. Any additional support needed from themunicipality should be applied in order to put limitations on the un-favorable impacts resulting from the termination of wells.



### Figure 5: % distribution of farmers by their willingness to terminate their wells

Acceptances of having restrictions to use their private wells were highlighted due to the procedures that might ban certain activities that need the well water. The motives varied according to certain worries the people raised. A health worry was the motive for those who accept or reject the restrictions, sincehealth problems could result from the injection of recovered water. Then the well will not be suitable to be used. However, the recovered water might be better than well water.

Regarding those who rejected having any restrictions, they were mainly the farmers who were worried due to health problems or pollution that might result. Some also expressed the desire to do whatever they want to their wells out of their own freedom. Planting vegetables that need fresh water createdworried because of having water that might not be suitable for their type of crops. The project might not be continuous, and this might affect the wells in case of having any restrictions of use.

The third group wasneutral, reporting that the wells are not their property as they might have partners (the well might cost \$80,000).

Perception of having restriction on well	Responses		% Farmer sample of Cases
	Ν	% Farmer sample	
Acceptance			
To avoid any harm to health of human	3	12.50%	12.50%
If water quality is bad	1	4.20%	4.20%
If the recoveredwater is good	2	8.30%	8.30%
Rejection			
The injection might cause pollution	2	8.30%	8.30%
Might cause economical problems	3	12.50%	12.50%
The well is mine no one can do anything	3	12.50%	12.50%
for me			
I plant certain crops that need the well	1	4.20%	4.20%
I am free to plant whatever I want	2	8.30%	8.30%
I can't trust the quality of water	1	4.20%	4.20%
The project might not be continuous	1	4.20%	4.20%
Neutral			
The well is partially owned	1	4.20%	4.20%
I am helpless I should obey the laws	2	8.30%	8.30%
It is not applied on me as I don't plant	2	8.30%	8.30%
vegetables			
Total	24	100.00%	100.00%

#### Table 9: Perceptions of well restrictions

### 2. Cost Analysis and Tariff

#### 2.1. Introduction

The cost analysis of the sludge and water recovery was not a simple process for the study team, as calculating the costs should be based on detailed studies that are more suited tousing a feasibility study technique. However, the team tried to develop a simple strategy to measure the cost of water and sludge that should be based on a multi-phase strategy.

Water tariffs are set based on a number of formal criteria defined by law, as well as informal criteria. Formal criteria typically include:

- Financial criteria (cost recovery),
- Economic criteria (efficiency pricing based on marginal cost) and sometimes
- Environmental criteria (incentives for water conservation).

Social and political considerations often are also important in setting tariffs. Tariff structure and levels are influenced in some cases by the desire to avoid an overly high burden for poor users. Political considerations in water pricing often lead to a delay in the approval of tariff increases in the run-up to elections. Another criterion for tariff setting is that water tariffs should be easy to understand for consumers. This is not always the case for the more complex types of tariffs, such as increasing-block tariffs and tariffs that differentiate between different categories of users.<sup>14</sup>

#### 2.2. Tariff Structures

There are numerous different tariff structures. Their prevalence differs between countries, as shown by international tariff surveys.

Water and wastewater tariffs include at least one of the following components:

- a volumetric tariff, where <u>water metering</u> is applied, and
- a flat rate, where no <u>water metering</u> is applied.

Many utilities apply two-part tariffs where a volumetric tariff is combined with a fixed charge. The latter may include a minimum consumption or not. The level of the fixed charge often depends on the diameter of the connection.

Volumetric tariffs can

• be proportional to consumption (linear tariffs),

<sup>14</sup> http://en.wikipedia.org/wiki/Water\_tariff

- increase with consumption (increasing-block tariffs, IBT), or
- decrease with consumption (decreasing-block tariffs, DBT).

The tariff for a first block on an IBT is usually set at a very low tariff with the objective to protect poor households that are assumed to consume less water than non-poor households. The size of the first block can vary from 5 cubic meters to 50 cubic meters per household and month.

Average monthly water consumption varies depending on household size and consumption habits between about 4 cubic meters for a single-person household in temperate climate with no outdoor water use and about 50 cubic meters for a four-person household in warm climate (e.g. in the Southern United States) including outdoor water use.

Wastewater tariffs typically follow the same structure as water tariffs. They are typically measured based on the volume of water supplied, sometimes after subtracting an allowance made for estimated or actual outdoor use. In the case of industries, wastewater tariffs are sometimes differentiated based on the pollutant load of the wastewater. In some cases wastewater tariffs are a fixed percentage of water tariffs, but usually they are set separately. In addition to regular bills, many utilities levy a one-time connection fee both for water and for sewer connections.

### 2.3. Tariff Adjustment Processes

The process of adjusting water tariffs differs greatly from one location to another. In many large countries (China, France, Germany, India, Mexico, South Africa and the United States) the process of price adjustment takes place at the municipal level. Rules for price adjustments vary greatly. In the case of public service provision, tariffs are typically adjusted through a decision by the municipal council after a request by the municipal utility. Some countries, such as Germany, stipulate by law that all the financial costs of service provision must be recovered through tariff revenues. Other countries define cost recovery as a longterm objective, such as in Mexico. In the case of private service providers tariff adjustment rules are often laid out in concession or lease contracts, often providing for indexation to inflation.

In some developing countries, water tariffs are set at the national level. Tariff increases are often considered a politically sensitive issue and have to be decided by the Cabinet of Ministers or a National Pricing Commission. This is the case in many countries of the Middle East and North Africa (Egypt, Jordan, Lebanon, Morocco, Syria, Tunisia), as well as in many countries in Sub-Saharan Africa. In many countries, there are no objective criteria for tariff adjustments. Adjustments tend to be infrequent and often lag behind inflation so that cost recovery remains elusive.

Some countries have created regulatory agencies at the national level that review requests for tariff adjustments submitted by service providers. The earliest and best-known example is the regulatory agency OFWAT, which was established for England and Wales in 1989. Some developing countries followed suit. They include Chile (1990), Colombia (1994), Honduras (2004), Kenya, Mozambique (1998), Peru (1994), Portugal (1997), and Zambia (2000). The
review process is typically based on transparent and objective criteria set by law, in an attempt to move decision-making at least partly out of the realm of politics. The track record of these agencies has been diverse, usually mirroring the political and administrative traditions of each country.

#### 3. Changes in Water Use in Response to Tariff Increases

The responsiveness of demand to a change in price is measured by the price elasticity of demand, which is defined as the percentage change in demand divided by the percentage change in price. The price elasticity of drinking water demand by urban households is typically low. In European countries it ranges between -0.1 and -0.25, i.e. the demand for water decreases by 0.1% to 0.25% for every 1% increase in tariffs. In Australia and the United States price elasticity is somewhat higher in the range of -0.1 and -0.4.<sup>15</sup>

#### 3.1. Social Protection Measures

Social protection measures to ensure that piped water remains affordable can be broadly classified into income support measures and tariff-related measures. Income support measures address the individual customer's ability to pay from the income side (through income assistance, water services vouchers, tariff rebates and discounts, bill re-phasing and easier payment plans, arrears forgiveness). An example of income assistance to poor users is the subsidy system applied in Chile. Tariff-related measures keep the size of water bills low for certain groups (e.g. refinement of increasing-block tariffs, tariff choice, tariff capping). Examples of increasing block tariffs with a price of zero in the first block are found in Flanders and South Africa. Another measure is the cross-subsidization using different tariffs for different neighborhoods, as practiced in Colombia. A similar approach has been used at the national level in Portugal. The Portuguese economic water regulator carried out an affordability study that found out that 10.5% of the population paid more than 3% of their income for water and wastewater services. As a result, the regulator showed flexibility concerning tariff increases and tariff solutions in municipalities where affordability was a particular issue.

### 3.2. Affordability and Social Protection Measures

Based on the ESIA report2006 it was reported that the affordability to pay for water and wastewater charges is difficult to judge, particularly in the absence of accurate data on per capita income by socio-economic category in various regions or settlements. It is well established that the design of any water tariff should take into account the basic human needs for water supply affordable to the poorest population segment.

Affordability to pay for water charges is normally based on the household ability to pay for the price of water consumed and the sewage disposal services. Willingness to pay for these services also stems from the customers' satisfaction of the level of services provided.

<sup>&</sup>lt;sup>15</sup>http://en.wikipedia.org/wiki/Water\_tariff

A certain minimum quantity of water is needed to meet the one-day human basicneeds for personal hygiene and basic amenities. This has been estimated to range from aslow as 25 1/h/d; at the most arid region, to as high as 75 1/h/d for piped water supply inregions where potable water supply is considered relatively sufficient.

One of the key elements of the previous tariff studies was to define the povertyline, as this is considered to be relevant in established the first block of the tariff. BeforeIntefada, basic statistics indicated that an average monthly income for the low-incomefamily was US\$273 in the project area. This number has certainly decreased by more than35% in the project area. Agricultural sector which is the main source of income in thenorthern area has been considerably damaged in the last four years due to the political studies. Hence the average monthly income for the low-income family is less thanUS\$180.

It is generally accepted that, to be affordable, water and wastewater charges shouldnot exceed 4% of income. The expected average income within the project area isUS\$270/month and therefore it is considered that the average family can afford to pay up to US\$10.1/month for water related services. Assuming an average family size of 7 and consumption of 100 1/h/d, the water and wastewater charge can be up to approximately US\$0.48 for each m3 of water supplied.

Based on the feasibility study conducted for the NGWWTP project, the requiredtariff for wastewater services would be 0.38 \$/m3 for coverage of O&M cost only, whilefull cost recovery would require 0.55 \$/m3. Additional 0.66 \$/m3 to 0.89 \$/m3 should be added to include water services for full recovery based on LEKA and CAMP studies.During the emergency phase the required O&M cost would be 0.24 \$/m3.

The discussion of water and wastewater tariffs might be summarized on the following scheme:

- The community should be analyzed objecting to have a clear description for the communities, consumption rate, income, expenditure and to analyze the cost of irrigation and fertilization
- A poverty mapping should be developed for the community in order to know the area most in need of subsidized water
- Develop an inventory for the people who will lose their wells due to the project in order to establish another tariff for them (as part of the mitigation measures).
- Developsupportive laws which might be added as articles dealing with the sludge and treated water tariff
- The institutional framework should be developed to identify who will be responsible for recovered water and sludge.
- Support from other institutions should be integrated in the tariff process
- Multiple phases of proportional volumetric tariffs should be modified in sequence with the fresh water tariff (the size of lands, consumption rate, poverty level should be covered). In additionthe governorate and municipality should adopt a tariff that will not affect their communities

•



Figure 6: Recovered water and sludge tariff scheme

As a preliminary analysis for the cost, 34 farmers were interviewed in addition to having four FGDs and two opinion pool workshops regarding the prices of recovered water and sludge. The discussion revolved around the following topics:

- Cost of cubic meter of water
- Cost of irrigating one dunum of land annually
- The least expected price of recovered water to irrigate a dunum of land
- The most expected price of recoveredwater to irrigate a dunum of land
- Cost of fertilizing a dunum of land annually
- The least expected price of sludge to fertilize a dunum of land annually
- The most expected price of sludge to fertilize a dunum of land annually

The sample of farmers who don't own wells reported that the municipality water is relatively high priced. The farmers who relied upon that water were not able to makea good profit. The data collected revealed that about one third of the farmers pay 0.7 shekel for acubic meter of water. Almost the same sample size reported paying between 0.5-0.6 shekel. The average cost reported was about 0.682 shekel while the mode value was 0.7 shekel.

Page 74



Figure 7: % Distribution of farmer sample by cost of cubic meter of water they pay

The cost of irrigation for one dunum of lands annually ranged between 105 shekel to 3500 shekel. That is mainly due the type of water used and the ownership of the source of water. The average cost reported was 583.82 shekel with a mode value of 400 shekel.



Figure 8: % distribution of the farmers sample by the cost of irrigating one dunum of land annually

The analysis for the least and the most expected price for the recovered water perdunum of land was highlighted and compared in order to reach the appropriate price that might be applied. About 30% of the farmers reported that they should pay nothing due to the fact that sewage water should be costless. However, those who reported the lowest prices varied between 5 shekel to 1500 shekel annually. While those who reported the highest value ranged between 10 shekel to 2000 shekel. The intersection point was the value of 100-200 shekel annually. This is the most accepted value for the farmers to pay. However, it is worth

mentioning that 20.6% of the farmers are completely unwilling to pay a penny. The average least value reported was 180.52 shekel/annual. The average of the highest expected price was 208 shekel/ annually.



Figure 9: Comparison between the least and the most proposed recovered water price (farmer sample)

The reported cost of fertilizers per year varied between 100 to700 shekel, with an average of 403 shekel and a mode value of 400. The farmers reported paying the cost for fertilizers imported from Israel. That might add burden to the economy of the country. For this reason, they were much in favor of using the sludge.

The discussion of the lowestand the highestproposed prices for the sludge ended in the following results: 11.8% of the sample reported that they should pay nothing, while those who accepted to payreported that they are willing to pay a maximum between 50 to 600 shekel with a mode value of 100 shekel. Regarding the lowestprice accepted, they reported the priceshould be30-300 shekel annually; the average amount reported was 56.55 shekel. The interconnection value reported was about 100 shekel annually.





# Figure 10 Comparison between the least and the most price for sludge (farmer sample)

The above discussion ended to the following results:

- The community is willing to use both recovered water and the sludge due to many rational reasons. The main reluctance reported was due tohealth problems
- The farmers were willing to use recovered water atan appropriate price. While the affected owners of wells reported that water should be provided to them free of charge as part of the compensation
- The multi-phases of sludge pricing and water tariff is the best mechanism to merchandize recovered water and sludge
- The appropriate pricing for the cubic water meter varies between 0.5-0.7 shekel. While the acceptable cost for sludge is 100 shekelannually.However, there should be additional studies (such as a Market Analysis Study) to develop the appropriate techniques to trade in sludge and reused water

### 4. Public Awareness

#### 4.1. Introduction

The public awareness is one of the main core issues to be highlighted under this project due to its nature that focus on awareness raising activities and marketing attitudes change. Therefore, the study team tried to set the objectives of the public awareness which might be summarized as follow:

1- Raise people awareness regarding the appropriate methods to combat flies that might result due the infiltration ponds;

- 2- Raise people awareness regarding the benefits of using sludge and recovered water, as well as, Do orientation sessions about the hazardous related to the use of the recovered water and sludge;
- 3- Raise community people awareness in the areas adjacent the project (NGWWTP) regarding the potential land use and expropriation;
- 4- Information sessions should be provided to the well owners who will be terminated or use restricted;
- 5- Provision of awareness raising campaigns regarding types of crops to be planted using the recovered water;

Awareness activities should be applied in cooperation with the Ministry of Health, Ministry of Agriculture, Land use Authority, Representative from Media people (Gazettes and TVs)



Figure 11. Awareness raising scheme

#### 4.2. Sludge and recovered water awareness raising activities

Different consumers may have different beliefs about the same thing, and this belief will affect consumer attitudes. Some consumers may think that the brand-name quality of the product is much higher than the average product can provide a lot of additional benefits; some consumers insist that as the product matures, the production of different enterprises is not much difference in quality products, brand names provide the additional benefits are not as people imagine. Obviously, these different beliefs will lead to different attitudes to the brand-name products.<sup>16</sup>

It was generally agreed that the attitude is learned through experience. This means that the attitude and buying behavior is formed as a result of a direct experience of this direct experience, including product, oral information from others by the mass media the influence of advertising, the Internet and a variety of direct marketing situation. us is worth noting that, although the attitude may be the result of behavior, but it is not synonymous with behavior, it reflects an attitude object like or do not like the evaluation as the tendency of acquisition through learning or experience, the attitude of the nature of a motive, which is that they can drive consumers to the formation of a special kind of behavior, and also allows consumers to boycott a certain kind of behavior.

The data collected revealed that the community is in terribly needed for awareness raising strategy regarding all aspects related to the project. One of the main issues to be covered is the benefit of sludge and recovered water. The main channel of awareness raisingrecommended to be applied with traders was through media 45.10% of the total sample reported TV and Radio. The second main channel reported is through conferences and workshop. The third main strategy reported is through using brochures. The type of market reflected on the results

Strategies to encourage traders to purchase crops		Total		
irrigated by recovered water	Daily market	Super market	Permanent	
Conferences and workshops	10.00%	23.50%	28.60%	19.60%
Media	70.00%	23.50%	35.70%	45.10%
Brochures	5.00%	23.50%	28.60%	17.60%
Awareness campaigns		5.90%	7.10%	3.90%
Marketing plans		5.90%		2.00%
No suggestions		17.60%		5.90%

## Table 10 % distribution of traders sample by Strategies to encourage traders to purchase crops irrigated by treated water by market type

16 http://www.wikipedia123.com/Wikipedia-736144-Consumer-attitudes.html

Strategies to encourage traders to purchase crops		Total		
irrigated by recovered water	Daily market	Super market	Permanent	
Meeting with professionals and experts	15.00%			5.90%
	100.00%	100.00%	100.00%	100.00%

The traders sample reported that the main strategy to be applied on consumers was mainly through Media followed by awareness campaigns and brochures

## Table 11. % distribution of traders sample by Strategies to encourage people to purchase crops irrigated by treated water by market type

		Market Type		
Strategies to encourage				
consumers	Daily	Super	Permanent	
	market	market		
Scientific programs N	0	2	0	2
%	0.00%	11.80%	0.00%	
Media N	15	9	9	33
%	75.00%	52.90%	64.30%	
<b>Brochures</b> N	7	1	1	9
%	35.00%	5.90%	7.10%	
Awareness campaigns N	5	5	5	15
%	25.00%	29.40%	35.70%	
No suggestions N	1	3	1	5
%	5.00%	17.60%	7.10%	
Meeting with N	2	0	0	2
professionals and experts				
0/0	10.00%	0.00%	0.00%	
TotalN	20	17	14	51

Multiple responses

The consumer sample reported that Media is the main channel followed by the internet and one to one meetings. A scientific program was reported as source of information. This will be the appropriate program to provide the awareness rising through.

Annex 9

Awareness strategy for people		Market Type			Total
		Daily market	Super market	Permanent	
Media	Ν	375	66	149	590
	%	93.80%	66.00%	76.40%	
Internet	Ν	111	3	41	155
	%	27.80%	3.00%	21.00%	
One to one meetings	Ν	129	0	6	135
	%	32.20%	0.00%	3.10%	
Scientific programs	Ν	40	20	29	89
	%	10.00%	20.00%	14.90%	
Workshops	Ν	33	0	7	40
	%	8.20%	0.00%	3.60%	
Mosques	Ν	16	2	7	25
	%	4.00%	2.00%	3.60%	
No suggestions	Ν	24	5	20	49
	%	6.00%	5.00%	10.30%	
Brochures	Ν	8	2	9	19
	%	2.00%	2.00%	4.60%	
Raising awareness	N	2	17	17	36
campaigns					
	%	0.50%	17.00%	8.70%	
Total	N	400	100	195	695

Multiple responses